



Tekla Structures 2025

Share models and files

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1 Working collaboratively within a Tekla Structures model

To work collaboratively within a Tekla Structures model, you can select out of the different methods:

Tekla Model Sharing (page 10)	With Tekla Model Sharing, a global team can work efficiently within one model regardless of the team location and time zones. Each user has a local version of the model on their computer. The model data is shared and synchronized over internet, and stored to a cloud-based Tekla Model Sharing service. It is possible to work also offline. Internet connection is needed only when you want to share your model changes.
Trimble Connect (page 107)	Trimble Connect is a collaboration tool that connects the constructible data. Trimble Connect enables architects, engineers, contractors, owners and operators to collaborate in building projects. Trimble Connect is available as a cloud-based platform (Trimble Connect for Browser) and a Windows application (Trimble Connect for Windows). Projects are synchronized between the Windows app and the cloud. Link a Tekla Structures model to a Trimble Connect project, and then, for example, add, upload, and download files and work in the Trimble Connect 3D Viewer. To learn more about Trimble Connect, see: • https://connect.trimble.com/ • https://trimbleconnect.support.tekla.com/
Multi-user mode (page 78)	Multi-user mode also allows several users to access the same model simultaneously. Multi-user mode is suitable

for local teams with projects where the team members do not necessarily have an internet connection.

In multi-user mode a server computer runs the multi-user server, a file server computer contains the multi-user master model and client computers run Tekla Structures. The multi-user model consists of a single master model on the file server computer and local views to the master model, called working models, on each users' computer. The model synchronization is done by saving the working model to the master model.

NOTE Tekla Model Sharing and multi-user mode do not work together. When you want to work collaboratively, you need to select which one of the methods to use.

If your company takes part in external projects, or if more than one user works with the same model at different locations, we recommend that you use Tekla Model Sharing. With Tekla Model Sharing, the users in your company can work with the same shared model, offline and with high performance, and synchronize the changes with other team members even in a low-speed network.

If you work in a local team and prefer not to use internet while working on your models, you can use multi-user mode.

1.1 Tekla Model Sharing

Tekla Model Sharing enables efficient global collaborative modeling within one Tekla Structures model. Tekla Model Sharing gives users the freedom to work with the same model at the same time in different locations and time zones.

With Tekla Model Sharing, you can work locally and share the model changes globally. For example, one Tekla Model Sharing team of users can work in New York, one in London and one in Bangkok. They all contribute to the same model, working around the globe during their respective office hours in different time zones while the model keeps building up all the time.

With Tekla Model Sharing,

- each user has a local version of the model on their computer, and the model data is shared and synchronized over the internet using a Microsoft Azure cloud sharing service. When a model is shared, it is connected to the cloud-based sharing service.
- users can start to share their changes immediately. To easily share the model changes, [write out \(page 23\)](#) them to the sharing service. When you want to update your model with the changes made by other users, [read in \(page 21\)](#) the changes from the sharing service. Only new and changed

data is shared, and the data that is fetched from the sharing service is merged to the data on your computer.

- even though the changes are shared over the internet, you do not need to be connected to the sharing service all the time. You need to be online only when you want to write out or read in the changes. This enables offline work if your internet connection is not always available.
- if needed, you can install a separate cache service. The cache service is particularly beneficial in locations where the internet download speed might be limited, as it reduces the download effort from the Tekla Model Sharing service by downloading and caching the model changes on behalf of the Tekla Structures client workstations.
- if you are a Tekla Model Sharing administrator of your organization, you can manage all of your organization's shared models through the [Management Console for Tekla Model Sharing](#).

Prerequisites for Tekla Model Sharing

Before you can start using Tekla Model Sharing and share your models, the following prerequisites must be met.

- Tekla Structures installed.
All users of the same shared model must have the same Tekla Structures version, and use the same latest service pack.
- A personal Trimble Identity connected to an organization.
All sharing actions require authentication, and the authentication is based on Trimble Identity.
- An internet connection to share and download changes.
You must connect to the Tekla Model Sharing service to perform any model sharing actions. Ensure that the TCP port 443 (the default HTTPS) outbound is open, and if using an HTTP proxy, it must support HTTP 1.1.

Cloud-based Tekla Model Sharing service

When you start to share a model using Tekla Model Sharing, the model is connected to the cloud-based sharing service.

- To send model changes to the sharing service, you [write out \(page 23\)](#).
- To fetch other users' model changes from the sharing service, you [read in \(page 21\)](#).

When you read in changes, the updates to your local version of the shared model are delivered as incremental packets. This means that when you read in, the data that is fetched from the sharing service is merged with the data on

your computer. You must read in all shared changes before you can write out your own changes to the sharing service.

Note that there is no central model in the sharing service as such, only a model instance that consists of a model baseline and incremental updates. You cannot open the model in the sharing service or access any files.

The model data is stored to the sharing service. Each user fetches the model data from the sharing service to their local versions of the model when they read in. User authentication is based on [Trimble Identity](#).

If you cannot use the cloud-based sharing service, an alternative is the on-premises sharing service for Tekla Model Sharing. The on-premises sharing server requires a separate subscription and installation.

Cache service for Tekla Model Sharing

You can also install a separate cache service for Tekla Model Sharing that downloads and caches the model changes on behalf of the Tekla Structures client workstations. Using the cache service for Tekla Model Sharing makes downloading model data faster when the same data is requested multiple times, such as when several users in the same office are working in a shared model. The cache service is particularly beneficial in locations where download speed might be limited.

The cache service downloads model data from the Tekla Model Sharing service and stores the data in the file system in a local area network (LAN). The first time that a user reads in and fetches a packet from the Tekla Model Sharing service, it is stored in the cache. Any later requests for the same packet are served from the cache in the LAN. The cache is not used for packets that are written out.

The cache service is useful even if there is only one Tekla Model Sharing user in the office. For example, rejoining a model is faster because the model data is available locally. Additionally, since the model data is always loaded in small data blocks, the cache service can download any missing blocks later if the download is interrupted.

You can download the cache server installation file from [Tekla Downloads](#).

Work with Tekla Model Sharing

Tekla Model Sharing is available in all configurations of Tekla Structures. You can find all the Tekla Model Sharing commands on the **File** menu, under **Sharing**.

How does Tekla Model Sharing work?

In short, the workflow in Tekla Model Sharing has the following phases:

1. **Downloading the cache service to compliment Tekla Model Sharing**

If needed, the person who plans to share a model, downloads the cache service for Tekla Model Sharing from [Tekla Downloads](#).

The Tekla Model Sharing cache service downloads and caches the model changes on behalf of the Tekla Structures client workstations. Using the cache service speeds up working, as users can fetch the changes to their local versions of the model from the LAN instead of the Tekla Model Sharing service.

2. **Sharing the model to other users**

The model owner [shares a single-user model](#) and invites users to join the model.

To share a model, open the single-user model that you want to share, or create a new single-user model.

To start sharing the model, go to **File --> Sharing --> Start sharing** to open the **Start sharing** dialog. You can invite other users to join the model and send an email notification to the invited users, or you can add users later. When you start sharing, you become the **Owner** of the model.

When you start sharing the model, a [model baseline \(page 30\)](#) is uploaded to the sharing service. The baseline is a snapshot of the current state of the model. The **Owner** of a model should create baselines of the model regularly. For example, you can create a baseline once a week. We recommend creating a new baseline each time a new user has been invited to the model. This way, joining the shared model is faster.

When a model is shared, it is connected to a cloud-based sharing service. Each user of the model has a local version of the model on their computer or on a network drive.

3. **Joining the model**

The invited users can join the model.

You can also join a model you have been invited to without the email notification. You will find all the models that have been shared with you in **File --> Sharing --> Browse shared models**. Just select the model from the list, and click **Join**. The model is downloaded, and you can start working with it.

4. **Working on the model**

The invited users can start working on the model. When you have joined the model, you can work also offline, provided that you are using the same Windows account as you did when you joined the model.

5. **Sharing and downloading changes**

You need an internet connection to download other people's changes to the model and share your own changes.

a. **Downloading changes made by other users**

To keep your model up to date, you need to [read in the changes other users have made to the model \(page 21\)](#) from the sharing service. Only the changed data is read in to the model.

To read in, you can either go to **File --> Sharing --> Read in**, or click  on the Quick Access Toolbar.

If there are available packets to read in, the **Read in** icon shows a green arrow and the number of packets . Model changes are collected to packets that are fast to download and upload. Each packet contains one or more changes made by another user. After reading in all the packets, the changes are listed in a table at the bottom of the screen.

The changes are color-coded:

- Red for deleted objects
- Yellow for modified objects
- Green for new objects

b. **Sharing your changes to other users**

When you have made changes to your local model, you can share your changes to other users of the model by writing out the changes to the sharing service.

Before you write out, you always need to [read in \(page 21\)](#) any changes made by other users first. This is done to solve any conflicting changes made by other users.

After you have read in, you will see a green arrow on the **Write out** icon . You can now write out your changes.

When you write out, only the changes that you have made are sent to the sharing service. These changes are then available for other users to read in. Typically, you would want to read in other users' changes and write out your changes a couple of times a day to keep everyone updated.

6. **Tracking the progress of the project**

Users with the **Owner** role can [create new starting points, or baselines, \(page 30\)](#) for the model. Baselines make the model faster and easier to join for new users, and allow tracking the progress in the model.

Who can use the shared model?

Model owner invites other users to join the model.

Tekla Model Sharing has four roles that define what a user can do in a shared model.

- When you share your model, you automatically get the **Owner** role. Typically, there are one or two owners who can control everything in the shared model.

As the model owner, you can invite more users to your shared model and assign appropriate roles for them. The users of a model and their roles are listed in **File --> Sharing --> Users and data**.

- **Editor** can perform all modeling and drawing tasks.
- **Viewer** is for those who just want to follow up on the project.
- **Project viewer** is for those who use the model information and need to update the fabrication status, for example.

The permissions of each role:

	Owner	Editor	Viewer	Project viewer
Read in	Yes	Yes	Yes	Yes
Write out	Yes	Yes	No	Yes
Modify objects and drawings	Yes	Yes	No	No
Modify UDAs	Yes	Yes	No	Yes (only UDAs that do not affect numbering)
Invite or remove users, change roles, baseline, exclude from sharing	Yes	No	No	No

In addition to the **Owner**, the Tekla Model Sharing administrator of the organization can manage all the shared models and the users and their roles in the web-based Management Console for Tekla Model Sharing. The administrator can change the roles in Management Console without opening Tekla Structures, or take role of the model owner. All the users in the shared model can then have, for example, the **Editor** role.

Share a model in Tekla Model Sharing

When you start sharing a model in Tekla Model Sharing, you become the **Owner** of the model.

You need to belong to an [organization](#) as an employee to start sharing a model. If you have an external licenses, you cannot have the model ownership, so you cannot start sharing a model.

1. Open a single-user model that you want to share.
2. On the **File** menu, click **Sharing** --> **Start sharing**.

The **Start sharing** dialog opens.

3. Select the service from the **Service** list.

Tekla service is the cloud-based sharing service for Tekla Model Sharing.

An alternative to the cloud-based sharing service is the on-premises sharing service. Tekla Model Sharing on-premises server requires a separate subscription and installation.

If the on-premises sharing service is enabled, you need to select the service from the **Service** list when you use Tekla Model Sharing for the first time.

4. If needed, enter a **Code** and a **Description** for the model.
 - **Code** can be a site number, a project number, or an accounting number, for example.
 - Type a description according to your company conventions.
5. In **Model data storage location**, select the location for the model data storage.

There are four model data storage locations available: North America (Virginia/East US), Australia (New South Wales/Australia East), Asia (Singapore/Southeast Asia), and Europe (Ireland/North Europe). The locations are the same locations as in Trimble Connect.

Select the region closest to the majority of the users in the model to improve the performance.

If you use the on-premises sharing service, you cannot select the data storage location.

Note that you can set the data storage location only if the Tekla Model Sharing administrator of your organization has allowed that in Management Console for Tekla Model Sharing. Administrators can set a default data storage location to be used in the organization.

6. Invite other users to share your model by typing their email addresses to the **Invite users** box, and set their user role to either **Editor**, **Owner**, **Project viewer**, or **Viewer**.

You can add several users at one go. Separate the email addresses with semicolons. Do not use spaces between the email addresses. If you add

several users at one go, they all get the same user role. The role can be changed later.

Note that if you are using Tekla Structures Partner license, and you want to join to a Tekla Model Sharing production model, ask to be added as a **Viewer**. You can then read in changes but you cannot write out changes. This ensures that the production model is not converted to a partner model.

7. Click the **Add** button to add the users to the model.
8. Select the **Send email notification to user.** checkbox to send a notification email to the invited users, and write a message to the users.
9. Click the **Start** button to start sharing your model.

The model is saved and written out to the sharing service.

When you open the model the next time, you have two options:

- In the Tekla Structures start screen when you open Tekla Structures:
 1. Go to the **Shared models** tab.
 2. Click **Continue** to open the **Shared models** dialog.
 3. Select the **Show shared models on this computer** checkbox to list the models.
 4. Click **Join**.

You can also open shared models on the **Recent** or **All models** tabs.

- In Tekla Structures, go to **File --> Open --> Browse shared models**.

See also

[Share your model changes in Tekla Model Sharing \(write out\) \(page 23\)](#)

[Update the model with other users' changes in Tekla Model Sharing \(read in\) \(page 21\)](#)

[Manage users in Tekla Model Sharing \(page 33\)](#)

Join a shared model in Tekla Model Sharing

When someone using Tekla Model Sharing has invited you to join a shared Tekla Structures model, you may receive an invitation email.

The email contains information about the model, the used environment, and your user role. The user role defines your permissions in the model. You can join a model at any stage of sharing, and as many times as you need.

NOTE All users of the same shared model need to have the same Tekla Structures version, and use the same latest service pack.

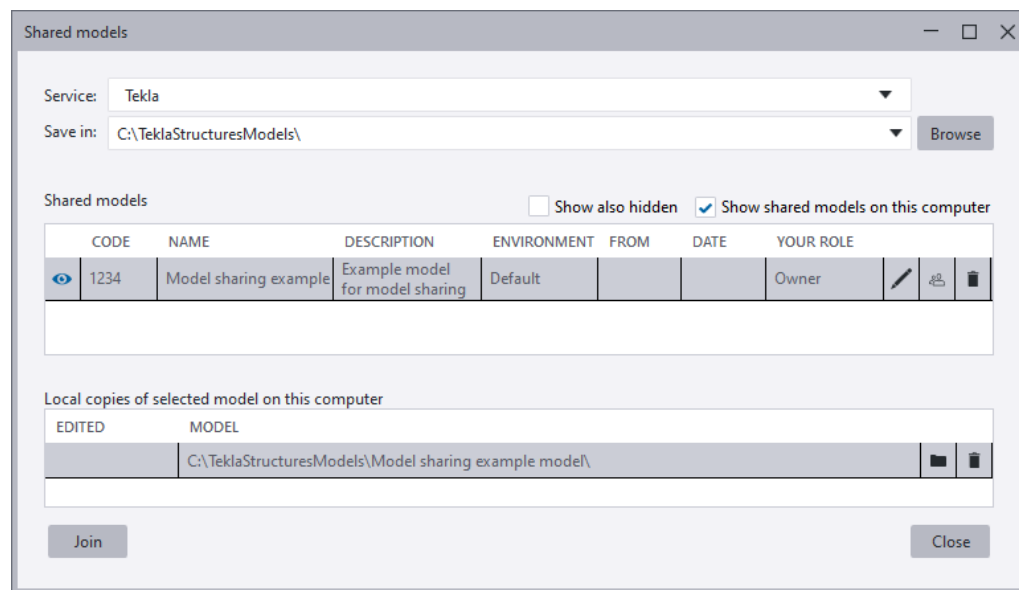
Join a shared model

1. On the **File** menu, click **Sharing** --> **Browse shared models**.
2. In the **Shared models** dialog, select the service from the **Service** list.

Tekla service is the cloud-based sharing service for Tekla Model Sharing.

An alternative to the cloud-based sharing service is the on-premises sharing service. Tekla Model Sharing on-premises server requires a separate subscription and installation.

If the on-premises sharing service is enabled, you need to select the service from the **Service** list when you use Tekla Model Sharing for the first time.



3. In **Save in**, browse for the location where you want to save your local version of the model.

If you later want to join the same model again, you need to save a new local version of the model on your computer.

If you use the same name for the model, the local versions of the model need to be saved in different locations on your computer, because you cannot have two or more models with the same name in the same folder.

4. From the **Shared models** list, select the model you have been invited to.
You can find the name of the model in the invitation email, if you received one. Otherwise, you can ask the model owner.
5. Click the **Join** button.

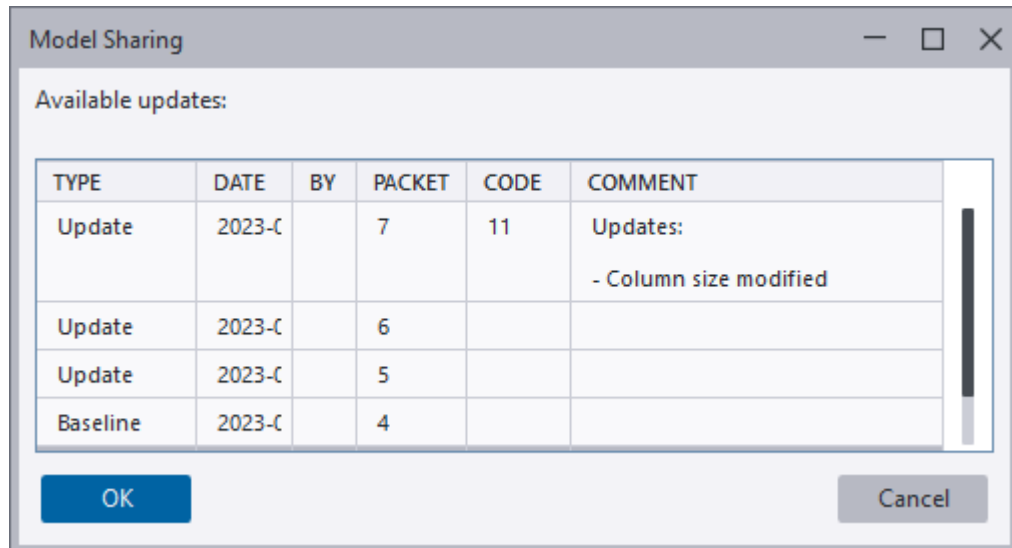
When you join the model:

- Tekla Structures checks that the local version of the model does not already exist in the selected folder. A warning message is displayed if

the selected folder already contains the model. In that case, you need to browse for a different folder where to save the model.

- Tekla Structures checks the environment you are using and displays a message if you are using a different environment than the shared model. We recommend that all users within the same shared model use the same environment.

The **Available updates** list opens.



6. From the list of available updates, select [an update or a baseline \(page 30\)](#) that you want to join.

You can join any baseline (a snapshot of the model state on a certain date) or update, not only the latest. Selecting a baseline is beneficial if you join the model when many changes have already been made in the model. Joining a baseline instead of an update is also faster.

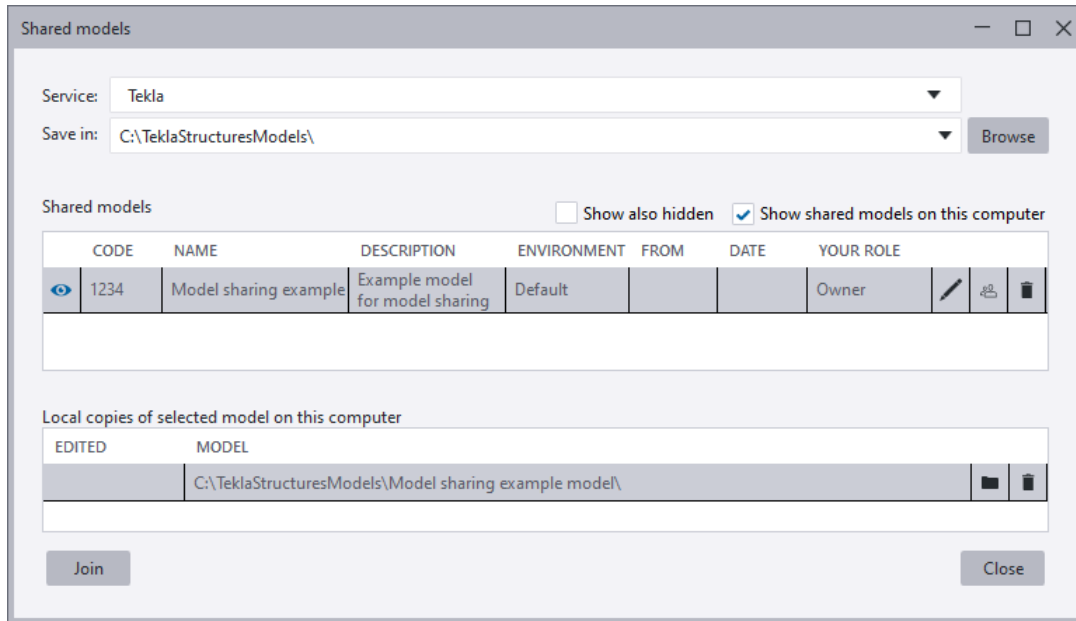
By joining an earlier baseline or update, you can go back in the model history, and, for example, check the model state on a certain date.

7. Click **OK**.
8. Start working with the model and [share your model changes \(page 23\)](#).

When you read in, only incremental update packets are fetched from the sharing service.

Information on shared models in Tekla Model Sharing

When you want to join a shared model in Tekla Model Sharing, you select the model to join in the **Shared models** dialog, in **File --> Sharing --> Browse shared models**.



Option	Description
Service	Sharing service that is being used.
Save in	Location where the local version of the model is saved on your computer. If you want to save to another location, click the Browse button.
Shared models Show also hidden Show shared models on this computer	List of models that you have shared or that have been shared with you. - If you have hidden some models from the Shared models list, select the Show also hidden checkbox to see the full list of models that have been shared with you, or that you have shared. - Select the Show shared models on this computer checkbox to see the models that you have locally saved on your computer.
	Click to hide the model from the Shared models list. If you have many models on the list, it can be useful to hide the models you are not actively working with.
Code	Code of the model. The code can be, for example, a site number, a project number, or an accounting number.
Name	Name of the model.
Description	Description of the model.
Environment	Environment of the model.

Option	Description
From	Person who has invited you to the shared model, or has changed your role the last.
Date	Date when the sharing of the model was started.
Your role	Your role and your access level to the model. The options are: Owner, Editor, Project viewer, or Viewer. Only the Owner can change the roles of the other users.
	If you are the Owner , you can edit the Code and the Description of the model.
	If you are the Owner, you can invite new users to the model, or remove existing users. If you are the Editor, you can see which users have been invited or have joined the shared model.
	If you are the Owner, you can remove the model from the sharing service. This discontinues the sharing, and the users who have been working with the shared model cannot share changes anymore.
Local copies of selected model on this computer Edited Model  	When you select a model from the Shared models list, the model information is displayed here. - The date when the local version of the model has been edited. - The location of the local version of the model on your computer. - Click  to open the selected local version of the model. - Click  to remove the selected local version of the model from your computer.

Update the model with other users' changes in Tekla Model Sharing (read in)

To update your model with the changes made by other users, fetch the changes from the sharing service by reading them in.

You always need to read in the most current changes to a model before you can write out your own changes.

1. On the **File** menu, click **Sharing --> Read in**, or click  on the Quick Access Toolbar.

If there are available packets to read in, the **Read in** icon shows a green arrow and the number of packets .

NOTE If you have been idle for over 6 hours, the number of packets may not be shown in the **Read in** icon. That is why we recommend that after a long time of idling, you click the **Read in** icon to ensure if any packets are available to read in.

If one of the users who shares the model has selected the **Show available updates when reading in the changes** option in the [Sharing settings \(page 39\)](#) dialog, the **Available updates** list opens after you have clicked the **Read in** icon.

The dialog lists all the available packets. You can read in the changes packet-by-packet, if you want to check the model changes in phases. If you want to receive all the updates at once, you can select the latest packet and all the previous packets are read in as well.

When you read in, the updates to the shared model are delivered as incremental packets that only include the changed data. You need to read in all shared changes before you can write out your own changes to the sharing service again.

If you have selected the **Show changes after read in** option in the [Sharing settings \(page 39\)](#) dialog, a list of sharing changes opens at the bottom pane after the selected packets are read in. The list shows the changes according to how they affect the model.

For more information on sharing changes, see [Detect sharing changes and view the sharing history in Tekla Model Sharing \(page 25\)](#).

2. Continue working with the model.

If you encounter problems with sharing, check the sharing related [log files](#) in the current model folder and in `..\Users\<user>\AppData\Local\Tekla DataSharing` for troubleshooting.

If Tekla Model Sharing detects changes that should not appear in the local version of the model after read in, Tekla Structures displays a message and the changes are recorded in the `modelsharing.log`. We recommend that you contact your local support to solve the issue.

TIP You can use the **Sharing automation tool** to [automate read in \(page 23\)](#), so that you can keep the model updated with changes made by other users of the model.

See also

[Share your model changes in Tekla Model Sharing \(write out\) \(page 23\)](#)

[Detect sharing changes and view the sharing history in Tekla Model Sharing \(page 25\)](#)

Share your model changes in Tekla Model Sharing (write out)

After you have modified your local version of the shared model, you can share your changes with other users who are working with the model.

To share your changes with other users, send your changes to the sharing service by writing them out. To ensure that other users will not write out while you are making changes in the model, you can reserve the next write out. You can also use the **Sharing automation tool** to automate sharing your changes.

Write out

Before you write out your changes, you need to:

- [Read in \(page 21\)](#) the most current changes made to the model.
 - Save the changes you have made into the model.
1. On the **File** menu, click **Sharing --> Write out**, or click  on the Quick Access Toolbar.

The **Write out** icon shows a green arrow  when there are no packets that need to be read in before you can write out. You can write out changes immediately.

The **Write out** icon shows a gray arrow  when there are packets that need to be read in before you can write out changes.

When you write out, Tekla Structures saves the model, creates a packet of the model changes, writes out the changes to the sharing service and saves the model again.

NOTE The maximum size for a packet is 25 GB. If the packet size is bigger than 25 GB, the write out will not succeed.

Only new or changed data is written out. If you attempt to write out your changes, but some other user has shared some changes earlier and you have not yet read in all the available updates, you are asked to read in first. If there is no new data to be read in, Tekla Structures writes out your changes to the sharing service immediately.

If one of the users who shares the model has selected the **Enable write out revision comment** option in the [Sharing settings \(page 39\)](#) dialog, you can enter a code or a comment for the update that you are writing out.

If you delete objects and share the deletion to the sharing service, the deletion is shared with other users, and the deleted objects cannot be recovered.

2. Continue working with the model.

Note that if several users modify the same objects at the same time, the model will contain the changes by the user who first wrote out the changes.

Reserve the next write out

1. On the **File** menu, click **Sharing** --> **Reserve next write out**.
2. In the **Reserve next write out** dialog, write a comment about why you are reserving the next write out.
3. Click **Reserve**.

When you have reserved the next write out, the **Write out** icon on the

Quick Access Toolbar shows a yellow arrow  for all users of the model. Placing the mouse pointer on top of the icon shows who has reserved the next write out and the comment written in the **Reserve next write out** dialog.

Other users cannot write out while you have the next write out reserved. If another user has started writing out when you reserve the next write out, the write out of the other user is canceled only if data transfer has not started yet. The other user will get a notification if the write out is canceled.

4. To write out the changes you have made, on the **File** menu, click **Sharing** --> **Write out**.

Note that you may need to [read in \(page 21\)](#) before you can write out.

5. In the **Reserve next write out** dialog, enter a comment about the changes that you have made.
6. Click **Release**.

When you have written out, the arrow in the **Write out** icon on the Quick Access Toolbar changes to green again . Other users can now write out normally.

You can also release your write out reservation without writing out. To do this, on the **File** menu, click **Sharing** --> **Release reservation without write out**.

Note that if you do not write out or release the write out reservation within 1 hour, Tekla Structures will automatically release the reservation. Tekla Model Sharing administrator can also release the write out reservation in [Management Console for Tekla Model Sharing](#) at any time.

Share your model changes automatically

If you want to automate sharing your model changes, you can use the **Sharing automation tool** from the **Applications & components** catalog.

The **Sharing automation tool** first [reads in \(page 21\)](#) and then tries to write out the changes until it succeeds. The tool is useful if there are many packets to read in and you want to make sure you get the write out done, or if you want to have the packets read in when you arrive at the office.

You can also use the tool just to automate read in to keep your local model updated with changes made by other users of the model. You can select the date and set the time for the read in.

1. Click the **Applications & components** button  in the side pane to open the **Applications & components** catalog.
2. Define the settings that you want to use:

Option	Description
Write out now until successful	Select this option to write out your changes immediately. Note that before writing out, the tool reads in other users' changes.
Create baseline	If you are the Owner of the shared model, you can select this option to create a baseline (page 30) when writing out.
Close Tekla Structures after successful write out	Select to close Tekla Structures after write out.
Code	Enter the code of the model, for example.
Comment	Enter a comment, if needed.
Delayed read in at	Select the date and set the time at which you want to read in. If you have not selected Write out now until successful, the tool only reads in. If you have selected Write out now until successful, the tool first reads in and writes out, and then starts waiting to read in at the set date and time. Using the tool to only read in can be useful if your local model has changes that you do not wish to share but you want to get changes from others.

3. Click **OK** to start the tool.

See also

[What is shared in Tekla Model Sharing \(page 48\)](#)

[Detect sharing changes and view the sharing history in Tekla Model Sharing \(page 25\)](#)

[Best practices in Tekla Model Sharing \(page 59\)](#)

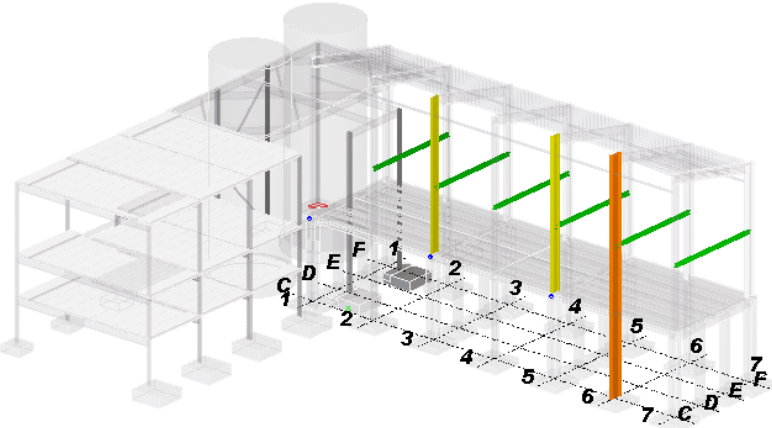
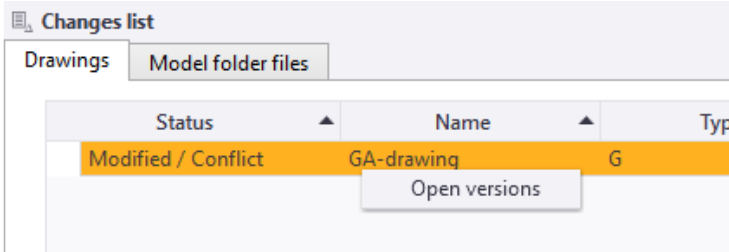
Detect sharing changes and view the sharing history in Tekla Model Sharing

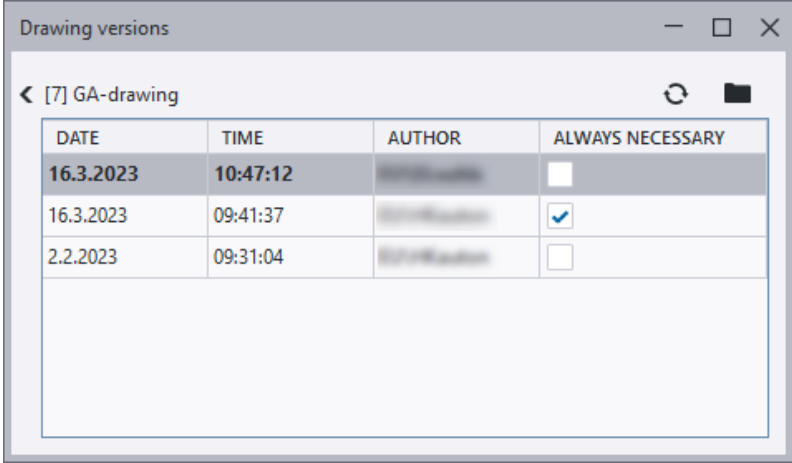
To see how the model has been changing and who has shared their model changes, use the sharing change detection and sharing history to see what kind of changes the model includes.

Detect changes

After you have either [read in \(page 21\)](#) the model changes from the sharing service or made changes in the local model, you can view the changes that have been made in more detail. A list of changes is shown at the bottom of the screen. The changes are visualized with colors both in the **Changes list** and in the model.

To	Do this
Open the changes list	Do one of the following: - On the Quick Access Toolbar, click the Show read in changes icon . - Click File --> Sharing --> Show read in changes. - To automatically show the list after each read in, select the Show changes after read in option in File --> Sharing --> Sharing settings.
View changes in the list	Click the separate tabs to see the changes according to how they affect the model. The changes are divided to the following tabs: Physical objects, Other objects, Drawings, Options, Attribute definitions, Model folder files, and UDA changes. The changes are visualized with colors in the list. Deleted objects are listed in the Changes list but they do not have any information available in the Name column. The UDA changes tab includes user-defined attributes that have a definition included in the <code>environment.db</code> file. Reference objects are detected as changed if there are physical or material changes. Tabs do not exist if there are no items on the tab. If the tab content becomes empty because of filtering, the tab is no longer shown.
View changes in the model	- Select the Select objects in the model checkbox and a row in the list to highlight the changed objects in the model. The changes are visualized with colors in the model. Deleted objects are not visualized in the model. - Added objects = green

To	Do this
	- Modified objects = yellow - Conflicting objects = orange - Existing objects that have not been modified by another user = gray 
View changes in drawings	You can list the different versions of the same drawing, show their snapshots, and change the current drawing version. You can also view a modified drawing and its snapshot, or clone drawings from other models. When users modify the same drawing in their local version of the model and one user writes out, the Changes list will show a conflict in other users' local version of the model when they read in. To view the versions of a drawing, do the following: 1. Select the changed drawing on the Changes list. 2. Right-click the drawing. 3. On the context menu, select Open versions.  The Drawing versions dialog opens. In the dialog, you can select a drawing version, right-click and open the selected version. You can save the drawing version and write out to make the selected drawing version the current version for all users.

To	Do this
	To keep the number of drawing files reasonable, use the XS_DELETE_UNNECESSARY_DG_FILES and XS_DELETE_UNNECESSARY_DG_FILES_SAFETY_PERIOD advanced options. The XS_DELETE_UNNECESSARY_DG_FILES advanced option defines if the unnecessary drawing files (.dg files) are automatically deleted or not. To automatically delete the drawing files that are no longer used, ensure that XS_DELETE_UNNECESSARY_DG_FILES is set to TRUE. The XS_DELETE_UNNECESSARY_DG_FILES_SAFETY_PERIOD advanced option defines how long the drawing files are kept before they are deleted. The default safety period is 7 days. This means that after 7 days, the drawing files that are not used are deleted when the XS_DELETE_UNNECESSARY_DG_FILES advanced option is set to TRUE. You can define a different safety period according to your needs. However, if you want to protect some of the drawing versions from being automatically removed, use the Always necessary checkbox in the Drawing versions dialog. Set the Always necessary option individually for each drawing version you want to keep by selecting the corresponding checkbox. 
Filter changes in the list	On each tab, you can filter the changes in every column. 1. Hover the mouse pointer over the column. 2. Click the filter icon  next to the column name. 3. Select how you want to filter the changes.

To	Do this
	The name of the selected filter is shown at the bottom left corner of the list. If you right-click the filter icon , you can, for example, sort the columns.
Edit the filter	1. Right-click the filter icon . 2. In the context menu, select Filter Editor.... The Filter editor dialog opens. You can edit the selected filter as needed, or create a new filter.
Zoom to changed objects in the model	Select the Zoom to selected checkbox, and click a row in the list to zoom to the changed object in the model.
Search for specific changes	Type a search word to the search box on the bottom right corner of the list. 
Move the Changes list somewhere else on the screen	You can: • move the list around the screen • drag the list to a second screen • dock the list to the side pane or to the bottom of the screen The list has a button, , in the side pane. If you drag the list to a second screen, click the button to return the list to the main screen.
Add new columns to the Changes list or bring back hidden columns	1. Right-click the column title. 2. On the context menu, select the column that you want to add to the Changes list. 3. Hold down the left mouse button and drag the column to the desired location. 4. Release the left mouse button.

View the sharing history

After you have read in and written out model changes, you can check the sharing history of the model. The **Sharing history** dialog shows:

- All your read in and write out events
- The packets included in each read-in and write out event

- The changes that you have made to the model locally and have not yet shared

You can check the sharing history event-by-event, and see how the model has evolved by the changes made by other users.

To	Do this
Open the sharing history	On the File menu, click Sharing --> Sharing history .
Check the read in and write out events	To see all your read in or write out events and their date and time, click the Collapse all button.
Check the packet information	To see all the packets in each read in or write out event, click the Expand all button. The packet information shows: • The packet number • The user who wrote out the packet • The packet upload date and time • The code and comment of the update that is included in the packet If the comment is too long, it is not shown entirely.
View the model changes included in a single event	Select the event and click the Show changes button. A list of model changes is displayed at the bottom pane of Tekla Structures.
View the local model changes	To view the changes that you have made to the model but have not yet written out, select Local non-shared changes and click the Show changes button. A list of local model changes is displayed in the bottom pane of Tekla Structures.

The **Undo history**  dialog lists all the commands that you have run and the modifications that you have done in your local version of the model. The **Undo history** list is cleared when you read in or write out.

Create a baseline for a model in Tekla Model Sharing

If you are the **Owner** of a model in Tekla Model Sharing, and you want to keep a record of the current progress in the model or you want to make the model faster to join for a new user, you can create a new starting point for the model in the sharing service. This new starting point is a *baseline*.

Baseline is a snapshot of the current state of the model. When you create a baseline, a full model is created and uploaded to the sharing service. We recommend that the **Owner** creates a new baseline when a new user has

been invited to the model. Existing users do not need to re-join the model after a new baseline has been created.

1. On the **File** menu, click **Sharing --> Create baseline**.
2. Enter a code or a comment, if entering revision comments has been enabled in the [Sharing settings \(page 39\)](#) dialog.

A full model is [written out \(page 23\)](#) to the sharing service. Files and folders that have been excluded from the sharing are not included in the baseline.

NOTE The maximum size for a packet or a baseline is 25 GB. If the packet or baseline size is bigger than 25 GB, the upload will not succeed, and the baseline is not created. To resolve this, reduce the model size by deleting anything that is not needed.

If you need to read in while you are creating the baseline, you need to repeat the **Create baseline** command after you have read in other users' changes.

If you make changes in the model before creating the baseline, an incremental update packet is created before the baseline. This ensures that no model data is lost and that the users of the shared model do not need to join the model again.

3. If needed: Invite someone to [join \(page 17\)](#) the model.

When the new user joins the model, the **Available updates** list opens.

The user can then select a baseline or an update to join. The **Available updates** list shows all the baselines and the updates after the latest baseline. You can select any baseline or update to join, not only the latest. By joining an earlier baseline or update you can go back in the model history, and, for example, check the model state on a certain date.

Joining a baseline is beneficial for users who join the model when there already are many changes made. Joining a baseline instead of an update is also faster.

After joining a model, only incremental update packets are read in from the sharing service.

You can also create a baseline using the [Sharing automation tool \(page 24\)](#) from the **Applications & components** catalog.

See also

[Share a model in Tekla Model Sharing \(page 15\)](#)

[Update the model with other users' changes in Tekla Model Sharing \(read in\) \(page 21\)](#)

[Share your model changes in Tekla Model Sharing \(write out\) \(page 23\)](#)

Exclude a model from the sharing service in Tekla Model Sharing

If needed, you can exclude yourself and your local version of the model from the sharing service.

When you exclude a model, your local version of the model is no longer connected to the sharing service and you cannot share your changes anymore. However, the model instance still exists in the sharing service and other users can continue working with the model normally.

NOTE After you have excluded your local version of the model from the sharing service, you cannot merge the excluded model back to the original shared model. The excluded model is completely new and it has no connection to the model in the sharing service.

All users, regardless of their user role (**Owner, Editor, Project viewer, Viewer**), can exclude their local version of the model from the sharing service.

1. On the **File** menu, click **Sharing --> Exclude from sharing**.

A confirmation message is displayed.

2. Click **Continue**.

Your local version of the model is disconnected from the sharing service, and you cannot write out and read in changes anymore.

The model automatically becomes a single-user model.

After you have excluded your local version of the model from the sharing service you can

- continue working with the model in single-user mode.
- start working with the model in [multi-user mode \(page 47\)](#).
- start working with the model again in Tekla Model Sharing.

If you would like to start working again with the excluded model in Tekla Model Sharing, you can either

- [start sharing \(page 15\)](#) the model and invite other users to join the model.

If you start to share the model, the model is completely new and it has no connection to the previous model in the sharing service, even though the model retains its old name.

- [join \(page 17\)](#) the same model again in the **Shared models** dialog in **File --> Sharing --> Browse shared models**.

When you join the model, you can select [a baseline or an update \(page 30\)](#) to join.

If you join the model again, you need to save a new local version of the model on your computer. If you do not change the name of the model, you may have several models that have the same name in the **Shared models** dialog. All these local versions of the model need to be saved in different

locations on your computer, because you cannot have two or more models of the same name in the same folder.

See also

[Update the model with other users' changes in Tekla Model Sharing \(read in\) \(page 21\)](#)

[Share your model changes in Tekla Model Sharing \(write out\) \(page 23\)](#)

Manage users in Tekla Model Sharing

Users with the **Owner** role in a shared model can manage the users in that model in several ways. Among other options, owners can invite new users, change user roles and permissions, send email notifications, and remove users.

If you are a Tekla Model Sharing administrator of your organization, you can take the role of the model owner in Management Console for Tekla Model Sharing and manage the shared model and its users. All the users in the shared model can then have, for example, the **Editor** role.

Administrators can manage all the organization's shared models and users and their roles in the Management Console. You can use the Management Console without opening Tekla Structures, and you do not need to be a user in any of your organization's shared models. Note that the **Owner** role is not the same as the administrator of an organization.

Invite new users to a shared model

1. Open the shared model to which you want to invite new users.
2. On the **File** menu, click **Sharing --> Users and data**.
3. In the **Users and data** dialog, type the email addresses of new users in the **Invite users** box, and set their user roles to either **Editor**, **Owner**, **Project viewer**, or **Viewer**.

You can add several users at one go. Separate the email addresses with semicolons. Do not use spaces between the email addresses.

If you add several users at one go, they all get the same user role. The roles can be changed later.

4. Click the **Add** button to add the new users to the model.
5. If necessary, modify the user roles of the new users.
6. Select the **Send email notification to user** checkbox to send a notification email to the invited users, and write a message to the users.
7. Click **Save changes** to invite the users.

View information on users and sharing actions

When you want to check the Tekla Model Sharing users and the basic sharing actions on the model, or invite new users to the shared model, open the **Users and data** dialog in **File --> Sharing --> Users and data**.

Option	Description
Name	Name of the user.
Email	Email address of the user.
Role	Role of the user: Owner, Editor, Project viewer, or Viewer. When you start to share a model, you become the Owner of the model and you can set other users' roles. The roles can be changed later, if needed. Use the different roles to control the permissions of users regarding the shared model. Note that there can be more than one Owner within one model. If you are a Tekla Model Sharing administrator, you can take the role of the model owner in Management Console for Tekla Model Sharing and manage the shared model and its users. All the users in the shared model can then have, for example, the Editor role.
Joined	Indicates whether the invited user has joined the model.
Date	Date when the user has joined the model.
By	Person who invited the user or changed the user role the last.
Last read in	Date when the user last read in.
↓	Number with the arrow down indicates the total number of update packets available in the sharing service. The number next to the arrow indicates how many of the packets the user has read in.
Last write out	Date when the user last wrote out.
↑	Number with the arrow up indicates the total number of update packets available in the sharing service. The number next to the arrow indicates the number of the last packet that the user has written out.
✕	Remove the selected user's permissions to the model. Only users with the Owner role can remove other users from the sharing service.

Modify user roles in a shared model

User roles define a user's permissions to view and modify the shared model. There are four different user roles in Tekla Model Sharing: **Owner**, **Editor**,

Project viewer, and **Viewer**. When you start sharing your model in Tekla Model Sharing, you become the **Owner** of the model. The **Owner** can invite other users to join in the model and give them one of the four roles. If you are a Tekla Model Sharing administrator of your organization, you can manage users and their roles in the Management Console.

The permissions of the four different user roles are described in the table below:

Role	Permissions
Owner	Users with the Owner role can: • Read in (page 21) other users' changes and write out (page 23) their own changes to the sharing service • Invite new users • List other users and change their roles • Remove users from the model • Remove the model instance and all the model related data from the sharing service • Change the model code and description properties Several users can have the Owner role within one model. The Owner who has started to share the model can give the Owner role to any selected user. If you are a Tekla Model Sharing administrator, you can take the role of the model owner in Management Console for Tekla Model Sharing and manage the shared model and its users. All the users in the shared model can then have, for example, the Editor role.
Editor	Users with the Editor role can: • Read in other users' changes and write out their own changes to the sharing service • Edit the model • List other users
Project viewer	Users with the Project viewer role can: • Read in other users' changes and write out their own changes to the sharing service • View the model, but they cannot modify the model objects • List other users Users with the Project viewer role cannot: • Modify user-defined attributes that affect numbering • Insert and modify grids

Role	Permissions
	Import and update models that would create beams and other objects Note that when you open the model in the Project viewer role, restarting Tekla Structures is required. The permissions of the Project viewer role in a shared model correspond with the set of functionalities available in the Tekla Structures Carbon configuration.
Viewer	Users with the Viewer role can: - Read in other users' changes - View the model Users with the Viewer role cannot: - Write out any changes to the sharing service - Modify the model objects - Use the export commands Note that when you open the model in the Viewer role, restarting Tekla Structures is required. If you are using Tekla Structures Partner license and you want to join to a Tekla Model Sharing production model, use the Viewer role. You can then read in changes but you cannot write out changes. This ensures that the production model is not converted to a partner model. If you are using Tekla Structures Partner license with some other role than Viewer and you write out model changes, the model is then for non-production usage, and all drawings in the model have a watermark stamp.

Note that your permission to access the shared model is removed when you detach the model from the sharing using one of the following methods:

- [Exclude the model from the sharing \(page 31\)](#) using the **Exclude from sharing** command
- Upgrade to the next Tekla Structures version
- Use the **Save as** command to save the model

A user with the **Owner** role can change the role of a user as follows:

1. Open the shared model whose user roles you want to modify.
2. On the **File** menu, click **Sharing --> Users and data**.
3. In the **Users and data** dialog, select the user whose role you want to modify.
4. Click the arrow in the **Role** column, and select a new role for the user in the list.

5. If you want to send an email notification to the user whose role has been changed, select the **Send email notification to user.** checkbox.
6. If needed, write a short message that you want to attach to the email notification.
If you include a message, all the invited users and the user whose role has been changed receive the same message.
7. Click **Save changes.**

Remove users from a shared model

Users with the **Owner** role can remove unnecessary users from a shared model.

1. On the **File** menu, click **Sharing --> Users and data .**
2. In the **Users and data** dialog, select the user that you want to delete.
3. Click the  button to remove the user's permissions to access and modify the model.

If you clicked the  button accidentally, you can click the button again to cancel removing the user's permissions.

4. Repeat steps 2 and 3 for all users that you want to remove from the model.
5. Click **Save changes** to remove the users from the model.

Export and import users

Users with the **Owner** role can export the list of users in the current shared model to make changes to users' roles and permissions, or to add the same users into another shared model.

1. On the **File** menu, click **Sharing --> Users and data.**
2. At the bottom of the **Users and data** dialog, click **Export users.**

The list of users is saved in the `users.csv` file in the `\ModelSharing` sub-folder under the model folder. The format of the list is `<email address>;<role>`.

3. According to your needs, do any of the following:

To	Do this
Change users' roles and permissions in the current model	a. Open the <code>users.csv</code> file. b. Change user roles according to your needs, or remove users' permissions by setting their roles to <code>NONE</code>. c. Save and close the <code>users.csv</code> file.

To	Do this
	d. Go back to the shared model. e. To apply the changes, at the bottom of the Users and data dialog, click Import users. f. Select the <code>users.csv</code> file. g. Click Open. The changes made in the <code>users.csv</code> are now updated to the current list of users. h. To save the user changes to the current model, click Save changes.
Copy users to another shared model	a. Close the current model, and open another shared model. b. On the File menu, click Sharing --> Users and data. c. At the bottom of the Users and data dialog, click Import users. d. Find and select the previous model's <code>users.csv</code> file. By default, the <code>users.csv</code> file is saved in the <code>\ModelSharing</code> sub-folder under the model folder. e. Click Open. The users in the <code>users.csv</code> file are added to the current model with the roles defined in that file. f. To save the user changes, click Save changes.

Send email notifications

Users with the **Owner** role can send messages to other model users via email at any point.

1. On the **File** menu, click **Sharing --> Users and data**.
2. In the **Users and data** dialog, select the **Send email notification to user** checkbox.
3. In the message box below the **Send email notification to user** checkbox, type the notification text.
4. According to your needs, do any of the following:

- To send the notification to particular users, select the users in the list of model users.

You can hold down **Shift** to select a range of users, or **Control** to select multiple users.

- To send the message to all users, ensure that no users are selected in the list of model users.

5. Click **Send**.

Tekla Model Sharing settings

To modify the basic Tekla Model Sharing settings, use the options in the **Sharing settings** dialog box in **File --> Sharing --> Sharing settings**.

Option	Description
Model folder file sharing	Click the Exclude button to define files or folders that you do not want to share (page 48) .
• Tekla Model Sharing cache • Name and Port	You can set up a separate cache service for Tekla Model Sharing to be used with the Tekla Model Sharing service. The cache service downloads model data from the Tekla Model Sharing service and stores the data in the file system in a local area network (LAN). This set-up is useful especially if there are several Tekla Model Sharing users in the same location, or a narrow bandwidth to the internet. Using a cache reduces the download effort. When a user fetches a packet, the packet is stored in the cache service. Any later requests for the same packet are served from the cache service in the LAN. The cache is not used for packets that are written out. • Name is the name of the computer on which the cache is installed. To check the computer name, click Windows Control Panel --> System and Security --> System. • Port is the cache service port number that you have set when you installed the cache service. The default value is 9998. • Click the Set button to connect to the cache. • Alternatively, you can set the advanced option <code>XS_CLOUD_SHARING_PROXY</code> to "name of the

Option	Description
	server"; "port" in a .ini file. This advanced option is user-specific. To reset the cache settings in the dialog box to the ones defined in the .ini file, click the Reset button. If any .ini file has the advanced option defined, the settings appear in the dialog box.
Show available updates when joining the model	Select the checkbox to enable a list that shows all the available baselines and updates (page 30) when you join the model. The Available updates list shows all the baselines and the updates after the latest baseline. You can select any of the available baselines or updates to join, not only the latest. By joining an earlier baseline or update you can go back in the model history, and, for example, check the model state on a certain date. Alternatively, you can set the advanced option XS_SHARING_JOIN_SHOW_AVAILABLE_VERSIONS to TRUE in a .ini file to enable the showing of updates. This advanced option is user-specific.
Show available updates when reading in the changes	Select the checkbox to enable a list that shows all the available updates (page 23) when you read in the model changes. The Available updates list shows all the available updates. You can select any of the available updates to be read in, not only the latest. By reading in an earlier update you can go back in the model history, and, for example, check the model state on a certain date. Alternatively, you can set the advanced option XS_SHARING_READIN_SHOW_AVAILABLE_VERSIONS to TRUE in a .ini file to enable the showing of updates. This advanced option is user-specific.
• Show changes after read in • Only when conflicts exist	Select the checkbox to enable a list that shows the model changes after you have read in. If you select the Only when conflicts exist option, the list is shown only when there are conflicts in the model after read in. Alternatively, you can set the advanced options XS_SHARING_READIN_SHOW_CHANGEMANAGER and XS_SHARING_READIN_SHOW_CHANGEMANAGER_CONFLICTSONLY to

Option	Description
	TRUE in a .ini file to enable the showing of model changes. These advanced options are user-specific.
Enable write out revision comment	Select the checkbox to enable the entering of revision comments. When you write out, you can enter a revision comment and code in the comment dialog box. If you enable the revision comments, the comment dialog box is displayed for all the model users. Alternatively, you can set the advanced option XS_SAVE_WITH_COMMENT to TRUE in .ini files to enable the revision comment. This advanced option is model-specific.
• Copy project folder files to model folder • Copy firm folder files to model folder • Overwrite model folder files	If you have stored files, such as property files, report templates (.rpt), or graphical templates (.tpl) in a project folder or a firm folder, or their designated sub-folders, you can copy the files to the model folder. Files that are placed to the model folder are synchronized by Tekla Model Sharing. This means that by having copies of the files in the model folder, you can ensure that the files are shared and synchronized appropriately. Select whether the project or the firm folder files are copied to the model folder that you are going to share. Select the checkboxes and click the Copy files button. We recommend that you copy files from the project and firm folders. You can also select whether the copied project or firm folder files replace the existing files of the same name in the model folder. Individual files can be copied to the model folder at any time. The next time you write out, the files are shared to all model users.

See also

[Share a model in Tekla Model Sharing \(page 15\)](#)

[Best practices in Tekla Model Sharing \(page 59\)](#)

Set privileges, object locks, and drawing locks in Tekla Model Sharing

You can use privileges, object locks and drawing locks to prevent other users from accidentally modifying the shared model objects and the shared drawings, and to control other users' access to particular attributes, files, and settings.

Set privileges

The user who has created the model, or anyone in the same organization, can control certain access rights to the model using [privileges \(page 102\)](#). By using privileges, you can restrict some users or organizations from modifying your model. In practice, the privileges of the model are controlled via the `privileges.inp` file.

Setting the privileges in Tekla Model Sharing works the same way [as setting the privileges in multi-user mode. \(page 102\)](#)

By modifying the `privileges.inp` file, you can control the access to:

- modify user-defined attributes
- access to modify object properties or drawings. This is done by locking and unlocking objects or drawings.
- modify numbering settings
- save standard files

To change the access rights:

1. Close the model.
2. Open the `privileges.inp` file in any text editor.

The `privileges.inp` file is typically located in `.. \ProgramData\Trimble\Tekla Structures\<version>\environments\common\inp` folder. The exact file location may vary depending on the folder structure of your environment files.

3. Change the desired settings and save the `privileges.inp` file to your model folder.
4. Re-open the model.
5. [Write out \(page 23\)](#) to share the privileges information.

You can prevent your model and drawings being accidentally modified by using the **Locked** user-defined attribute (UDA) and drawing locks. Use the **Locked** UDA and privileges together to control which users or organizations can modify your model or drawings.

Set object locks

In addition to using privileges, you can use the **Locks** dialog to lock assemblies, cast units and model objects and thus prevent accidental modification and numbering of objects. This is useful when there are multiple organizations working with the same shared model, and the organizations want to prevent changes to the assemblies, cast units, and model objects that they have created.

Organization lock means that assemblies, cast units and model objects are locked so that users who are not employees of a particular organization

cannot modify them. The assemblies, cast units and model objects are marked as locked **For others** in the **Object locks** dialog (**Manage > Locks**). We recommend that you use the **Assemblies** option for locking as this also prevents the editing of objects in the assembly.

NOTE The organization information is based on the Windows user account, not on the Trimble Identity.

We recommend that you use the `XS_OBJECTLOCK_DEFAULT` advanced option to set the default lock status to `ORGANIZATION` so that assemblies, cast units and model objects are automatically locked **For others** when they are created.

Set the default organization lock status

You can automatically set the default lock status for all new assemblies and cast units when they are created. Use the `XS_OBJECTLOCK_DEFAULT` advanced option to set the default lock status. The default lock status can be `ORGANIZATION` or `NO`. When you start to share the model, the default lock status is set for all assemblies and cast units that do not have any lock status yet.

To set the default organization lock status:

1. On the **File** menu, click **Settings --> Advanced options --> Modeling properties**.
2. Set the `XS_OBJECTLOCK_DEFAULT` advanced option to `ORGANIZATION`.
3. Click **OK**.

All new assemblies and cast units are locked for your organization, and their lock status in the **Object locks** dialog is **For others**. The users in your organization can modify the objects in the assemblies and cast units. Note that users who are not in your organization see the locked status as **For us**.

Change the lock statuses

To change the lock statuses:

1. On the **Manage** tab, click **Locks**.

The **Object locks** dialog opens.

2. Select the objects in the model.

You can select the objects on the assembly and cast unit level, or on the model object level. Use the **Assemblies** and **All object types** options, and the **Sub-objects** checkbox to define the level of selection.

3. Click the **Add objects** button  to add the assemblies, cast units, or the objects to the list.

Once the objects are on the list, you can check their **Object type**, **Name** and **Locked** status.

- To change the status of the locks, select the assemblies or objects in the list or in the model, and a new lock value from the list at the bottom of the dialog, and click **Set**.

The lock status is changed.

How the object locks are set	What is locked
Assembly is set to Organization (the Locked status is For others) and the objects in the assembly are set to No .	Assembly and the objects in the assembly are locked for your organization, and users in your organization can modify the assembly or the objects in the assembly. Users in other organizations cannot modify the assembly or the objects in the assembly. Assembly and the objects in the assembly are green in the model.
Assembly is set to Yes and the objects in the assembly are set to No .	Assembly and the objects in the assembly are locked for all users, no one can modify the object. Assembly and the objects in the assembly are red in the model. It is not possible to delete, modify or number the assembly or the object.
Assembly is set to No and the objects in the assembly are set to No .	Assembly or the objects in the assembly do not have any locks, anyone can modify the objects. Assembly and the objects in the assembly are green in the model.

If you want to clear the list, click the **Reset data** button



You can use the following template fields in report templates to report the lock statuses: ASSEMBLY.OBJECT_LOCKED, ASSEMBLY.OWNER_ORGANIZATION and ASSEMBLY.LOCK_PERMISSION.

In addition, you can use the object representation to visualize the locks. When you share the object representations, other members in the project can visually check the lock statuses.

Set drawing locks

You can lock drawings to prevent accidental modifications and to reserve drawings for editing. If a drawing is locked and the lock is shared, use a snapshot instead.

- [Read in \(page 21\)](#) all the model changes.

2. Open **Document manager**, enable direct editing , and click the **Lock** column next to the drawing.

The **Locked by** column in the **Document manager** shows the user who has locked the drawing.

3. [Write out \(page 23\)](#) to share the drawing lock information.
4. To edit the drawing, open the drawing locks.
5. Edit the drawing as needed.
6. Write out to share the updated drawings.

Note that the drawing can also be unlocked, unless unlocking drawings has been limited to only particular users in the `privileges.inp` file. If the drawing is unlocked and a user writes out the changes they made, the changes made by the original lock owner are overridden.

To use the `privileges.inp` file to restrict the access to drawing editing only to particular users, add the `OBJECT_LOCKED` user-defined attribute (UDA) for different drawing types in the `objects.inp` file. The `OBJECT_LOCKED` attribute in the `objects.inp` file defines whether the **Locked** user-defined attribute (UDA) is visible in the Tekla Structures user interface. Create the needed drawings and edit them, and then lock the drawings using both the **Locked** UDA and the locks in **Document manager** to prevent editing.

Collect model history in Tekla Model Sharing

In Tekla Model Sharing, you can collect model history information on the actions made in a model. The model history of a shared model shows when the model has been changed, how the model has changed, and who has made the changes.

Collect model history in Tekla Model Sharing

To start collecting model history, do the following:

1. On the **File** menu, click **Settings --> Advanced options --> Speed and accuracy**.
2. Ensure that `XS_COLLECT_MODEL_HISTORY` is set to `TRUE`.
Tekla Structures automatically sets `XS_COLLECT_MODEL_HISTORY` to `TRUE` when a model is shared.
3. Set `XS_CLEAR_MODEL_HISTORY` to `FALSE`.
4. Click **OK**.
5. To view model history, do one of the following:

- On the ribbon, click  and select an object in the model.

The model history is shown in the **Inquire object** dialog.

If the **Enable write out revision comment** option has been selected in the **Sharing settings** dialog, the revision comments are displayed as well.

- Create a model history report.
 - a. On the **Drawings & reports** tab, click **Reports**.
 - b. Select a report template that shows the model history.

The name of the report template may vary in different environments. In the Default environment, the report template is called `Q_Model_History_Report`.
 - c. Click **Create from all** to create a report on all the objects in the model, or select one or more objects in the model and click **Create from selected** to create a report from the selected objects.

Offline usage history is stored according to the Windows domain user account. Note that in Tekla Model Sharing models, when you write out your changes to the sharing service, the changes are stored using your Trimble Identity.

Clear model history in Tekla Model Sharing

Clearing the model history of a shared model can improve the performance of a large shared model in Tekla Model Sharing and save disc space. Note that if you clear the model history, the model history information can no longer be used in the Tekla Structures user interface, reports, or Tekla Open API.

Before you clear model history, ensure that:

- The information stored in the model history is no longer needed.
- All users in the shared model have written out all their changes.
- You are the only user currently working on the shared model. We recommend that you delete the model history at a quiet time, such as during the weekend.

NOTE Do not delete the `history.db` file in order to clear the history of a shared model. The `history.db` file is incrementally shared, and deleting the file can cause errors in the shared model.

1. Open the shared model whose history you want to delete.
2. On the **File** menu, click **Sharing** --> **Reserve next write out** .
3. In the **Reserve next write out** dialog, write a comment about why you are reserving the next write out.
4. Click **Reserve**.
5. On the **File** menu, click **Settings** --> **Advanced options** --> **Speed and accuracy** .

6. In the **Advanced options** dialog, set the `XS_CLEAR_MODEL_HISTORY` option to `TRUE`.
 7. Click **OK**.
 8. Save the model.
 9. Restart Tekla Structures.
 10. Open the model folder and ensure that the size of the `history.db` file has been reduced.
 11. [Write out \(page 23\)](#) the baseline.
- Other users should now [join the new baseline \(page 17\)](#) you have written out.

Convert a shared model to a multi-user model in Tekla Model Sharing

If needed, you can stop working with a shared model in Tekla Model Sharing and convert your local version of the model to a multi-user model.

A model cannot be simultaneously shared and used in [multi-user mode \(page 85\)](#). If you want to start using multi-user mode as a means to share your model instead of Tekla Model Sharing, you need to first exclude your local version of the model from the sharing service and then convert it to a multi-user model.

NOTE The excluded model has no connection to the original shared model in the sharing service. This means that if you exclude your local version of the model from the sharing service and start to use the model in multi-user mode, you cannot later merge the original shared model and the multi-user model.

1. Exclude your local version of the shared model from the sharing service to make it a single-user model:
 - a. Open the shared model that you want to convert to a multi-user model.
 - b. On the **File** menu, click **Sharing --> Exclude from sharing** .
A confirmation message is displayed.
 - c. Click **Continue**.
The model automatically becomes a single-user model.
Your local version of the model is disconnected from the sharing service, and you cannot write out or read in changes anymore. However, the model instance still exists in the sharing service and other users can continue working with the model normally.
2. Convert the current single-user model to a multi-user model:
 - a. On the **File** menu, click **Sharing --> Convert to a multi-user model**.

- b. Enter the multi-user server name or select the name from the list in the **Convert to multi-user model** dialog.
- c. Click **Convert**.

The current model is converted to a multi-user model and you can start using the model in multi-user mode.

See also

[Share a model in Tekla Model Sharing \(page 15\)](#)

What is shared in Tekla Model Sharing

By default, all the model data is shared when you share a model in Tekla Model Sharing.

How data is shared in Tekla Model Sharing depends on the type of the shared data.

- Some data is shared incrementally.

This means that only the new and changed data is shared. When you read in, the data that is fetched from the sharing service is merged to the data on your computer.

NOTE You cannot remove or replace incrementally shared databases. The compatibility of incrementally shared databases is checked when the model is opened.

- Some data is shared, but it cannot be updated incrementally.

When you read in, the data that is fetched from the sharing service overwrites the data on your computer.

- Some data is not shared.

- Empty folders under the model folder are not shared.
- By default, **Organizer** data is not shared.

However, you can use the **Organizer** import and export with Tekla Model Sharing to share **Organizer** changes.

- Backup copies of the model database, or `.bak` files, are not shared.

NOTE Some of the catalog files that are located in the environment folders (`rebar_database.inp`, `assdb.db`, `screwdb.db`, `matdb.bin`, `profdb.bin`) are copied to the model folder when the sharing is started.

How data is shared

If you want to check the files that have been overwritten when you read in, click **File --> Sharing --> Open file backup folder** to open the `\ModelSharing\BackUpEnv` folder under the model folder. The folder contains overwritten files from the three latest read ins. You can then, for example, copy the files back to your model or check the files for change detection.

NOTE We recommend that you do not remove or replace any databases. If you remove or replace a database, you must create a new baseline of the model. All other users must then join this new baseline, and then continue reading in packets.

Databases

	Description
Model database	Model database <code>.db1</code> is shared incrementally.
Numbering database	Numbering database <code>.db2</code> is shared, but it cannot be updated incrementally. If you have modified the family numbering settings and you read in, you lose the changes if another user has changed the family numbering settings and has written out. NOTE We recommend that one user updates and shares the numbering settings with other users by writing them out. In case the user needs to read in before writing out the numbering updates, it is important to check that the settings are as they were before starting to share them. We recommend you to use the Number series of selected objects command on the Drawings & reports tab when numbering. Create your model output, such as drawings, reports, NC files and IFC files, after a successful write out.
Model history database	Model history database <code>history.db</code> is shared incrementally.
Plan database	Plan databases <code>.db3</code> are shared, but they cannot be updated incrementally. If you have imported a CIS/2 or a SDNF model and you read in, you lose the plan database changes if another user has imported the same CIS/2 or SDNF model and has written out.

	Description
Analysis model database	Analysis model database .db6 and analysis results model database .db5 are shared, but they cannot be updated incrementally. If you have modified an analysis model and you read in, you lose the analysis model changes if another user has changed the same analysis model and has written out.
Custom components and sketched profiles	Custom components and sketched profiles database xslib.db1 is shared incrementally.
Standard-part model database	Standard-part model .db1 is shared when you save the standard-part model in a separate folder under the model folder. Ensure that XS_STD_PART_MODEL is set relative to the model folder and that it points to the correct standard-part model, for example, XS_STD_PART_MODEL=.\StandardParts\.

Catalogs

	Description
Profile catalog	Shared model contains the profile catalog file profdb.bin. When you add and use a new profile definition in the shared model, the definition is shared the next time you write out. When another user reads in this new definition, the profdb.bin file in the user's model folder is updated to include the added definition. You can also update (page 57) the profile catalog with new definitions without creating any new objects or change the existing profile definitions of a profile that is already used in the model. For more information, see the 'How to share catalog updates' section below.
Rebar catalog	Shared model contains the rebar catalog file rebar_database.inp. When you add and use a new rebar definition in the shared model, the definition is shared the next time you write out. When another user reads in this new definition, the rebar_database.inp file in the user's model folder is updated to include the added definition. You can also update the rebar catalog with new definitions without creating any new objects. For more information, see the 'How to share catalog updates' section below.

	Description
Bolt catalog Bolt assembly catalog	Shared model contains the bolt catalog file <code>screwdb.db</code> and the bolt assembly catalog file <code>assdb.db</code>. When you add and use a new bolt definition or bolt assembly definition in the shared model, the definition is shared the next time you write out. When another user reads in this new definition, the <code>screwdb.db</code> and <code>assdb.db</code> files in the user's model folder are updated to include the added definition. You can also update the bolt catalog and bolt assembly catalog with new definitions without creating any new objects. For more information, see the 'How to share catalog updates' section below.
Material catalog	Shared model contains the material catalog file <code>matdb.bin</code>. When you add and use a new material definition in the shared model, the definition is shared the next time you write out. When another user reads in this new definition, the <code>matdb.bin</code> file in the user's model folder is updated to include the added definition. You can also update the material catalog with new definitions without creating any new objects. For more information, see the 'How to share catalog updates' section below.

UDAs, options, views, pour units

	Description
User-defined attribute (UDA) definitions	When a model is created, the user-defined attribute definitions are read from the <code>objects.inp</code> files and the definitions are stored to the <code>environment.db</code> database. Modified and added new attribute definitions are shared incrementally. New attribute definitions are added to the database automatically when the model is opened. If the current <code>objects.inp</code> file has a different definition than the <code>environment.db</code>, it is possible to take changes to use by clicking File --> Diagnose & repair --> Diagnose and change attribute definitions. If the <code>objects.inp</code> file is in the model folder, it is shared as a file and it overrides the local <code>objects.inp</code> file when you read in.
Options	When a model is created, the options are read from the <code>options.ini</code> files and the model-specific

	Desription
	options are stored to <code>options_model.db</code> and <code>options_drawings.db</code> databases. Model-specific options can be modified using the Options and Advanced options dialogs. Modifications to model-specific options are shared incrementally. - Some of the options are of the type SYSTEM(ROLE). These options are read from the <code>.ini</code> files and are not shared. It is possible to change SYSTEM(ROLE) model option to MODEL(ROLE) option and the drawing option to DRAWINGS(ROLE) option. The options are then stored to the <code>options_model.db</code> or <code>options_drawings.db</code> databases in the model folder, and the value is shared incrementally. - Some of the options are of the type USER. These options are user-specific and they are not shared. - Some of the options are of the type SYSTEM. These options are user-specific and they are not shared. It is possible to change a SYSTEM option to a MODEL(SYSTEM) option. If you change a SYSTEM option to MODEL(SYSTEM), the changed value only works for the current model. These options are not shared.
Other important files in the model folder	The database ID range mapper file <code>db.idrm</code> and the library database ID range mapper file <code>xslib.idrm</code> are related to the handling of IDs. These files are needed, for example, to open drawings that have been created in single-user or multi-user modes. The <code>plotdev.bin</code> file contains the print device definitions that you create in Printer Catalog (old printing). The file is shared when located in the model folder. NOTE If your project has users that work in different offices and with different printers, you should not save any local changes to the <code>plotdev.bin</code> file in the model folder. Save the local changes in the XS FIRM folder instead.
View sharing	By default, views are not shared. Views are shared if they have a name, and the Share option in the View Properties dialog is set to Shared. Note that when you join a model, you get all the model views but changes to the views are not shared if the Share option is set to Not shared.

	Description
Pour unit information	Automatic assignments of objects to pour units are not shared. Each user has to run the Calculate pour units command in their local version of the shared model to update the pour units. Manual assignments created by using the Add to pour unit and Remove from pour unit commands are shared.

How different object types work in shared models

When several users modify the model at the same time in Tekla Model Sharing, conflicts may occur.

In general, all object types work similarly in Tekla Model Sharing. When you read in, the changes in the incoming packet override your local changes to the same object. In other words, if several users modify the same object, the user who first writes out the changes to the sharing service wins in conflicts.

Before you start to share models, agree on common ways of working. For example, you can agree that users work on different areas of the model.

Object / Property	Description
Model objects	A shared modification to an object property overrides any other object property modification. For example, one user modifies a beam profile and writes out. Another user has modified the material of the same beam and reads in. The user who modified the beam material loses the changes, because the shared changes override the local changes to the same object.
Family numbering	Check the family numbering settings. Family numbering settings are shared but cannot be incrementally updated. We recommend that one user first reads in all the packets, makes the updates and then shares the settings by writing them out. If the user needs to read in before writing out, it is important to check that the settings are as they were before starting to share them. Give start numbers in wide ranges so that you do not run out of numbers within a numbering series, and that any numbering series does not overlap with another. We recommend you to use the Number series of selected objects command on the Drawings & reports tab when numbering.

Object / Property	Description
Grids	If there is a conflict in sharing grids, grids are recreated using the original values that have been set in the grid properties. Any manually added grid lines are lost. For example, when two users modify a grid by adding extra grid lines and write out, the added grid lines disappear from the model when they read in.
Catalogs	Check the catalogs so that they include all the needed definitions. Starting from Tekla Structures 2018, the shape geometry files that are in .xml format are automatically converted to .tez format in shared models.
User-defined attributes (UDAs)	A shared change to a user-defined attribute (UDA) overrides changes to the same UDA only. For example, a change in the Comment UDA overrides a change to the Comment UDA but not to the Shorten UDA. A shared change to a part does not override UDA changes and vice versa.
Part and the related component	A shared change to a part does not override component changes and vice versa.
Custom components	If a user deletes a custom component from the Applications & components catalog in the local version of the shared model, reading in causes an instance of the custom component to appear in the model even if the component was not used in the model. You cannot edit the component instance in the model. If you need to edit the component, explode it first.
Drawings	There can be duplicate drawings from the same part. For example, two users create drawings from the same part when they are working on their local versions of the shared model. When both users write out their changes, two drawings appear in Document manager. Tekla Structures does not delete either of the drawings, and it does not merge the changes from the drawings. You need to visually check the drawings and decide which drawing to delete, or to use drawing locks (page 41) to prevent other users modifying the drawings.

Object / Property	Description
Pours	Agree whether pour management will be used in the model and set XS_ENABLE_POUR_MANAGEMENT accordingly. If pour management is enabled in the model, do not disable it using XS_ENABLE_POUR_MANAGEMENT, especially in the middle of the project. This may cause problems if you have drawings containing pour objects, and if you are sharing your model. The pour objects and pour breaks in the model and in the drawings may get invalid, and you may lose all pour-related modeling work. Automatic assignments of objects to pour units are not shared. Each user has to run the Calculate pour units command in their local version of the shared model when they need up-to-date pour unit information. For example, user 1 moves a reinforcing bar so that it touches a pour object, runs the Calculate pour units command to add the bar to the pour unit, and writes out. When user 2 reads in, user 2 sees that the reinforcing bar has been moved, but the bar has not been added to the pour unit. Manual assignments, and other modifications to pour objects and to the objects attached to the pour objects (such as changes to geometry or location), are shared. A shared manual change in pour unit assignment overrides a local change. For example, user 1 adds an embed to a pour unit by using the Add to pour unit command, and writes out. User 2 has added the same embed to another pour unit by using the Add to pour unit command. When user 2 reads in, user 2 sees that the embed has been added to the pour unit user 1 added it to.
Standard files for numbering setup	Standard files for numbering setup are not loaded automatically when you read in. If you want to take them in to use, you need to reload them after reading in.

WARNING If an object deletion has been written out to the sharing service, the object will be deleted in your model when you read in. This happens regardless of whether you have modified the object before reading in. Deleted objects remain deleted if the deletion has been shared.

Deleted objects are not visualized when you read in.

Exclude files and folders from Tekla Model Sharing

By default, files and sub-folders in the model folder, and in firm and project folders, are shared when you share a model in Tekla Model Sharing. If you do not want to share all of the files or sub-folders, you can select to exclude some of them from sharing.

NOTE Tekla Model Sharing works only if the model is the same for all users. Tekla Structures takes care of model-specific data sharing. You can only exclude files that do not have an effect on the model. You cannot exclude any of the databases that are in the model folder, `xslib.db1`, for example.

Empty sub-folders under the model folder and some files are excluded automatically.

-
1. On the **File** menu, click **Sharing** --> **Sharing settings** .

The **Sharing settings** dialog opens.

2. Click the **Exclude** button to see which files and folders are excluded from sharing, and to exclude more files or folders.

Some files and folders are excluded automatically from sharing. These files and folders appear on the **Excluded model folder files and directories** list, and they cannot be removed from the list.

- a. If you want to exclude more folders or files, click the **Directory** or the **File** button.
- b. Select the folder or the file to be excluded.

The excluded folders and files are added to the **Excluded model folder files and directories** list.

If you exclude a folder, all its sub-folders and sub-files are also excluded from Tekla Model Sharing.

You can exclude files in several ways. For example, if you have a file called `TeklaStructures.bbb`, and you use the following settings to exclude the files:

Option	Description
(x.x)	<code>TeklaStructures.bbb</code> is excluded from sharing.
(x.*)	All the files with <code>TeklaStructures.</code> are excluded from sharing.
(*.x)	All the files with <code>.bbb</code> are excluded from sharing.
(*.*)	All the files from that folder, but not from its sub-folders, are excluded from sharing.

- c. If you want to remove the added folders or files from the list of excluded files, click **Remove**.

You cannot remove a folder or a file that has been excluded automatically.

3. Click **OK** when you have finished selecting the excluded files.

Use a Trimble Connect project as the project or firm folder

When you need to set up a project folder `XS_PROJECT` or a firm folder `XS_FIRM` to be used in Tekla Model Sharing, the most convenient way to do this is to use a Trimble Connect project as the project or the firm folder.

The project and firm folder information is only updated from the Trimble Connect project to the local versions of the shared models, not vice versa. In practice, this means that Tekla Structures downloads new files from the project or firm folder to the local model and updates any changed files.

How to share catalog updates

Sometimes you may need to update catalogs with new definitions, such as new profiles, and share the changes without creating any objects with the new definitions.

1. Ensure that all users on the shared model [write out \(page 23\)](#) their changes.
2. [Read in \(page 21\)](#) all the model changes.
3. Update the needed catalogs.
4. Create a new [baseline \(page 30\)](#).
5. Ensure that all users [join \(page 17\)](#) the created baseline.

After users have joined the baseline:

- a. Ensure that users check that their settings for excluded files and folders are up-to-date in **File --> Sharing --> Sharing settings --> Exclude**, or that they copy the `FileSharing.ini` file from the previous local version of the model in `..\TeklaStructuresModels\<model>\ModelSharing\Settings`.
- b. Ensure that users remove their previous local versions of the model.

How to share Organizer data

By default, **Organizer** data is not shared. However, you can use the **Organizer** import and export with Tekla Model Sharing to share **Organizer** changes.

1. Select a user who is responsible for the **Organizer** data. This is User A.
2. User A creates the **Organizer** data and exports the data to a model subfolder.

Note that the selected folder cannot be the default `ProjectOrganizer` folder.

3. User A [writes out \(page 23\)](#).

4. User B [reads in \(page 21\)](#) and notices that there is new data available.
5. User B opens **Organizer**, synchronizes, and imports the data that User A has exported by using the import and replace option. User B synchronizes **Organizer** again.

The data appears as new in **Organizer**.

How property files in the XS_FIRM and the XS_PROJECT folders are shared

You can store property files in user-defined sub-folders under the firm or project folders. The property files are copied and shared in Tekla Model Sharing in two situations: when you start sharing a model, or when you have a shared model open and click the **Copy files** button in the **Sharing settings** dialog.

Property files are copied and shared from the following folders:

1. The `\attributes` folder under the model folder.
2. The user-defined sub-folders under the `XS_PROJECT` folder.
If the `XS_PROJECT` folder is empty, Tekla Structures skips it when copying files.
3. The user-defined sub-folders under the `XS_FIRM` folder.
If the `XS_FIRM` folder is empty, Tekla Structures skips it when copying files.
4. The sub-folders of the environment folder.

The folders are searched in the order they are listed above. When Tekla Structures finds the first corresponding file, that file is selected. Other corresponding files are ignored, and the file names are stored in the error log.

Note that if the following folders are immediate sub-folders of project or firm folders, Tekla Structures does not read property files from the folders:

- `ProjectOrganizerData`
 - `ProjectOrganizerData\DefaultCategoryTrees`
 - `ProjectOrganizerData\PropertyTemplates`
 - `ProjectOrganizerData\ExcelTemplates`
- `AdditionalPSets`
- `macros`
 - `macros\drawings`
 - `macros\modeling`
- `Drawing Details`
- `CustomInquiry`

- PropertyRepository\Templates
- symbols
- template
 - template\mark
 - template\settings
 - template\tooltips
- profil
 - profil\ShapeGeometries
 - profil\Shapes

Best practices in Tekla Model Sharing

To keep your shared models in good shape and to share your changes successfully, follow the Tekla Model Sharing best practices below.

NOTE The users of the same shared model need to have the same Tekla Structures version, and use the same latest service pack.

Use GUIDs correctly in shared models

Tekla Structures objects have an identifier that is shown as an object GUID, Globally Unique Identifier, that is also used in Tekla Model Sharing.

This means that features that do not use GUIDs need to be changed to use GUIDs.

- Interoperability import/export actions:
 - FabTrol XML
 - ASCII
- All other applications, macros and report processes that rely on static IDs.

Save local versions of shared models on your computer

We recommend that you save the local versions of shared models on your computer instead of a network drive for two main reasons.

- The performance of shared models is better when the local models are saved on your own computer. This means that the models open faster, for example.

- Saving shared models on your own computer prevents other users from accessing them and accidentally blocking important files.

If you still want to save local models on a network drive, use a private network drive that other users cannot access.

Create baselines regularly

The **Owner** of a model should create baselines of the model regularly. For example, you can create a baseline once a week.

We recommend creating a new baseline each time a new user has been invited to the model. This way, joining the shared model is faster.

Back up shared models

We recommend you to back up the models used in Tekla Model Sharing. In case there are problems with a shared model, it is possible to select any user's local version of the model, or a model that has been backed up, and continue working using that model. Make sure that you have the complete backed up model in use and that the model folder includes, for example, drawings and different databases. This ensures that the model functions properly and you do not lose any data. If the backed up version of the model is old, reading in all the changes may take some time.

Back up your models according to your company conventions, for example, by using Windows Backup. You can also use the **File --> Save as --> Save and create backup copy** command to create a backup copy of the model. The backup copy will have the same GUIDs as the original model.

Note that the **Save as** command cannot be used for backing up the model. If you use **Save as**, the model gets new IDs and it has no relation to the original model. If you use the **Save as** command, the model history is not copied with the saved model.

Number model objects in Tekla Model Sharing

Numbering a shared model has three main phases: reading in the changes made by other users, numbering a series of objects, and writing out the numbering changes. Always use the **Number series of selected objects** command when you number parts in a shared model. To avoid unnecessary work and conflicts, do not use the **Number modified objects** command.

Before you start numbering objects in a shared model, you should plan the numbering carefully. We recommend that you divide the model into phases, and each user only numbers objects within the phase they are working on. This way, you can avoid numbering conflicts in your shared models.

To number a phase, do the following:

1. Finish the changes you are making in the phase that you are working on.
2. Save the model.

3. [Read in \(page 21\)](#) the changes made by other users.
4. Review the changes and save the model.
5. Select the parts in a numbering series that have been modified.
You can create selection filters to select objects in a specific numbering series. For example, you can create a selection filter that allows you to select objects with the same assembly start number.
6. On the **Drawings & reports** tab, select **Perform numbering --> Number series of selected objects** .
Repeat steps 5 to 6 for different numbering series, if needed.
7. When numbering has been performed successfully, save the model.
8. [Write out \(page 23\)](#) your changes immediately.

Reference model handling in Tekla Model Sharing

If Tekla Model Sharing uses reference models, one user can insert a reference model to the Tekla Structures model. When other users read in, the data related to the reference model is copied to the `..TeklaStructuresModels\<model name>\datastorage\ref` folder, and the reference model is displayed in the **Reference models** side pane.

If you delete the original reference model from the original location, a copy of the reference model remains in the `datastorage` folder. When a Tekla Model Sharing user writes out, the content in the `datastorage/ref` folder is shared.

You cannot exclude reference models from Tekla Model Sharing, and all reference models are public for other Tekla Model Sharing users.

If the reference model needs to be updated

When an existing reference model is updated, a new version of it is copied to the `datastorage/ref` folder.

- If there is an updated version of the reference model in the original file location with the same file name, select the reference model in the

Reference models side pane and click the  **Refresh** button. Otherwise the reference model is not taken to use in the Tekla Structures model.

- Alternatively, you can save an updated copy of the reference model with a different name, and then update the new version by using the **Change detection** functionality.

Do not replace the existing reference model with a totally different reference model. This leads to an error with the following error message:

Warning: no suitable reference sub object found for id xxxxx.

Deleting a reference model and replacing it with a new version of an existing reference model as a totally new reference model changes GUIDs, and the references disappear from drawings, for example.

React to Tekla Model Sharing error messages

If you encounter problems, check the following error messages for troubleshooting.

Licensing, sign-in, and opening errors

Message: Failed to open model.

Description: This message appears when the selected model cannot be opened.

This can happen if a model is corrupted, or if another program is reserving files that are important for opening the model.

Solution:

1. Look for errors in the following log files:
 - In the `\logs` folder under the model folder:
`modelsharing.log`, `error_<user>_<YYYYMMDD>_<HHMMSS>.log`,
and `sharingfacade.log`
 - In the `\TeklaStructuresModels` folder:
`TeklaStructures_<user>.log`
 - In the `\Users\<user>\AppData\Local\Tekla DataSharing`
folder: `ClientLog_cat.txt` and `ClientLog_dog.txt`
2. Proceed as the error messages require.
For example, if another application is blocking a file, close that application.
3. If you do not know how to proceed or the issues persist, [contact Tekla Structures support](#).

Message: Invalid database files have been detected: [invalid files]

Description: When you open a shared model, certain database files are checked.

This message appears if there are issues in the database files that are checked. The invalid files are listed at the end of the error message.

Solution:

1. Look for errors in the following log files:

- In the `\logs` folder under the model folder:
`modelsharing.log`, `error_<user>_<YYYYMMDD>_<HHMMSS>.log`,
and `sharingfacade.log`
 - In the `\TeklaStructuresModels` folder:
`TeklaStructures_<user>.log`
 - In the `\Users\<user>\AppData\Local\Tekla DataSharing`
folder: `ClientLog_cat.txt` and `ClientLog_dog.txt`
2. Proceed as the error messages require.
For example, if another application is blocking a file, close that application.
 3. If the model is currently open, diagnose and repair the model.
 4. If the problem persists, try to take a backup copy in use by replacing
all `.db` files in the model folder with `.db.bak` files.

Message: Login failed

Description: Signing in to the Tekla Model Sharing sharing service has failed.

Solution:

1. Open Internet Explorer and clear the browser cookies.
2. Optionally, sign out from all Tekla Online services and ensure the services
do not automatically remember your sign-in information.
3. Try signing in again.
4. If the issues persist, [contact Tekla Structures support](#).

Message: Model does not exist.

Description: The model that you are trying to open has been deleted from the
Tekla Model Sharing Service.

Solution: If you need to access the deleted model, [contact Tekla Structures
support](#).

Message: Model requires environment: [Environment name]

Description: The model has been shared with a particular environment, but
you are trying to join the model using another environment.

We recommend that you use the original environment, if possible. Using
another environment might cause problems when you are working with the
model.

Solution: According to your situation, do either of the following:

- To join the model with another environment, click **OK**.

- To use the original environment, click **Cancel** and switch to the original environment.

Message: The command could not be completed, Tekla Structures must close. After restarting Tekla Structures run diagnose & repair command and try again.

Description: Tekla Structures cannot perform the selected command right now because of errors and inconsistencies in model objects or the library database (`xslib`).

Solution:

1. Restart Tekla Structures.
2. Open the shared model that you were working with when Tekla Structures was closed.
3. On the **File** menu, click **Diagnose & repair**, and select an appropriate command.
4. Try to perform the selected command again.

Message: The command could not be completed, Tekla Structures must close. Try again after restarting Tekla Structures.

Description: Tekla Structures cannot perform the selected command right now.

For example, this might happen because of a database issue or a canceled operation.

Solution:

1. Restart Tekla Structures.
2. Open the shared model that you were working with when Tekla Structures was closed.
3. Try to perform the selected command again.
4. If the issues persist, [contact Tekla Structures support](#).

Message: You do not have permissions to remove model from service.

Description: For safety reasons, only Tekla Model Sharing users with the **Owner** role can exclude models from the Tekla Model Sharing sharing service.

This message appears if you are trying to exclude a model from the Tekla Model Sharing sharing service, but your role (**Editor**, **Viewer**, or **Project viewer**) does not allow doing that.

Solution: Do either of the following:

- Ask a user with the **Owner** role to change your role.
- Ask a user with the **Owner** role to exclude the model from the Tekla Model Sharing sharing service.

Message: Your Tekla Model Sharing license subscription expires in [X] days.

Description: Your Tekla Model Sharing subscription is about to expire.

Solution: Contact your organization's administrator and ask them to renew your subscription.

File removal errors

Message: Removing model from the service failed.

Description: Tekla Structures cannot exclude the model from the Tekla Model Sharing sharing service.

Solution:

1. Try again.
2. If the issues persist, [contact Tekla Structures support](#).

Message: Removing model from the computer failed.

Description: You cannot delete the selected model from your computer.

Solution:

1. Ensure that the model still exists on your computer.
2. Ensure that the model or any of its files are not open in Tekla Structures or in another application.
3. Try again.

Message: Removing model from the computer failed. Model is in use.

Description: You cannot delete the selected model from your computer because the model is currently open.

Solution:

1. Close the model.
2. Try deleting the model again.

Message: The Tekla Cloud service cannot be removed from list of known services.

Description: Users cannot delete the Tekla Cloud service.

Role and permission errors

Message: Your permission level has been modified. You no longer have permissions to manage users for this shared model. You can continue to use the model otherwise. Contact the model owner if you need permissions.

Description: A Tekla Model Sharing user with the **Owner** role has changed your role in the shared model, so that you can no longer manage the users of the model in the **Users** dialog.

Solution:

Do either of the following:

- Ask a user with the **Owner** role to change your role to **Owner**. Then, try again.
- Ask a user with the **Owner** role to manage the users as necessary.

Sharing and connection errors

Message: Check the port number.

Description: The port number is incorrect.

Solution:

1. Find out the correct port number.
2. Type the correct port number, and try again.

Message: Check the server name.

Description: The server name is incorrect.

Solution:

1. Find out the correct server name.
2. Type the correct server name, and try again.

Message: Connecting to model sharing service failed as the email is already in use in another organization.

Please check the model sharing log, and contact Tekla Structures support if the problem persists.

Description: You cannot connect to the Tekla Model Sharing service because the email address that you are using has been added to another organization.

A user can only be added to one organization at a time.

Solution: According to your needs, do one of the following:

- Ask your organization's administrator to move you back to the original organization and add you to the new organization as an external license user.

This way, you can work on existing models. Note that as an external user, you cannot start sharing new models.

- Create a new email address in the new organization, and then, create a new Trimble Identity using the new account.
- If you need full access to the models of both organizations, [contact Tekla Structures support](#).

- - -

Message: Connection to proxy server failed.

Description: Tekla Model Sharing cannot connect to the proxy server.

Solution:

1. Ensure that you have access to the proxy server.
2. Ensure that the proxy server is running.

Even when Tekla Model Sharing cannot connect to the proxy server, Tekla Model Sharing can retrieve information using the sharing service.

- - -

Message: Different Tekla Structures versions cannot be used in the same model sharing project.

You can save the model and start sharing again to create a new project, or close the model without saving and continue with the original version [version number].

Description: All users need to use the same Tekla Structures version when working on a shared model.

This message appears if you try to open a shared model with a different Tekla Structures version.

Solution: Do either of the following:

- Save the model in the Tekla Structures version that you are using, and start sharing the newly saved model.
- Close the model without saving it and open the model using the Tekla Structures version with which the model was originally shared.

Message: Exclude from sharing failed.

Description: Tekla Structures cannot exclude the model from the Tekla Model Sharing sharing service.

Solution:

1. Look for errors in the following log files:
 - In the \logs folder under the model folder:
modelsharing.log, error_<user>_<YYYYMMDD>_<HHMMSS>.log,
and sharingfacade.log
 - In the \TeklaStructuresModels folder:
TeklaStructures_<user>.log
 - In the \Users\<user>\AppData\Local\Tekla DataSharing
folder: ClientLog_cat.txt and ClientLog_dog.txt
2. Proceed as the error messages require.
For example, if another application is blocking a file, close that application.
3. If you do not know how to proceed or the issues persist, [contact Tekla Structures support](#).

Message: Failed to write out model changes. Reason: Failed to create the data. Path is too long. maximum length is 125.

Description: The shared model is located on a network drive whose path is too long.

Message: Fatal database integrity error discovered during the operation. Use the Diagnose Model command to find problematic objects.

Description: Some of the databases that the model uses have been corrupted. Tekla Structures needs to diagnose the model to find out how the model can be repaired.

Solution:

1. Go to **File** menu and select **Diagnose & repair --> Diagnose model**.
The errors and inconsistencies found in the model are listed in a report. Some of them are automatically corrected, some of them are warnings that you need to correct manually.
For more information, see Diagnose and repair the model.
2. If you do not know how to proceed or the issues persist, [contact Tekla Structures support](#).

Message: Not enough memory.

Description: A change management operation has failed because of insufficient system memory.

Message: Operation is not allowed for shared model.

Description: This message appears when you are trying to fix ID gaps in a shared model. Fixing ID gaps is only used to repair models that are not shared and that have been saved in Tekla Structures 2016i or older.

Solution:

1. To release memory, close some open applications.
2. Try again.

Message: Sharing operation failed.

Description: Tekla Model Sharing cannot find all necessary information.

Solution:

1. Ensure that you have not used characters that Tekla Model Sharing cannot recognize, such as semicolon (;).
2. Look for errors in the following log files:
 - In the `\logs` folder under the model folder:
`modelsharing.log`, `error_<user>_<YYYYMMDD>_<HHMMSS>.log`,
and `sharingfacade.log`
 - In the `\TeklaStructuresModels` folder:
`TeklaStructures_<user>.log`
 - In the `\Users\<user>\AppData\Local\Tekla DataSharing`
folder: `ClientLog_cat.txt` and `ClientLog_dog.txt`
3. Proceed as the error messages require.
For example, if another application is blocking a file, close that application.
4. If you do not know how to proceed or the issues persist, [contact Tekla Structures support](#).

Message: Sharing operation failed. Please check the Internet connection and Tekla Model Sharing Status in <https://status.tekla.com/>.

Description: Tekla Model Sharing cannot retrieve all necessary information.

Solution:

1. Check that your Internet connection works properly.

2. Go to <https://status.tekla.com/> and check the Tekla Model Sharing Status.

Message: Sharing operation failed. Please check the model sharing log, and contact Tekla Structures support if the problem persists.

Description: Tekla Model Sharing cannot retrieve all necessary information.

Solution:

1. Open the `\logs` folder under the model folder.
2. Look for error messages in the `modelsharing.log` file.
3. Proceed as the error messages require.
4. If you do not know how to proceed or the issues persist, [contact Tekla Structures support](#).

Message: Sharing operation failed. Service could not be reached - realm or server address could be wrong. Please check the model sharing log, and contact Tekla Structures support if the problem persists.

Description: Tekla Model Sharing cannot retrieve all necessary information.

Solution:

1. Open the `\logs` folder under the model folder.
2. Look for error messages in the `modelsharing.log` file.
3. Proceed as the error messages require.
4. If you do not know how to proceed or the issues persist, [contact Tekla Structures support](#).

Message: Invalid database files have been detected: [invalid files].

The versions of these databases do not match. To enable sharing operations in this model, backup files will be used.

Description: Some of the databases used in the shared model have been deleted or replaced with irrelevant databases. Instead, Tekla Structures automatically uses the available backup files. You do not need to react to this message.

Message: Invalid database files have been detected: [invalid files].

The versions of these databases do not match. To enable sharing operations in this model, databases are needed from a model that has the correct version (packet number).

Description: Some of the databases used in the shared model have been deleted or replaced with irrelevant databases. Because of this, Tekla Structures cannot open the model.

Solution:

1. In the shared model, [join \(page 17\)](#) the packet that is mentioned in the error message.
2. Open File Explorer and copy the necessary database file to the newer version of the model.
3. Try opening the model again.

Message: This model has been shared in a previous version. Sharing operations cannot be used in this release. If you save the model in this version, it will be excluded from sharing.

/

This model has been shared in a previous version. If you save it now, it will be excluded from sharing.

Description: The current model has been shared in an earlier Tekla Structures version, so you cannot share your changes or read in other users' changes with a newer Tekla Structures version.

Solution:

Do either of the following:

- Close the model without saving, and open it with the earlier Tekla Structures version with which it has been shared.
- If you want to use the current version of Tekla Structures, save the model and start sharing the model again with the newer version.

Note that all other Tekla Structures users in the project also need to use the newer version.

Read-in and write out errors

Message: Another user has reserved the next write out

Description: This message appears if another user has already reserved the next write out.

You cannot reserve the next write out if another user has already reserved it.

Solution: Do any of the following:

- Find out who the other user is and ask them to [release the next write out. \(page 23\)](#)
- Wait for the other user to write out their changes before you write out your changes.

- Wait for an hour.
If the other user does not write out their changes in that time, the next write out will be released.
- Ask a user with administrator rights to unlock the model in Management Console for Tekla Model Sharing.
When an administrator unlocks the model, the next write out is released.

Message: Failed to populate the changes list

Description: This message appears when change management fails to show the list of latest changes.

Solution:

1. Look for errors in the following log files:
 - In the `\logs` folder under the model folder:
`modelsharing.log`, `error_<user>_<YYYYMMDD>_<HHMMSS>.log`,
and `sharingfacade.log`
 - In the `\TeklaStructuresModels` folder:
`TeklaStructures_<user>.log`
 - In the `\Users\<user>\AppData\Local\Tekla DataSharing` folder: `ClientLog_cat.txt` and `ClientLog_dog.txt`
2. [Contact Tekla Structures support.](#)

Message: Failed to release next write out.

Description: This message appears if you cannot release the write out that you previously reserved.

This is usually an Internet connection issue.

Solution:

1. Check your Internet connection.
2. Try again.
OR
Wait one hour. The write out is automatically released after that time.

Message: Failed to reserve next write out.

Description: This message appears if you cannot reserve the next write out.

Solution:

1. Check your Internet connection.

2. Try again.

OR

Find out if another user has reserved the next write out. If yes, you can ask them to release the next write out.

Message: No new shared data available.

Description: You can only read in changes that other users have shared.

This message appears in the status bar at the bottom of Tekla Structures when you try to read in other users' changes, but no new changes have been shared.

Message: Please provide comment for operation

Description: A comment is required whenever you reserve the next write out in a shared model.

This message appears if you have attempted to reserve the next write out without typing a comment.

Solution:

1. Click **OK** to close the error message.
2. Type a comment that describes why you want to reserve the next write out.
3. Click **Reserve**.

Message: The following characters are not allowed in Code or Comment field: < & >

Description: This message appears if you try to use the characters "<", "&", or ">" when you type a revision code or comment at write-out.

Note that you can only type revision codes or comments if the **Enable write out revision comment** checkbox is selected in the **Sharing settings** dialog.

Solution:

1. Remove the forbidden characters from the revision code or revision comment.
2. Click **Save** to write out your changes.

Message: The revision code exceeds maximum length ([X] out of [Y] characters used).

Description: The revision code that you have typed is too long.

Solution: Type a shorter revision code.

Message: The revision comment exceeds maximum length ([X] out of [Y] characters used.)

Description: The revision comment that you have typed is too long.

Solution: Type a shorter revision comment.

Message: Write Out is not allowed because the model is not up to date. Use Read In to update the model.

Description: You cannot write out your changes before you have read in the changes that other users have made before you.

Solution:

1. On the **File** menu, click **Sharing** --> **Read in**, or click  on the Quick Access Toolbar.
2. View the changes made by other users.
3. To share your changes, on the **File** menu, click **Sharing** --> **Write out**, or click  on the Quick Access Toolbar.

Repair Tekla Model Sharing issues

Restore shared models

For administrators

If a shared model has problems that might cause loss of working time, a company administrator can delete the model versions that have problems using Management Console for Tekla Model Sharing.

[Management Console for Tekla Model Sharing](#) provides a web-based access for administrators to manage all shared models of an organization. An administrator can lock a model and name one user as the lock owner who can investigate the model in Tekla Structures. Once the lock owner finds the problem, the administrator can delete the model versions that are causing the problem, and then unlock the model so that it can be used normally again.

While the model is locked, the sharing commands in Tekla Structures are available as follows:

- The **Read in** and **Write out** icons have yellow arrows . Only the lock owner can use these commands.
- On the **File** menu, the **Read in**, **Write out**, **Create baseline** and **Users and data** commands are available for the lock owner.

- In the **Shared models** dialog, the **Edit model**, **Manage users**, and **Remove model from cloud** commands   , and joining a particular model are available for the lock owner.

For other users the sharing commands are not available.

If a user of the shared model has already read in or written out any of the model versions that the administrator has deleted, Tekla Structures shows the



Write out and **Read in** icons with red arrows for this user. The sharing commands on the **File** menu are not available. The user needs to rejoin the model.

If a user is not using any of the deleted versions, the user does not need to rejoin.

Note that it is also possible to revert to an earlier version of the model without further investigating it. The administrator can lock the model in Management Console for Tekla Model Sharing, delete the versions that are not needed or that contain errors, and then unlock the model. After this, the users need to rejoin the valid version of the model.

When the model versions are deleted, the changes that have been made in those versions are lost from the model. The changes that should be included in the model need to be made again and read in.

For users

It is also possible that a user of a shared model restores an earlier version of the model in Tekla Structures, and that model is used in Tekla Model Sharing.

Do the following:

1. [Join \(page 17\)](#) the model again.
2. [Read in \(page 21\)](#) the packets until you have reached the preferred level in the model history.
3. [Exclude \(page 31\)](#) the model from sharing.
4. [Start sharing \(page 15\)](#) and invite other users again to the model.

Ensure that all the users within the model start to use the restored version of the model.

Upgrade a shared model to a newer Tekla Structures version

If you need to upgrade a Tekla Model Sharing model from an older version of Tekla Structures to a much newer version (for example, from Tekla Structures 2019 to Tekla Structures 2023), we recommend that you open and save the Tekla Model Sharing model one version at a time.

Before you continue to the next Tekla Structures version, check that the model works as intended, and back up the model before you continue upgrading to the next Tekla Structures version. When a Tekla Model Sharing model from an

older Tekla Structures version is opened in a newer Tekla Structures version, the model data is converted. If you skip some Tekla Structures versions, the database changes are more extensive and the potential need for manual rework to match the new and changed product features increases.

If you need to upgrade a shared model to a new Tekla Structures version in the middle of a project, we recommend you to do the following:

1. Ensure that all users on the shared model [write out \(page 23\)](#) their changes.
2. A company administrator [reads in \(page 21\)](#) all the changes, and saves a local version of the Tekla Model Sharing model.
We recommend that a backup copy of the model is created at this point.
3. A company administrator locks the model in the [Management Console for Tekla Model Sharing](#) so that other users cannot accidentally write out changes.
4. A company administrator opens and saves the Tekla Model Sharing local model in a new Tekla Structures version using the **Save** command. Do not use the **Save as** command.

The following message is displayed:

"This model was created using a previous release. If you save it now, you will no longer be able to open it in previous releases. This model has been shared in a previous version. If you save it now, it will be excluded from sharing. Do you want to continue?"

5. Click **Yes** to close the message.
6. To investigate that the Tekla Model Sharing model works correctly, do any of the following:
 - Run the repair commands.
 - Check that there are no errors in the log files.
 - Check that the drawings can be opened. When you open a drawing in the new Tekla Structures version, a new .dg file is created and the database conversion is done.
7. A company administrator [starts sharing \(page 15\)](#) the model with the new Tekla Structures version and invites the users.
8. Users open the new Tekla Structures version and [join to the new shared model \(page 17\)](#).

Rejoin the model if the model is not saved after write out

If there are errors in writing out changes to the sharing service, you might need to rejoin the model. Tekla Structures will show you an error message if the errors in the write out could cause database inconsistencies and corrupt model data.

When you write out, Tekla Model Sharing does the following:

1. Saves the model.
2. Prepares the incremental packet. The data in the model folder is not changed yet.
3. Uploads the incremental packet to the sharing service.
4. Saves the model again if the incremental packet is uploaded successfully. Local model data is updated with the needed information.

Tekla Structures will not show you an error message if there are errors at any step before step 4. The sharing service has not received the model update yet. You can try to write out again as the model folder does not contain any data that would prevent the write out. If there are new updates available for the model, first read in the updates and then try to write out again.

If there are errors at step 4, Tekla Structures shows you an error message advising you to rejoin the model. After joining, you can check from the [sharing history \(page 25\)](#) that your write out was uploaded to the sharing service.

Errors at step 4 mean that the model might not have been saved correctly, and model data might be corrupted or lost. The model has several different Tekla Structures databases each of them with their own baseline. If there are errors, the Tekla Structures model does not have all the needed information of what has been shared.

Start a new Tekla Model Sharing session after timeout

Tekla Model Sharing sessions time out if you do not read in or write out changes for 8 hours. When your session times out, you are disconnected from the Tekla Model Sharing service and the on-premises server.

In these cases, the **Read in** icon  on the Quick Access Toolbar does not show the number of available packets. However, packets might still be available to read in.

To start a new Tekla Model Sharing session and re-connect to the Tekla Model Sharing service, click the **Read in** icon  on the Quick Access Toolbar.

Get support for sharing issues

You can contact Tekla Structures support to solve Tekla Model Sharing issues.

Use the Support tool to contact Tekla Structures support directly. With the Support tool you can collect the model, related files, and log files that are needed to investigate the issues with Tekla Model Sharing.

To create a support request:

1. In the shared model, ensure that you have logged in using your Trimble Identity.

2. On the **File** menu, click **Help** --> **Contact Tekla support**.
 - a. In **Category**, select **Model Sharing**.
 - b. In **Problem description**, describe the problem in detail.
 - c. In **Steps to reproduce**, describe the steps as closely as possible.
 3. Click **Next**, and ensure that all the checkboxes are selected.
 4. Click **Next**, and check the summary.
 5. Click **Create case** to upload your case to Tekla Structures support.
- You will receive a confirmation email from Tekla Structures support.
- Additionally, you can invite Tekla Structures support to join the model to investigate the issue. Remember to remove any support email addresses from the user list after the model has been investigated.

1.2 Multi-user mode

Multi-user mode allows several users to access the same Tekla Structures model at the same time.

Several users can work on the same project and be aware of each others' progress. Using multi-user mode eliminates the need to copy and merge models.

Requirements for using multi-user mode

- Multi-user models must be saved in a network directory.
- All members of a multi-user model must use the same environment and role.
- All members of a multi-user model must use the same version and service pack of Tekla Structures.
- We recommend that all members of a multi-user model use the same configuration or license type.

If the configuration is not the same, ensure that all licenses generate the same types of components (conceptual or detailing components).

Advantages

- No duplicate models to control, track or store
- Using only one model reduces on site errors
- Erection plans based on a single master model
- Bolt and material lists generated from a single master model
- Ability to share the workload of large projects among many users
- Ability to collect model history (see XS_COLLECT_MODEL_HISTORY)

Other issues to consider

As with all projects, you must plan your multi-user project carefully. Some issues to consider are:

- Only one user at a time can save to the master model.
- Use a numbering plan. When working with multi-user models, always use the option **Synchronize with master model (save-numbering-save)** in the **Numbering setup** dialog to prevent saving conflicts.
- Schedule numbering sessions appropriately. It can take a long time to number larger models.
- If possible, assign distinct areas of the model to each user to avoid conflicts that may happen when several users are working in the same area.
- Do not use a mix of single-user and multi-user setups on one project. Saving a multi-user model in single-user mode deletes changes by other users working on the model, and can also corrupt the model. See [Saving in multi-user mode \(page 87\)](#) to find out how saving works in multi-user mode.

See also

[How multi-user works \(page 85\)](#)

[Multi-user system \(page 79\)](#)

Multi-user system

A Tekla Structures multi-user system runs in a TCP/IP network and consists of:

- A server computer running the multi-user server (`xs_server.exe` started by the `AlwaysUp` utility)
- A file server computer containing the master model
- Client computers running Tekla Structures

For information about the recommended multi-user setup, see Tekla Structures multi-user server 2.5.0 hardware recommendations.

Tekla Structures multi-user server as a service

Tekla Structures multi-user server runs as a service that is started automatically when you start the computer. You do not need to sign in to the service.

Tekla Structures multi-user server performs the following main tasks:

- Locks the model when somebody saves or numbers the model
- Identifies client computers

- Keeps track of active users in multi-user models
- Gives numbers for general arrangement drawings and multidrawings
- Shows warnings if another user has already edited or is currently editing drawings or the same model object

To optimize the performance of a multi-user system, run as few other programs as possible on the Tekla Structures multi-user server.

Server shutdown

We recommend that users save their working models to the master model before the Tekla Structures multi-user server is stopped. If the service is stopped before saving the working models, such as when the server computer needs to be restarted, restart the multi-user server service and have users save their working models to the master model.

Install Tekla Structures multi-user server as a service

The Tekla Structures multi-user server installer installs the multi-user server as a service. When you have installed the server, the service is always available and it is automatically started when the server computer is started. There is no need to log in and no need to start the server manually every time you start your computer. Tekla Structures multi-user server allows many users to work on the same model simultaneously.

We recommend that you use the latest multi-user server version available regardless of the Tekla Structures version that you use.

1. Download the multi-user server software installation file from [Tekla Downloads](#).
2. Double-click the installation file to run the installation.
3. Follow the steps in the installation wizard to complete the installation.

By default, the server is installed to:

```
c:\Program Files (x86)\Tekla Structures Multiuser Server
```

You cannot change the installation path during the installation.

If you install the multi-user server on your own computer, the server name is the name of your computer.

The multi-user server uses TCP/IP port 1238.

The installation log is written to the `xs_server.log` file that is available in `c:\ProgramData\TeklaStructuresServer`.

Restart the multi-user server service

If you see an error message that the model is locked, it might be useful to restart the Tekla Structures multi-user server service. You can restart the multi-user server service without restarting the server computer.

If you regularly restart the multi-user server service, we recommend that you reserve a particular time during each workday to restart the multi-user server service.

1. Ensure that all users of the Tekla Structures multi-user server have signed out of Tekla Structures.
2. Find and open the computer that hosts the Tekla Structures multi-user server service.

The name of the computer is the same as the server name that you type when you sign in to the multi-user model.

3. On the server computer, go to `..\ProgramData\TeklaStructuresServer`.

For example, `C:\ProgramData\TeklaStructuresServer`.

In the `..\ProgramData\TeklaStructuresServer` folder, there might be a file called `tcpip_localhost_<xxxx>.db`.

4. If the `tcpip_localhost_<xxxx>.db` file exists in the `..\ProgramData\TeklaStructuresServer` folder, delete the file.

If the `tcpip_localhost_<xxxx>.db` does not exist in the `<root folder>\ProgramData\TeklaStructuresServer` folder, continue to the next step.

5. Restart the **Tekla Structures Multiuser Server** service.
 - a. In the Windows Start menu, type `Services`.
 - b. In the search results, click **Services**.
 - c. In the **Services** dialog, find and select **Tekla Structures Multiuser Server**.
 - d. Click **Restart** and wait until the Tekla Structures multi-user service restarts.

TIP As an alternative to these steps, you can use the Task Scheduler app in Windows to create a task that automatically restarts Tekla Structures multi-user server:

```
net stop"" "Tekla Structures Multiuser Server"
net start"" "Tekla Structures Multiuser Server"
```

If you are an advanced user, you can optionally create a batch file to automate this process:

```
ECHO.
ECHO ***STOPPING SERVICE***
```

```

ECHO.
net stop"" "Tekla Structures Multiuser Server"
ECHO DELETING MULTIUSER DATABASE
cd C:\ProgramData\TeklaStructuresServer\
del /f tcpip_localhost_1238.db
ECHO STARTING SERVICE
net start"" "Tekla Structures Multiuser Server"
ECHO DONE

```

Install a new instance of the multi-user server service

You can have several instances of the Tekla Structures multi-user server service on the same server computer.

Installing new instances of the multi-user server service is very important if you want to have several models with the same name, because the multi-user server uses the model name to identify models.

Note that you can have approximately 80 instances of the Tekla Structures multi-user server service on the same server computer. The exact maximum number of instances is not known. If you need a large number of multi-user server services, we recommend that you divide the services between multiple server computers.

1. Find and open the server computer that hosts the multi-user server service.

The name of the server computer is the same as the server name that you enter when you sign in to the multi-user model.

2. Go to C:\Program Files (x86)\Tekla Structures Multiuser Server.
3. To create a new instance of the Tekla Structures multi-user server service, right-click **TS_MUSaas_Install**.
4. Select **Run as administrator** and click **Yes** to confirm.

The related Command Prompt window opens. You can see the default service name, port number and destination for the new instance. The last character of the service name is the identifier of the instance.

The default identifier is 2, whereas the default port number is 1239.

5. If necessary, change the identifier or port number of the new instance.

To	Do this
Change the identifier	a. Press I on the keyboard. b. Press Enter. c. Type the new identifier. d. Press Enter to change the identifier.
Change the port number	a. Press P on the keyboard. b. Press Enter.

To	Do this
	c. Type the new port number.
	d. Press Enter to change the port number.

6. When you are ready, press any key on the keyboard except for **I**, **P**, or **Q**.
A new instance of the Tekla Structures multi-user server is installed and started.
7. Press any key on the keyboard to close the Command Prompt window.

Uninstall an instance of the multi-user server service

If you need to uninstall an instance of the Tekla Structures multi-user server service, do the following:

1. Find and open the server computer that hosts the multi-user server service.
The name of the server computer is the same as the server name that you enter when you sign in to the multi-user model.
2. Go to `C:\Program Files (x86)\Tekla Structures Multiuser Server`.
3. To create a new instance of the Tekla Structures multi-user server service, right-click **TS_MUSaas_Uninstall**.
4. Select **Run as administrator** and click **Yes** to confirm.
The related Command Prompt window opens.
5. Type the identifier of the instance that you want to uninstall, and press **Enter**.
The identifier is the last character of the instance name. For example, if the instance name is `Tekla Structures Multiuser Server 2`, the identifier is `2`.
6. Type `Y` to confirm uninstalling the instance, and press **Enter**.
The selected instance of the Tekla Structures multi-user server service is stopped and uninstalled. All files stored in the associated multi-user server folder are deleted.
7. Press any key on the keyboard to close the Command Prompt window.

Change the server of a multi-user model

You can change the Tekla Structures server of a multi-user model.

1. On the **File** menu, click **Sharing** --> **Change multi-user server**.
2. Enter the new server name or select it from the list.

3. Click **Change**.

If the connection to the new server cannot be established, the old connection is restored.

NOTE The file `.This_is_multiuser_model` located in the model folder defines whether the model is a multi-user or a single-user model. The file includes also the name of the server. You can open the file using any standard text editor.

Convert a multi-user model to a single-user model

You can convert a multi-user model to a single-user model and open it in the single-user mode.

To	Do this
Convert a current, open model	On the File menu, click Sharing --> Convert to a single-user model . The current model is converted to a single-user model.
Convert some other than the current model	1. On the File menu, click Open --> All models . 2. Select the multi-user model to be converted from the list of models and click Convert to single-user model. 3. Click Convert in the Convert to single-user model dialog.

See also

[Convert a single-user model to a multi-user model \(page 84\)](#)

Convert a single-user model to a multi-user model

You can convert a single-user model to a multi-user model and open it in the multi-user mode.

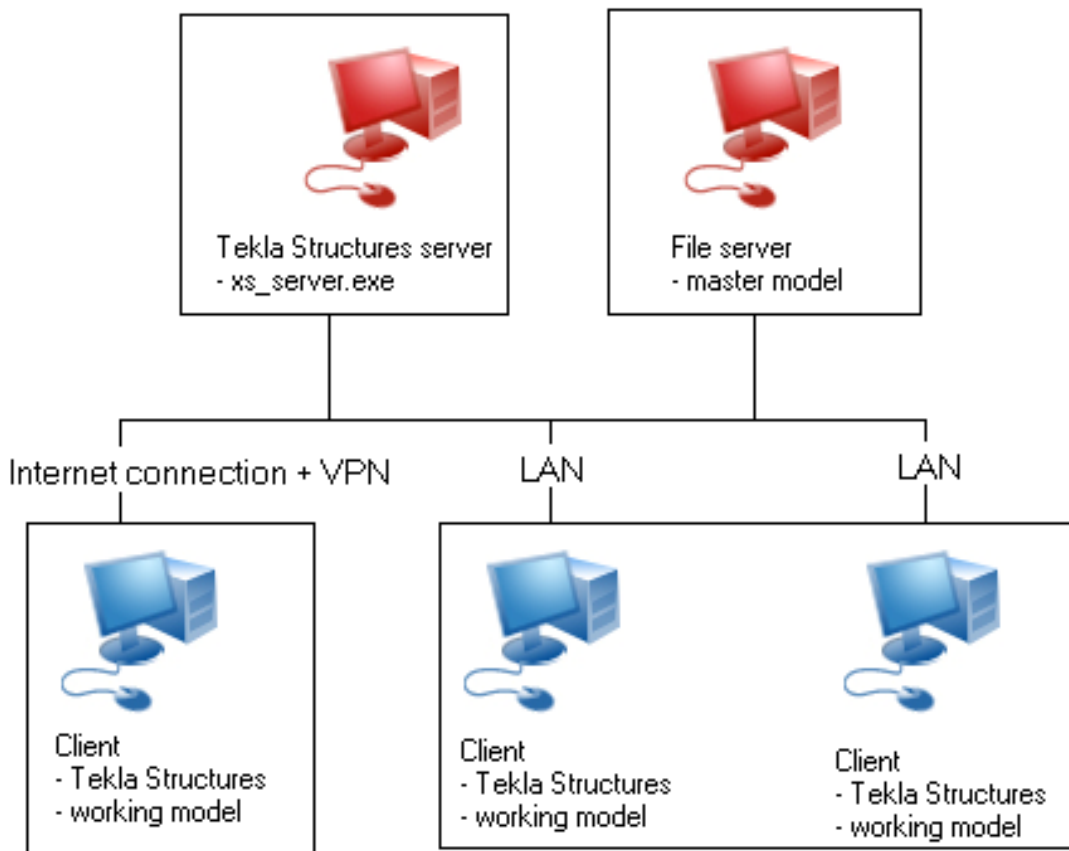
To	Do this
Convert a current, open model	1. On the File menu, click Sharing --> Convert to a multi-user model . 2. Enter the multi-user server name or select the name from the list in the Convert to multi-user model dialog.

To	Do this
	Click Convert. The current model is converted to a multi-user model.
Convert some other than the current model	- On the File menu, click Open --> All models. - Select the single-user model to be converted from the list of models, and click Convert to multi-user model. - Enter the multi-user server name or select the name from the list in the Convert to multi-user model dialog. - Click Convert.

See also

[Convert a multi-user model to a single-user model \(page 84\)](#)

How multi-user works



The multi-user model consists of a single *master model*. Each user can access this model and open their own local view of the model. This local view is called a *working model*. The above image shows one possible configuration of the multi-user system.

Any changes a user makes to his working model are local and are not visible to other users until he saves the working model to the master model.

The multi-user system can contain several *client computers*, where users work on their working models. The master model can be located anywhere on the network, including any of the client computers.

When you open a multi-user model on a client computer, Tekla Structures makes a copy of the master model to the memory of the client computer (a working model).

When you click **Save** to save your working model back to the master model, Tekla Structures:

1. Takes a new copy of the master model and compares your working model with it.
2. Saves the changes in your working model to the copy of the master model (locally).

3. Saves this copy back to the master model. (When other users save their working models, they can now see your changes.)
4. Takes a new copy of the master model and saves it locally as your working model. (You can see your own changes and those uploaded by other users.)

The multi-user model is locked during opening, saving and numbering. When one of the users performs any of these operations, other users cannot perform them during that time.

Locks for models in multi-user mode

To preserve the integrity of the multi-user model, Tekla Structures locks the master model when a user:

- Opens the multi-user model
- Saves a working model to the master model
- Runs numbering

When you try to save the model that is locked, Tekla Structures gives you an option to queue for saving until the model is unlocked. Tekla Structures keeps on retrying saving every 15 seconds until the operation is completed or until you cancel the operation.

See also

[Saving in multi-user mode \(page 87\)](#)

Saving in multi-user mode

Tekla Structures preserves the integrity of the model, even if more than one user modifies the same model objects. If two users modify the same object, then save to the master model, the master model will only contain the changes of the user who most recently saved their working model to the master model.

TIP To avoid potential save conflicts, have users work on different areas of the model.

Tekla Structures creates connections to the right parts, even if the part is moved by another user.

Note that if you use the **Save as** command to save the model, the model history is not copied with the saved model.

Speeding up the saving process

The following advice may help in speeding up the saving process:

- Check your network connection speed, because it can slow down the saving process significantly.
- Close down all the views of the model before saving.
- Set the advanced options `XS_PROJECT` and `XS_FIRM` so that they point to a local drive and move most of the system files there. If there are many system files in the network drive, saving may become slower than when using system files located on your own hard drive. Each user should use the same files to ensure similar outcome.
- Delete any hidden reference models which you do not need anymore.

See also

[How multi-user works \(page 85\)](#)

Autosaving in multi-user mode

Autosave only saves the working model, not the master model. Other users do not see the modifications you make after an **Autosave**. In multi-user mode, this makes **Autosave** much faster than the **Save** command. **Save** updates the master model.

By default, Tekla Structures saves the **Autosave** files in the master model folder with the filename `<model>.db1_<user>`. If several people are using the same username, conflicts will occur.

To avoid conflicts and problems caused by the network traffic, store the **Autosave** files locally, not in the model folder that is located on a network drive. Set the advanced option `XS_AUTOSAVE_DIRECTORY`, for example, to `XS_AUTOSAVE_DIRECTORY=C:\TeklaStructuresModels\autosave`. By saving autosave files locally you make sure that if there are problems in the network traffic, you are still able to save your own work.

1. On the **File** menu, click **Settings --> Options**, and in the **General** settings define the **Autosave** intervals for operations performed in the drawing and the model.
2. Periodically autosave the model manually.

To do so, create a shortcut for the **Autosave** command. Click **File menu --> Settings** and in the **Customize** area select **Keyboard shortcuts**.

NOTE Remember to save regularly to the master model by clicking **Save**.

See also

[Error messages in multi-user mode \(page 91\)](#)

[Copy multi-user models \(page 90\)](#)

[How multi-user works \(page 85\)](#)

Model history in multi-user mode

Tekla Structures collects *model history* on the actions that have taken place in the a model. In a multi-user model, the model history shows when the model has been changed, how the model has changed, who has made the changes, and the model revision comments.

Collect model history in multi-user mode

1. On the **File** menu, click **Settings** --> **Advanced options**.
2. Go to the **Speed and accuracy** tab.
3. Set XS_COLLECT_MODEL_HISTORY to `TRUE`.
4. Set XS_CLEAR_MODEL_HISTORY to `FALSE`.
5. Optional: Go to the **Multi-user** tab.
Set XS_SAVE_WITH_COMMENT to `TRUE`.
This enables the saving of model revision comments.

View model history in multi-user mode

To view model history, do one of the following:

- On the ribbon, click  and select an object in the model.
The model history is shown in the **Inquire object** dialog.
- Create a model history report.
 1. On the **Drawings & reports** tab, click **Reports**.
 2. Select a report template that shows model history from the list. The name of the report template may vary in different environments.
In the Default environment, the report template is called **Q_Model_History_Report**.
 3. Click **Create from all** to create a report on all the objects in a model, or select one or more objects in the model and click **Create from selected** to create a report from the selected objects.

Save model revision comments in multi-user mode

You can save model revision comments when working with multi-user models. This means that all objects which have been changed during the last save interval include the revision information in them. You can use this information in filtering and reports. You can also use it to examine which users have modified the objects.

- The **Owner** is the user, who has added the object into the model.
- **History** shows when the model has been changed, how the model has changed, who has made the changes, and the model revision comments.

Before you can save model revision comments, check the following:

- Set the advanced option XS_SAVE_WITH_COMMENT to `TRUE` in **File --> Settings --> Advanced options --> Multi-user**.
 - Set the advanced option XS_COLLECT_MODEL_HISTORY to `TRUE` in **File --> Settings --> Advanced options --> Speed and accuracy**.
1. When you have set the advanced options mentioned above to `TRUE`, Tekla Structures displays the **Model revision comments** dialog when you are saving the model. Enter the desired revision comment and code in the **Model revision comment** and **Model revision code** boxes.
 2. Click **OK**.

Tekla Structures applies the values of this dialog to parts that were changed after the last save. When you inquire objects, you can see the model revision information in the **Inquire object** dialog. You can use this information also for selection and view filtering.

Shutting down the model in multi-user mode

Do not shut down the computer containing the master model while other users are working on their working models. They will not be able to save their changes to the master model.

If this does happen, to avoid losing any changes, follow the steps below:

1. Keep the working models open on the client computers.
2. Restart the computer containing the master model.
3. Open the master model on the computer containing it and autosave the model.
4. Click **Save** on the client computers to save the working models to the master model.

See also

[Saving in multi-user mode \(page 87\)](#)

[Autosaving in multi-user mode \(page 88\)](#)

Copy multi-user models

1. Have all users save and close their working models.
2. On the **File** menu, click **Open --> All models**.
3. From the list of models, select the multi-user model and click **Convert to single-user model --> Convert**.
4. Use **Save as** to make a copy of the model.

5. Exit Tekla Structures and re-open the model in multi-user mode to continue working on it.

Display active multi-users

You can display information on users working on the same server.

To display active multi-users, click **File menu --> Sharing --> Active multi-users**.

The **Active Multi-Users** dialog displays the following information:

Option	Description
Locked	The time when the model was locked.
Model name	The name of the model.
User	Users that are currently working on models on the server.
Latest login	The time when the users have logged in.
Latest access to server	The time when the users have last accessed the server.
Editing drawings	The drawings that are currently being edited.
Edited drawings	The drawings that have been edited and saved to the server.

TIP The **Active Multi-Users** dialog is refreshed every 30 seconds. You can refresh it immediately by clicking **Refresh**.

Error messages in multi-user mode

Error message	Problem	Solution
Database write conflicts detected	More than one user has changed an object.	Check the <code>conflict.log</code> . It lists the GUID numbers of the objects that more than one user has changed. This is not usually a critical problem. No need to use the Check database tool. See also Saving in multi-user mode (page 87)

Error message	Problem	Solution
Could not save model. Possible reasons are: - disk is full or write protected - locked .tmp -file(s) exists in the model directory	You tried to save a multi-user model to a computer or folder that you could not access.	• Check that you have permission to write to the model folder. • Check that there is enough disk space to save the model. • Restart the computer where you want to save the model. Try to save the model again. • Delete the .tmp files from the model directory.
Database locked cannot open model	Computer stopped responding while saving the model, which locks the model.	To unlock the model, the user whose operating system stopped responding should open the model in multi-user mode and save it.
Cannot read autosaved model as a normal model in the multi-user mode	The opening of a multi-user Autosave file has been prevented in single-user mode to prevent the reading of wrong file types.	Do not rename or move Autosave files. Do not open the Autosave file of a single-user model in multi-user mode or vice versa.

Remove inconsistencies from a multi-user database

To preserve the integrity of your multi-user model, you need to remove any inconsistencies from the multi-user database at regular intervals, for example once a day. This may also fix assemblies with no main part and drawings of unknown (U) type.

We recommend you to check the multi-user database in single-user mode.

1. Have all other users exit the multi-user model.
2. Save your model to receive the modifications of other users.
3. Exit the model.
4. Open the model in single-user mode.
5. Exit the model without saving.
6. Re-open the model.

7. On the **File** menu, click **Diagnose & Repair** and in the **Model** area, click **Repair model**.
8. Save the model.
9. Exit the model.
10. Re-open the model in the multi-user mode.

Modeling in multi-user mode

Before you start a project, assign each user an area of the model. To prevent potential save conflicts, you need to avoid having more than one user working on the same, or adjacent model objects. See also [Saving in multi-user mode \(page 87\)](#).

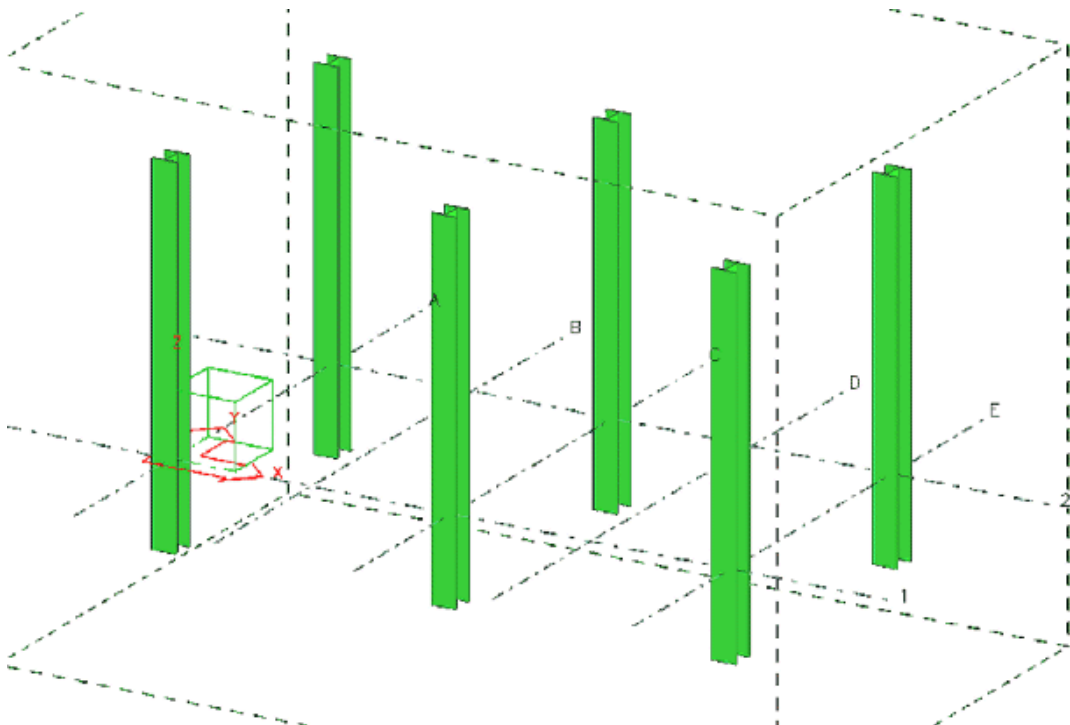
Example

If three users are to model a project, User #1 could model columns, User #2 the 1st floor beams, and User #3 the 2nd floor beams.

In the following example, three users are working on the same model. You can see how modeling and saving works in practice.

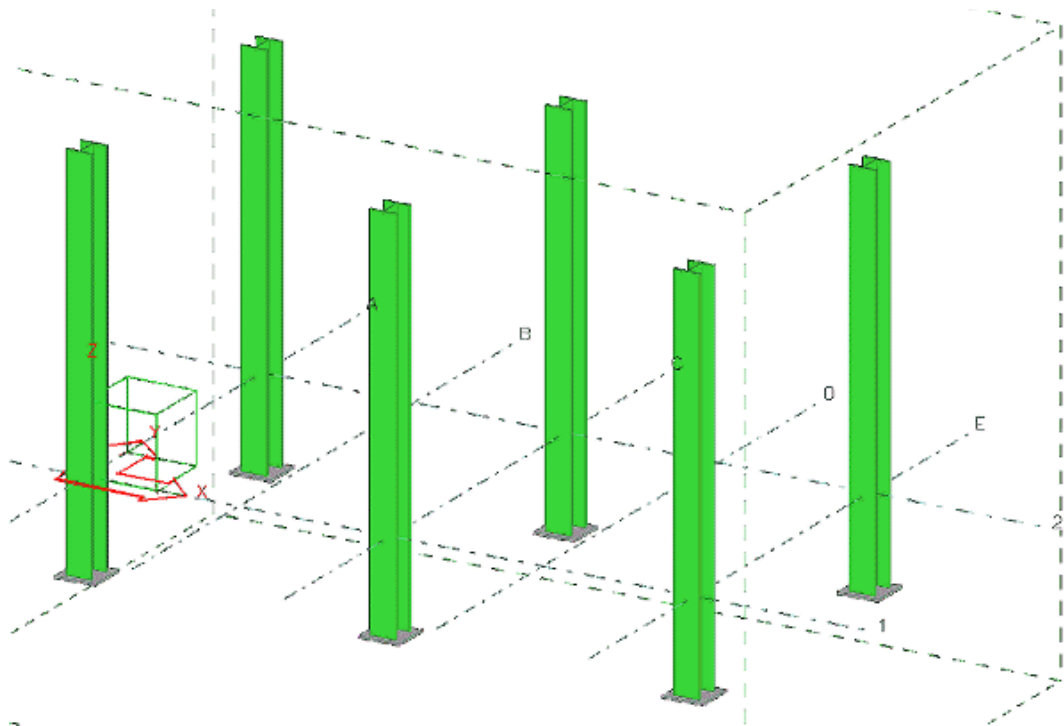
The master model contains columns and grids, as you can see here.

Each user opens the model in multi-user mode. All users are now working on working models, locally.

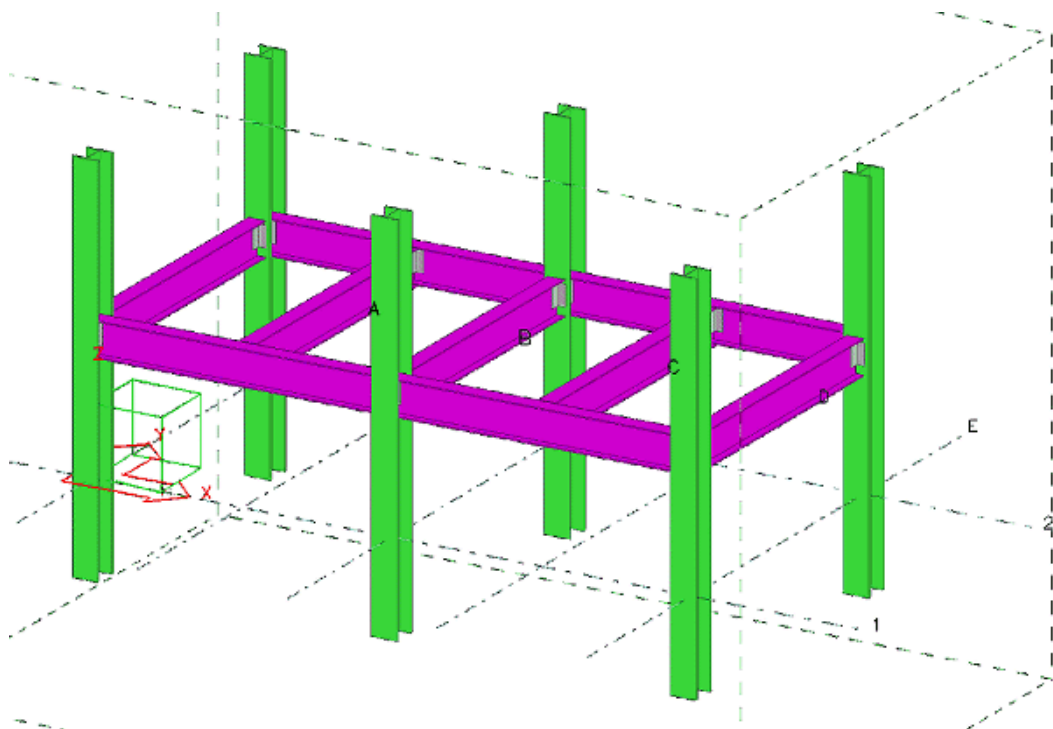


On the working models:

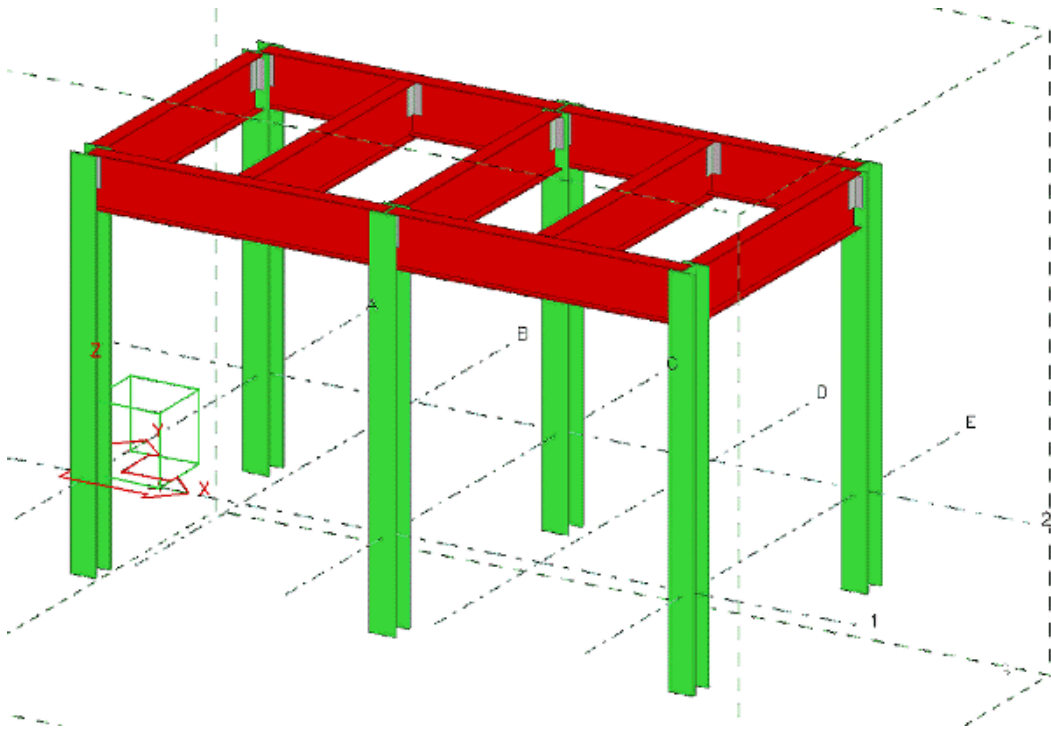
User #1 adds base plates to the columns:



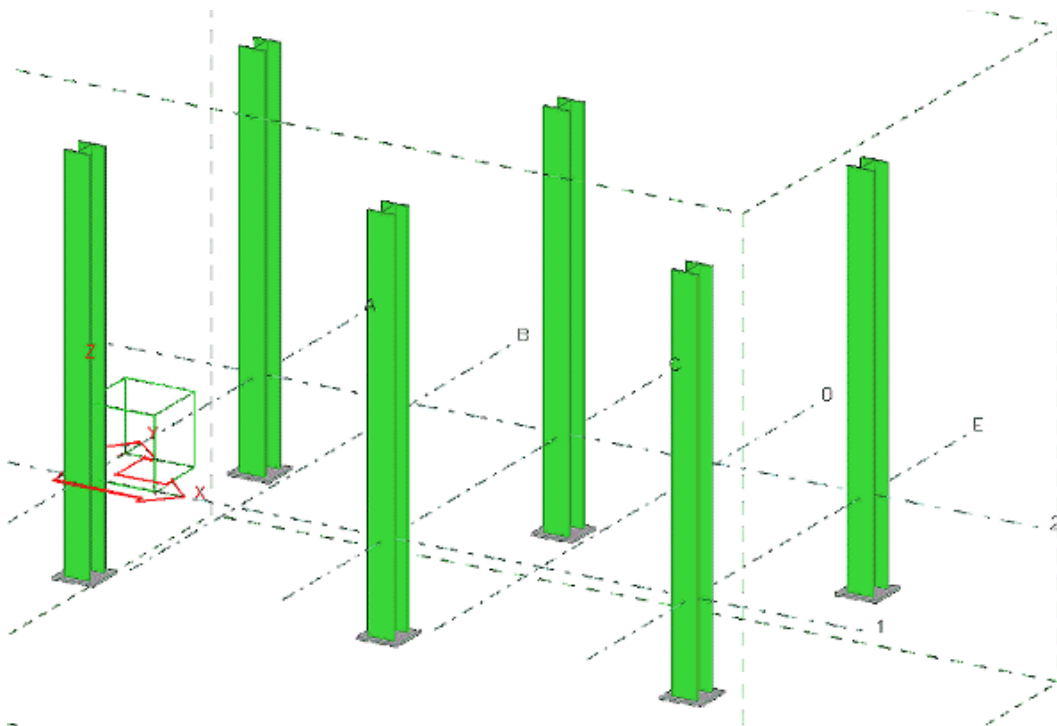
User #2 adds and connects the 1st floor steel beams:



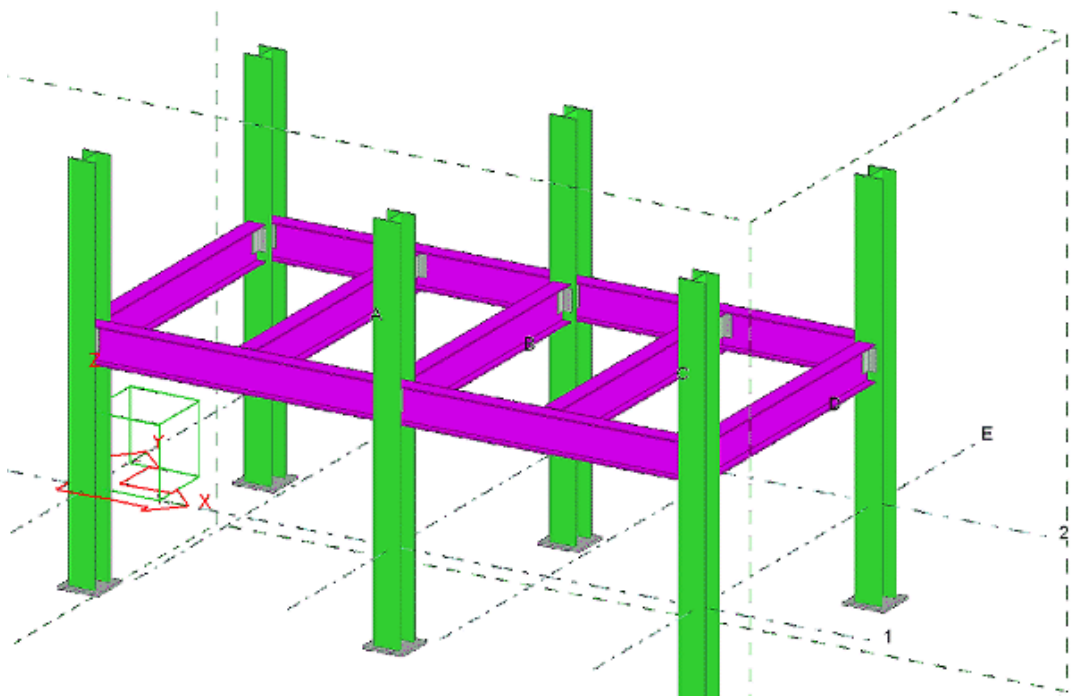
User #3 adds and connects the 2nd floor steel beams:



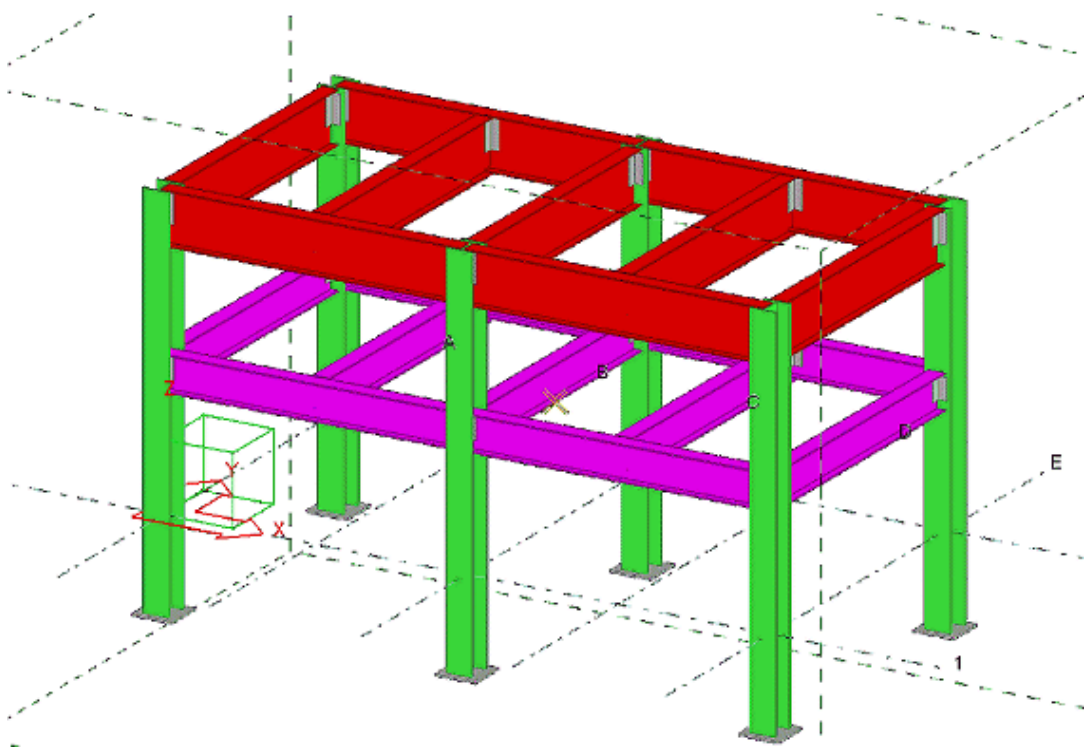
User #1 clicks **Save** to save to the master model. His working model now shows the base plates he added and looks like this:



User #2 clicks **Save** to save to the master model. His working model now shows his 1st floor framing and User #1's base plates:



User #3 clicks **Save** to save to the master model. His working model now shows all three users's work:



To see the updated master model, Users #1 and #2 need to save to the master model again to update their working models.

See also

[Numbering setup in multi-user mode \(page 97\)](#)

[Synchronize numbering with the master model \(page 98\)](#)

Numbering setup in multi-user mode

Define the numbering settings as follows:

1. On the **Drawings & reports** tab, click **Numbering settings** --> **Numbering settings**.
2. In the **Numbering setup** dialog, select the **Synchronize with master model (save-numbering-save)** checkbox.

When you select this checkbox, you can cancel the numbering before the last save is made. This is useful, for example, if you want to check the numbering results and you find something that you still want to change.

NOTE When working with multi-user models, use this option always to prevent saving conflicts.

3. Modify the other properties as required.
4. Click **OK**.

Tekla Structures will now save the model before and after you number all parts or modified parts.

When you click **Perform numbering** --> **Number modified objects** on the **Drawings & reports** tab to run numbering, Tekla Structures displays a list that shows the numbering progress. When the numbering is finished, the changed numbering results are highlighted in the list. When you select an item on the list, Tekla Structures highlights the corresponding object(s) in the model. If you keep the **F** key pressed when you select the item, Tekla Structures fits the work area of the current view around the objects.

If the numbering results are correct, click **Save numbers** to make the second save. To cancel the numbering before the second save, click **Cancel**. If you cancel the numbering, the model is returned to the state before numbering and standard files are read to all dialogs.

To review the numbering results further, click **Stop timer**.

To change the time frame in which Tekla Structures makes the second save, use the advanced option `XS_NUMBERING_RESULTS_DIALOG_DISPLAY_TIME`.

NOTE We recommend that you run the **Diagnose & Repair Numbering: All** command in **File** --> **Diagnose & repair** to remove any numbering inconsistencies from the multi-user database at regular intervals, for example once a day.

See also

[Access rights in multi-user mode \(page 102\)](#)

Synchronize numbering with the master model

If you need to include numbering information from areas in the model that have been modeled by other users:

1. Ask all users to save their working models. This updates the master model.
2. Number the model. Make sure that the **Synchronize with master model (save-numbering-save)** checkbox is selected in the **Numbering setup** dialog (see [Numbering setup in multi-user mode \(page 97\)](#)). This updates your working model to the master model, numbers the master model, and then saves the numbered master model for all users to access.

NOTE If you create drawings and/or reports after numbering, you need to save the master model again to make them visible to other users.

Drawings in multi-user mode

The multi-user environment is very useful when several users are simultaneously editing drawings.

Tekla Structures saves each drawing in a unique file. These drawing files are located in the drawing folder in the master model folder.



The file is in the format D0000123456.dg. The dg files are part of the model, so you can only open them using Tekla Structures.

dg files contain the locations of views, details of any editing done to the drawing, and the positions of dimensions, part marks, and text. The dg filename does not contain any reference to assembly, part, or multidrawing numbers.

If two users open and save the same drawing in their working models, then save their changes to the master model, one set of changes will be lost. The master model will only contain the changes of the user who most recently saved their working model to the master model. See [Saving in multi-user mode \(page 87\)](#).

The Tekla Structures multi-user server assigns the general arrangement drawing numbers automatically. This means that each drawing gets the first free number available. If users A and B both create a general arrangement

drawing at the same time, they are automatically assigned different numbers. The same applies to multidrawing numbers.

See also

[Guidelines for multi-user drawings \(page 99\)](#)

[Locks for drawings in multi-user mode \(page 100\)](#)

Guidelines for multi-user drawings

You may find the following guidelines useful when you edit or check drawings:

Action	Recommendation
Saving drawings	Periodically save your working model to the master model (every 5–10 drawings).
Editing drawings	- Assign each user a different range of drawings to edit. - Lock finalized drawings. - If Tekla Structures displays the message Database write conflicts detected and a drawing ID number, two or more users have opened and saved the same drawing. See Drawings in multi-user mode (page 98).
Checking drawings	Only check locked drawings.
Printing drawings	Make sure that no-one else is working with the same drawing. If you print a drawing while someone else is editing it and then save the model, the other user's changes will be lost, even though you have not opened, modified, or saved the drawing. You can disable the print date by using the advanced option XS_DISABLE_DRAWING_PLOT_DATE.
Creating general arrangement drawings	Create a set of empty general arrangement drawings in the beginning of the project, and assign a certain range of these ready-created empty drawings to each user (for example, GA1 to GA10 to User A, GA11-GA20 to User B and so on). This prevents overlapping general

Action	Recommendation
	arrangement drawing numbers in the project.

See also

[Delete unnecessary drawing files in multi-user mode \(page 100\)](#)

Locks for drawings in multi-user mode

When you are about to open a drawing, Tekla Structures displays a notification on the status of the drawing. The options are:

- Someone is already editing it.
- Someone has already edited it (drawing has been saved to their computer, but not yet to the server).
- The drawing has already been saved and there is a newer version available on the server.

NOTE Locks for drawings are only used when a drawing is edited manually, not for example when drawings are automatically edited through cloning.

Note that to lock edited drawings, the XS_COLLECT_MODEL_HISTORY advanced option must be set to `TRUE`.

Delete unnecessary drawing files in multi-user mode

Every time you update a drawing, Tekla Structures creates a new drawing (.dg) file in the `drawings` sub-folder of the model. After that, the previous drawing file is not used and might become unnecessary. To delete the unnecessary drawing files in multi-user mode, see the following instructions.

NOTE The drawing files that are not used are not always unnecessary. If you close the model without saving, or if Tekla Structures crashes and you cannot save the model, the drawing files that are not used can become necessary again. In these situations, you need the drawing files that were valid when you last saved the model and the drawing files that were valid when the last autosave was performed.

Having different versions of drawings allows you to revert to the previous versions of drawings. This is especially useful if two users have edited the same drawing.

Delete drawing files automatically in a multi-user model

In multi-user models, you can use the `XS_DELETE_UNNECESSARY_DG_FILES` and `XS_DELETE_UNNECESSARY_DG_FILES_SAFETY_PERIOD` advanced options to keep the number of drawing files reasonable.

The `XS_DELETE_UNNECESSARY_DG_FILES` advanced option defines if the unnecessary drawing files (.dg files) are automatically deleted or not. To automatically delete the drawing files that are no longer used, ensure that `XS_DELETE_UNNECESSARY_DG_FILES` is set to `TRUE`. The drawing files are deleted when the last user exits the model and saves the model.

The `XS_DELETE_UNNECESSARY_DG_FILES_SAFETY_PERIOD` advanced option defines how long the drawing files are kept before they are deleted. The default safety period is 7 days. This means that after 7 days, the drawing files that are not used are deleted when the `XS_DELETE_UNNECESSARY_DG_FILES` advanced option is set to `TRUE`. You can define a different safety period according to your needs.

The `XS_DELETE_UNNECESSARY_DG_FILES` and `XS_DELETE_UNNECESSARY_DG_FILES_SAFETY_PERIOD` advanced options work also in the models that are shared with Tekla Model Sharing.

Delete unnecessary drawing files manually in a multi-user model

The **Remove unnecessary drawing files** command deletes all drawing files that do not have a corresponding drawing in the current version of the model, regardless of the safety period. Note that also the drawing files that have a corresponding version in the last saved or autosaved version of the model are deleted, if there is no corresponding drawing in the current version of the model.

We recommend that you use the **Remove unnecessary drawing files** command when you want to archive the model or give the model to another user.

NOTE To avoid deleting drawing files that are still needed, we recommend that you only use the **Remove unnecessary drawing files** command if you are an experienced Tekla Structures user.

Before you use the **Remove unnecessary drawing files** command, ensure that:

- You are the only user that has the multi-user model open.
- You have [full privileges \(page 102\)](#) in the multi-user model. If you do not have full privileges in the model, you cannot delete the unnecessary drawing files manually.

To delete the unnecessary drawing files manually:

1. Save the model.

Saving the model ensures that any drawings that are still needed are not accidentally deleted.

2. [Convert the model to a single-user model. \(page 84\)](#)
3. Search for the **Remove unnecessary drawing files** command in **Quick Launch**.
4. When Tekla Structures finds the command, select it and press **Enter**.
Tekla Structures deletes all drawings that do not have a corresponding drawing in the current version of the model.
5. [Convert the model back to a multi-user model. \(page 84\)](#)

Access rights in multi-user mode

You can use privileges to control access rights. The person who has created the model, or anyone from the same organization, can control access rights to the model by using privileges. In practice, the privileges of the model are controlled via the `privileges.inp` file.

By modifying the `privileges.inp` file, you can control:

- access to modify user-defined attributes.
- access to modify object properties. This is done by locking and unlocking objects.
- access to modify numbering settings.
- access to remove users on multi-user server.
- access to save standard files.

You can prevent your model and drawings being accidentally modified by using the **Locked** user-defined attribute (UDA) or drawing locks, or locks in **Phase manager**. Using the **Locked** UDA and privileges together you can even restrict some users or organizations from modifying your model.

For example, you can limit access to the model so that a checker can only change status attributes. Or you could prevent certain users from changing the user-defined attributes used for approval or manufacturing and erection status.

NOTE The `privileges.inp` file is also used in Tekla Model Sharing to control which users are allowed to modify the shared model objects or the shared drawings.

Change access rights in the `privileges.inp` file

How the privileges work:

- The `privileges.inp` file serves as a user interface for updating the privileges in a model.

- The privileges are loaded from the `privileges.inp` file and stored in the model.
- The privileges are loaded from the `privileges.inp` file only if the current user is allowed to do so.
- If there is no `privileges.inp` file or if it cannot be loaded, then the privileges that are already stored in the model (if any) are used.
- If you do not set any privileges, all users have full rights.
- Tekla Structures checks the privilege defaults in the `privileges.inp` file when you create a model, and each time you open a model.
- Tekla Structures searches for the file first in the current model folder, then in the folder defined for the advanced option `XS_INP`.

NOTE Only the person who created the model, or anyone from the same organization, can modify the privileges of the model via the `privileges.inp` file.

To change the access rights:

1. Close the model.
2. Open the `privileges.inp` file in any text editor.

The `privileges.inp` file is typically located in `..\ProgramData\Trimble\Tekla Structures\<version>\environments\common\inp` folder. The exact file location may vary depending on the folder structure of your environment files.

3. Change the desired settings and save the file.
4. Re-open the model.

Example

Below is an example of the `privileges.inp` file. The slash (/) or backslash (\) separates the user name from the organization (<organization>/<user>). If no user name is entered, it means anyone in the company. Each row contains three columns, separated by tabs.

If you want to give the privileges only to one user or only to some users, you first have to exclude everyone and then include the users who you want to give the privileges.

Note that the organization and the user names are case sensitive. For example, `COMPANYA` is not the same as `companyA`.

privileges.inp

```
attribute:APPROVED_BY    COMPANYA/    full
attribute:APPROVED_BY    COMPANYB/james full
attribute:APPROVED_BY    everyone    none
attribute:STATUS         COMPANYB/    full
attribute:STATUS         COMPANYA/    view
attribute:STATUS         everyone    none
```

Options in the privileges.inp file

The following commands are available in the `privileges.inp` file:

- access to modify any user-defined attribute (UDA) - `attribute:UDA_NAME`
- access to modify object properties - `attribute:OBJECT_LOCKED`
- access to modify numbering settings - `action:PartnumbersOptions`
- access to perform numbering - `action:PerformNumbering`
- access to remove users in multi-user model -
`action:AllowMultiuserKick`
- access to save standard files - `action:SaveStandard`
- access to add watermarks to printed drawings -
`action:DrawingWatermark`

When you want to give the right only to one user or some users, you have to first exclude everyone and then include the users.

Column	Option	Description
protected user-defined attribute	<code>attribute: name</code>	Affects the protected user-defined attribute "name". Check the exact spelling of the name in the <code>objects.inp</code> .
OR		
action	<code>action: name</code>	Affects the action "name". The available actions: • <code>PartnumbersOptions</code>: Controls access to numbering settings. Limitation: only full/none • <code>PerformNumbering</code>: Controls access to performing numbering. • <code>AllowMultiuserKick</code>: Controls access to removing users from a multi-user model. Limitation: only full/none

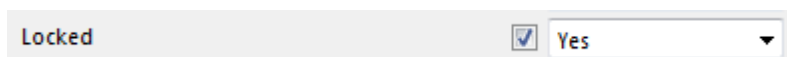
Column	Option	Description
		- SaveStandard: Controls access to saving standard files. Limitations: only standard - DrawingWatermark: Controls access to adding watermarks for printed drawings.
user	everyone	All users
	domain/	Affects all users within the network domain "domain".
	domain/nn	Affects the user "nn" in the network domain "domain".
	nn	Affects the user "nn".
rights	full	User can change the user-defined attribute.
	view	User can view the user-defined attribute, but not change it. This option appears dimmed to the user.
	none	The user-defined attribute is hidden from the user.

User-defined attribute Locked

To protect objects from being accidentally modified, you can use the **Locked** user-defined attribute (UDA).

You can use it for

- parts (separately for beams, columns, etc.)
- bolts
- welds
- specific drawing types
- project properties
- phase properties



The **Locked** user-defined attribute (UDA) has three values, **Yes**, **No** and **Organization**. When set to **Yes**, the object is locked and you cannot modify its properties. You can only change the object's user-defined attributes that do not affect numbering. If you try to modify a locked object, Tekla Structures displays the following warning message:

"There are locked objects, see report. The operation could not be performed."

The `OBJECT_LOCKED` attribute in the `objects.inp` file defines whether the **Locked** user-defined attribute (UDA) is visible in the Tekla Structures user interface.

NOTE Make sure that numbering is up-to-date before you lock objects.

Control access to lock and unlock objects in a multi-user model
Use the `OBJECT_LOCKED` attribute in the `privileges.inp` file to set users' access to the user-defined attribute (UDA) **Locked** and thus prevent users from locking and unlocking objects in the model.

Example
Only users `man` and `man2` have full rights to lock and unlock objects. The attribute is hidden from everybody else:

```
privileges.inp
attribute:OBJECT_LOCKED  everyone  none
attribute:OBJECT_LOCKED  man       full
attribute:OBJECT_LOCKED  man2      full
```

NOTE To protect other user-defined attributes, you need to list them in the `privileges.inp` file.

Control access to numbering in a multi-user model
Use the `PartnumberOptions` in the `privileges.inp` file to restrict users' access to the numbering properties and thus prevent unauthorized users from modifying the numbering settings.

NOTE Users can still run numbering even if they have no privilege to modify the numbering settings.

If a user who has no privilege to modify properties in the **Numbering Setup** dialog tries to access the dialog, Tekla Structures displays a warning message which states that the user does not have the required privilege.

Example
Only `admin` can modify the properties in the **Numbering Setup** dialog:

```
privileges.inp
action:PartnumberOptions  everyone  none
action:PartnumberOptions  ORGANIZATION\admin  full
```


Control access to save standard files in a multi-user model

Use the `SaveStandard` action in the `privileges.inp` file to control users' access to save standard files.

Example

Only `admin` has rights to save standard files in network domain ORGANIZATION:

```
privileges.inp
```

```
action:SaveStandard    everyone    none
action:SaveStandard    ORGANIZATION\admin    full
```

Control access to remove users from a multi-user model

Use the `AllowMultiuserKick` action in the `privileges.inp` to restrict permissions to remove users from a multi-user model.

You can define that undesired active multi-users can be removed from the user list in the **Active multi-users** dialog. This is useful, for example, if an application error has occurred on the user's computer, and the locks on locked objects need to be cleared by removing the user.

Define the `AllowMultiuserKick` action in the `privileges.inp` file and give full permissions to the user who you want to be able to remove other users from the model.

Example

Only user `jsmith` has full permissions to remove users:

```
privileges.inp
```

```
action:AllowMultiuserkick    everyone    none
action:AllowMultiuserkick    jsmith    full
```

To remove a user:

1. On the **File** menu, click **Sharing** --> **Active multi-users**.
2. Right-click a user who you want to remove and select **Clear locks**.
3. Click **Refresh** to remove the user.

All the locks that the user has on objects and the user are removed.

1.3 Trimble Connect

Trimble Connect is a collaboration tool that connects the constructible data. Trimble Connect enables architects, engineers, contractors, owners and

operators to collaborate in building projects. All the data is stored in a cloud service.

You can share model information between Tekla Structures and Trimble Connect for Windows or Trimble Connect for Browser applications. Link the Tekla Structures model to a Trimble Connect project, and then, for example, add, upload, and download files and open the 3D view of the project.

You can, for example, directly upload a Tekla Structures model to a Trimble Connect project as a `.tekla` file, download a reference model from a Trimble Connect project, or export model objects as `.ifc` reference models to Trimble Connect projects.

To transfer the reference models and overlay models between Tekla Structures and Trimble Connect, use the Trimble Connector tool.

Link a Tekla Structures model to a Trimble Connect project

To start collaboration between Tekla Structures and Trimble Connect, you need to link your Tekla Structures model to a Trimble Connect project.

1. To start linking your Tekla Structures model to a Trimble Connect project, do either of the following:
 - To link a new model, select the **Start Trimble Connect collaboration** checkbox when you create a new model.
 - To link an open model, go to **File --> Trimble Connect --> Start collaboration**.
2. According to your needs, do either of the following:
 - To link the model to a new Trimble Connect project, type a name for the project in the field at the top of the **Select project** dialog.
 - To link the model to an existing Trimble Connect project, select the project from the list at the top of the **Select project** dialog.
3. Select the geographical location of the new project from the **Project Server Location** list.

The options are:

- asia
- europe
- northAmerica
- australia

Project server locations cannot be changed after the project has been created.

4. Select your Trimble Connect subscription from the **License** list.

5. Click **Create** or **OK**.

The Tekla Structures model is linked to the selected Trimble Connect project. You can now start working and, for example, download or upload reference models, add Trimble Connect models as overlays on top of the model, or add BCF topics.

6. To unlink a Tekla Structures model from the Trimble Connect project:
 - a. Go to **File --> Trimble Connect --> Exclude from collaboration**.
 - b. To confirm unlinking the model from the linked Trimble Connect project, click **OK**.

See also

[Upload a Tekla Structures model to a Trimble Connect project \(page 110\)](#)

[Launch Trimble Connect in Tekla Structures \(page 109\)](#)

[Work with BCF Topics in Tekla Structures \(page 114\)](#)

[Set and share the statuses of model objects using Status Sharing \(page 126\)](#)

[Manage reference models in a Trimble Connector \(page 132\)](#)

Launch Trimble Connect in Tekla Structures

You can launch Trimble Connect in multiple ways in Tekla Structures.

To launch Trimble Connect, go to the **Trimble Connect** ribbon tab and select either

- **For Browser:** A browser solution tool for collaboration, administration, 2D and 3D viewing capabilities.

OR

- **For Windows:** A desktop tool for construction project collaboration with the highest 3D graphics performance for the largest models.

Click this	This is what happens
 For Browser	- If you have linked the Tekla Structures model to a Trimble Connect project, the project Explorer page opens in Trimble Connect for Browser. You can see the details of the linked project, and manage your data and attached files stored in the project. - If you have not linked the Tekla Structures model to a project, the Select project dialog opens whenever you click  For Browser, or any of the menu options underneath it. To link the model to a project, see Link a Tekla

Click this	This is what happens
	Structures model to a Trimble Connect project (page 108).
For Browser --> Project explorer	The project Explorer page opens in Trimble Connect for Browser. You can then manage your data stored in the Trimble Connect project.
For Browser --> 3D view	The 3D model view opens in Trimble Connect for Browser 3D viewer. You can adjust how 3D models in the project are shown, select objects, and add BCF topics, views, markups, clip planes, and measurements.
 For Windows	• If you have linked the Tekla Structures model to a Trimble Connect project, the project detail view opens in the Trimble Connect for Windows application. You can see the details of the linked project. You can also add, upload, and download files and open the 3D view of the project. • If you have not linked the Tekla Structures model to a project, the projects view opens in the Trimble Connect for Windows application. You can see a list of your projects. You can open any project, add new projects, or sort and search for projects. • If you have not installed the Trimble Connect for Windows application, the web page to download Trimble Connect for Windows opens: Download Connect Apps.

Upload a Tekla Structures model to a Trimble Connect project

You can upload the current Tekla Structures model to a Trimble Connect project folder as a read-only `.tekla` file. The `.tekla` file can then be used as a lightweight reference model with Tekla Structures or any Trimble Connect product.

Before you upload a model to a Trimble Connect project

Before you upload your Tekla Structures model to Trimble Connect, note the following:

Object colors	Object colors in the <code>.tekla</code> reference model might be different than in the Tekla Structures model.
Profiles	Profiles are exported with high solid accuracy, meaning that the rounding on profiles is visible. High solid accuracy affects Tekla Structures performance. If you do not want to use the high solid accuracy, set the advanced option <code>XS_HIGH_ACCURACY_TRIMBIM_EXPORT</code> to <code>FALSE</code>.
Assemblies	To include assemblies in the <code>.tekla</code> reference model, ensure that the assembly export is enabled in the <code>conf.json</code> file. 1. Go to <code>...\TeklaStructures\<version>\Environments\common\system\UploadToConnect</code>. 2. Copy the <code>conf.json</code> file to the <code>\attributes</code> sub-folder under the model folder. 3. Open the <code>conf.json</code> file in a text editor, such as Microsoft Notepad. 4. Check that <code>"assemblies"</code> is set to <code>"true"</code>. 5. Save the <code>conf.json</code> file. Note that • if the assembly export is enabled: rebars belong to the part's assembly (similarly as in the IFC export) and not to the part itself • if assembly export is disabled: rebars belong to the part
Pours	If you want to include pours and pour units in the <code>.tekla</code> reference model instead of cast units and cast unit parts, enable pour management. If you want to include cast units and cast unit parts instead of pours and pour units, disable the pours in the <code>conf.json</code> file. 1. Go to <code>...\TeklaStructures\<version>\Environments\common\system\UploadToConnect</code>. 2. Copy the <code>conf.json</code> file to the <code>\attributes</code> sub-folder under the model folder.

	3. Open the <code>conf.json</code> file in a text editor, such as Microsoft Notepad. 4. Change "pours" : "model" to "pours" : "false". 5. Save the <code>conf.json</code> file.
Layers	Layers are available in <code>.tekla</code> models. You can use phases, part names, or template attributes as layer names for uploaded objects. On the File menu, click Trimble Connect --> Upload model settings and use the Layer names as option to set the layer. Select Name or Phase from the list, or type the attribute name in the box. Note that you cannot use user-defined attributes (UDAs) as the layer name.
Template attributes and user-defined attributes	If you want to define which template attributes and user-defined attributes are uploaded with the <code>.tekla</code> model, use the IFC property sets. Select which IFC property sets are included in the upload. On the File menu, click Trimble Connect --> Upload model settings and use the Property sets option to set the IFC property sets. • To use a default property set from your environment, select the property set from the Property sets list. • To modify an existing property set, select the property set from the list and click . • To define a new property set, select <new> and click .

Upload a Tekla Structures model to Trimble Connect

1. Define settings for the upload, if needed.
 - a. On the **File** menu, click **Trimble Connect --> Upload model settings**.
The **Upload model settings** dialog opens.
 - b. In **Trimble Connect folder**, select the Trimble Connect project folder where the current model will be uploaded as a `.tekla` file. By default, the folder path is `Structural\Tekla Models`.
 - c. In **Layer names as**, select **Name** or **Phase** from the list to set the layer information, or type the attribute name in the box.

- d. In **Property sets**, select the IFC property set for the upload. You can open the **Property set definitions** dialog that allows you to add and modify the property sets.
- e. Click **OK** to save the settings.

2. Go to the **Trimble Connect** ribbon tab, and click  **Upload model**.
3. To confirm saving the model and uploading the entire model folder to the attached Trimble Connect project, click **Save and upload**.

The Tekla Structures model is uploaded as a `.tekla` file to the Trimble Connect project folder that you defined.

An error message is displayed if the model upload to Trimble Connect fails. In case of upload errors, see the `PublishToTrimbleConnect.log` file, which you can find in the `/logs` sub-folder under the model folder.

Note that if you want to move the model to another folder after uploading it, you need to do so manually in Trimble Connect.

Upload a Tekla Model Sharing model to Trimble Connect

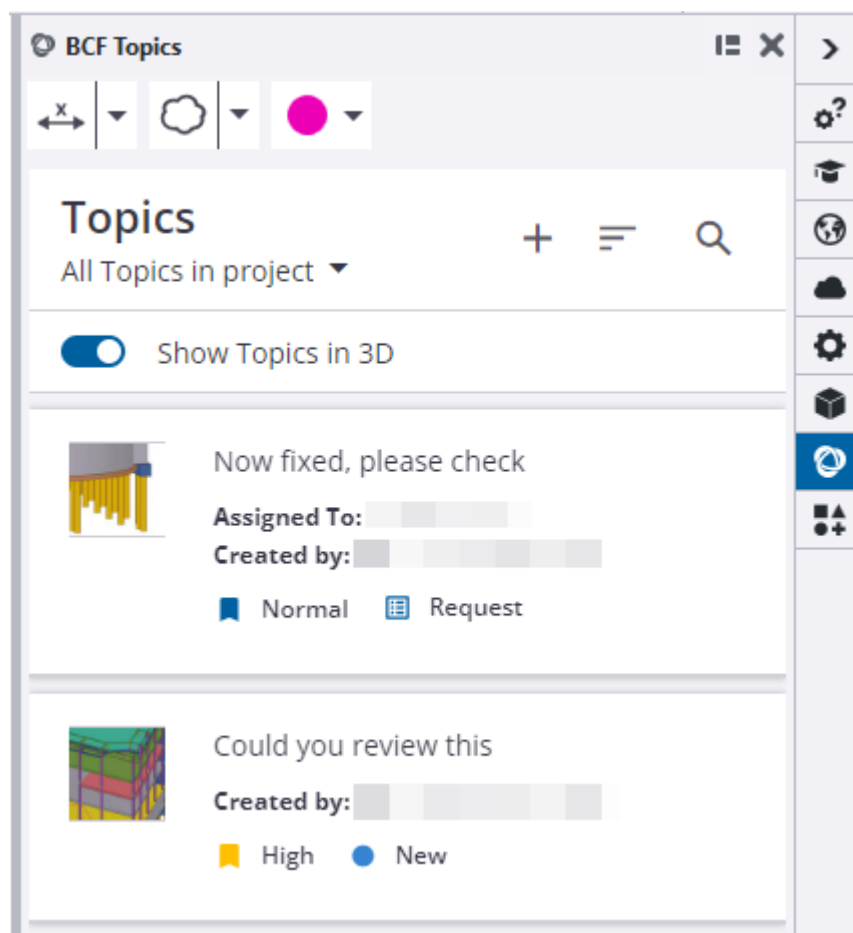
The **Upload model**  command does not upload Tekla Model Sharing models to a Trimble Connect project. Instead, use the **Upload model settings** dialog to select if and when a Tekla Model Sharing is uploaded to a Trimble Connect project folder.

1. On the **File** menu, click **Trimble Connect --> Upload model settings**.
The **Upload model settings** dialog opens.
2. In **Upload**, select when the Tekla Model Sharing model is uploaded to the Trimble Connect project folder.
The options are:
 - **Baseline** (default) = The shared model is automatically uploaded to the set Trimble Connect project folder each time a user creates a new baseline.
 - **Write out** = The shared model is automatically uploaded to the set Trimble Connect project folder after each successful write out.
 - **Never** = The shared model is never uploaded to the set Trimble Connect project folder.
3. Additionally, you can set the following on the **Upload model settings** dialog:
 - Select the Trimble Connect project folder where the model will be uploaded.
 - Set the layer information.

- Select the IFC property set for the upload.
4. Click **OK** to save the settings.

Work with BCF Topics in Tekla Structures

BCF topics are notes that are added to a linked Trimble Connect project. BCF stands for BIM Collaboration Format and it is an open industry standard from buildingSMART International. Using the BIM Collaboration Format (BCF), you can communicate project-based issues between different BIM applications, such as Tekla Structures, Tekla PowerFab and Trimble Connect, as well as other 3rd party applications. BCF topics are stored and managed in a Trimble Connect project.



Before you can start adding BCF topics in Tekla Structures, your model needs to be linked to a Trimble Connect project. See instructions here: [Link a Tekla Structures model to a Trimble Connect project \(page 108\)](#).

BCF topics can be used with `.tekla`, `.ifc`, and `.trb` files that are created from a Tekla Structures model and uploaded to Trimble Connect.

- A `.tekla` file that is created when you upload the current Tekla Structures model to a Trimble Connect project. Using a `.tekla` file is the preferred way of working.

If you are using Tekla Model Sharing with a Trimble Connect project, the model is automatically uploaded when you write out or create a new baseline. Note that if the `.tekla` file is uploaded to a Trimble Connect project for the first time after using the **Write out** or **Create baseline** commands, you need to write out the changes again. This is needed because after a `.tekla` file is uploaded, an `.xml` file with a model ID is created in the model folder.

- An `.ifc` file that is created from a Tekla Structures model and uploaded to a Trimble Connect project.
- A `.trb` file that is created from a Tekla Structures model when exporting to Tekla PowerFab and uploaded to a Trimble Connect project.

Create and modify BCF topics

Before you start adding BCF topics in Tekla Structures, ensure that your model is linked to a Trimble Connect project.

Use topics to communicate, assign, track and resolve issues within a project. You can view all the topics that you have created or that have been assigned to you in the Tekla Structures **BCF Topics** side pane.

1. On the **Trimble Connect** ribbon tab, click  **BCF Topics**.
The **BCF Topics** side pane opens and displays the BCF topics added to the Trimble Connect project.
2. To create a new BCF topic, click the plus **+** button.

The **New topic** page opens.

The screenshot shows a web application window titled "BCF Topics". The window has a toolbar with three icons: a double-headed arrow, a cloud, and a red circle. Below the toolbar is a form titled "New topic". The form contains several input fields and dropdown menus:

- Title (Required):** A text input field with the placeholder text "Add a title".
- Description:** A text input field with the placeholder text "Add a description".
- Assignee:** A text input field with the placeholder text "Please enter users, groups".
- Type:** A dropdown menu with the text "Select type".
- Priority:** A dropdown menu with the text "Select priority".
- Due date:** A text input field.
- Tags:** A text input field with the placeholder text "Begin typing to search...".
- Status:** A dropdown menu with the text "Select status".

Below the input fields, there are two links: "Add references" and "Add models". At the bottom right of the form, there are two buttons: "Cancel" and "Save".

3. Fill in the fields.

Title is mandatory.

4. Assign the topic to a user or a user group.

The BCF topics are shared to all project members by default, but you can select a user or a user group to whom you want to assign the BCF topic with a due date when it needs to be resolved.

5. Use **Add references** to add references to documents or links.

A topic can reference several documents or links. You can add, for example, a PDF file for reference.

- a. Click **Add references**.

- b. On the **Add references** page, select the type of reference that you want to add:

- under , select the desired reference file from the list of project files.

Attached project files always point to the latest version of the file stored in the Trimble Connect project.

- under , browse for a desired reference file to add a new file.

- under , add the display text for the desired link and the URL.

- c. Click **Add references**.

- d. To add or remove reference files:

- to add more reference files, click  to open the **Add references** page.
- to remove a reference file, click  next to the file.

You can work with the references also on the  **References** page after the BCF topic is created.

6. Use **Add models** to add model files, if needed.

To enable the collaboration workflow using BCF topics, you need to have a model uploaded to a Trimble Connect project. The preferred way of working is to upload your model as a `.tekla` file. If you have already uploaded a `.tekla` file to the linked Trimble Connect project, you do not need to use the **Add models** option.

If you are using an `.ifc` or a `.trb` file instead of a `.tekla` file, use the **Add models** option to select the file that contains the objects associated to the BCF topic that you are creating in Tekla Structures.

Note that if you are using `.ifc` or `.trb` files, you need to manually associate each BCF topic with an `.ifc` or a `.trb` file when you create BCF topics in Tekla Structures. You can associate your BCF topics with several `.ifc` or `.trb` files at once.

In Trimble Connect the association happens automatically, and therefore the **Add models** command is not available in Trimble Connect. When BCF topics are created in Trimble Connect, Trimble Connect knows which models are visible in the view and stores that information with the BCF topics. These BCF topics will work correctly in Tekla Structures.

- a. Click **Add models**.
- b. On the **Add models** page, select the type of model file that you want to add:
 - under , select the desired model file from the list of project files.
 - under , browse for a desired model file to add a new file.
- c. Click **Add models**.
- d. To add or remove model files:
 - to add more model files, click  to open the **Add models** page.
 - to remove a model file, click  next to the file.

You can work with the models also on the  **Models** page after the BCF topic is created.

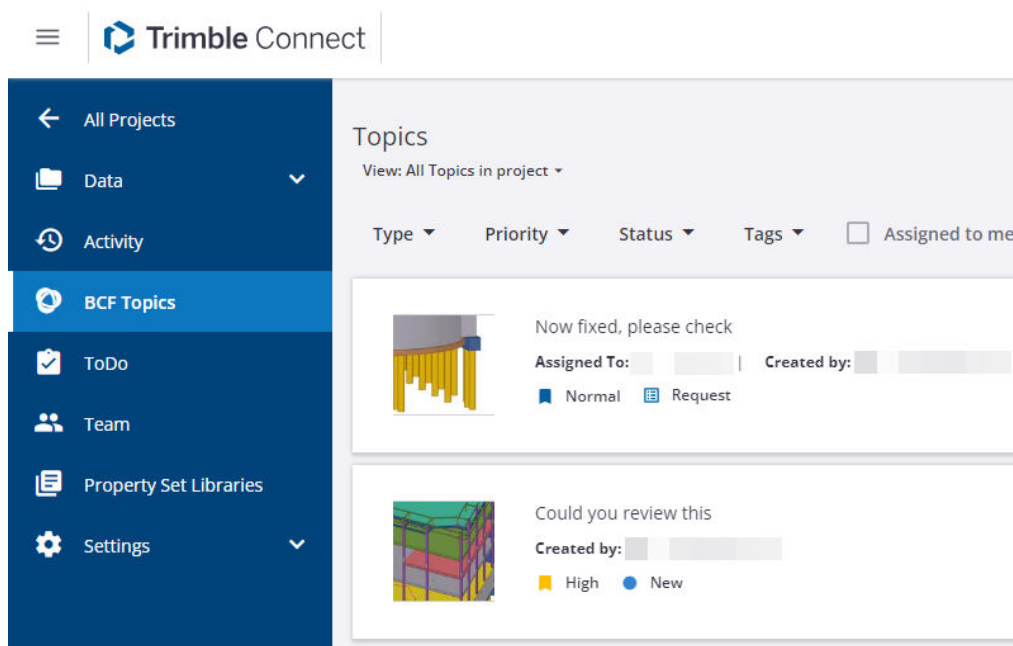
7. Click **Save**.

A view is automatically always added to each new topic.

The saved BCF topic is immediately synchronized to Trimble Connect.

You can then continue by adding, for example, comments and views with graphical markups and measurements.

In Trimble Connect, you can see the BCF topics on the **BCF Topics** page of the linked project.



8. If you want to further edit a BCF topic in Tekla Structures:

To	Do this
Define which topics are shown on the Topics page in BCF Topics side pane	In the BCF Topics side pane, click the arrow under Topics and select the option. By default, the Active topics are shown.
Sort the topics	In the BCF Topics side pane, click  at the top of the side pane and select the sorting option. The default sorting order is by Creation date .
Edit a topic	You can edit topics that you have created or that have been assigned to you. - In the BCF Topics side pane, select the BCF topic that you want to edit. The topic opens on its own page. - Click  Edit. - Adjust the BCF topic information according to your needs. - To save the changes, click Save.

To	Do this
Assign a topic	You can assign topics that you have created or that have been assigned to you. - In the BCF Topics side pane, select the BCF topic that you want to assign to someone. The topic opens on its own page. - Click  Edit. - In the Assignee field, enter the names of the users or the user groups. There can be multiple users or user groups listed in the Assignee field. - To save the changes, click Save.
Remove a topic	You can delete only the topics which you have created. Deleting topics from the project cannot be undone. If you delete a topic, the topic will be deleted for everyone for who it has been assigned to. All the data is deleted as well. - In the BCF Topics side pane, select the BCF topic that you want to remove. - Click  Remove. - Click Delete.

Create measurements and markups

You can create measurements and markups in BCF topics and show the measurements and markups both in Tekla Structures and in Trimble Connect. To add measurements and markups in the current model, use the measurement and markup tools in the **BCF Topics** side pane.

Markups and measurements are saved in a view. You cannot add them separately in an already existing view.

You cannot edit the inserted measurements or markups in Tekla Structures. You can edit them in Trimble Connect and transfer them to Tekla Structures by creating a new view.

Option	How to use
 Select the type of the measurement that you want to create.	 Show the distance between two points. In the model, pick the start point for the measurement.

Option	How to use
	- Pick the second point. - Pick the point where you want to place the measurement.
	 Show the coordinates of a single point. In the model, pick the point whose coordinates you want to show.
	 Show the angle measurement between two points. - In the model, pick the vertex point of the angle. - Pick the first side of the angle. - Pick the second side of the angle.
 Select the type of the markup that you want to create.	 Add a cloud markup. - In the model, pick the center point of the cloud. - Pick the second point. Picking the second point defines the size of the cloud markup.
	 Add an arrow markup. - In the model, pick a point for the arrow head. This point is the start point of the line. - Pick the second point. This point is the end point of the line.
	 Add a line markup. - In the model, pick the start point of the line. - Pick the end point of the line.
	

Option	How to use
	Add a text markup. Text markup consists of text and a leader line. You cannot edit text after it has been inserted in the model. 1. Type the text in the text field under the markup tools. 2. In the model, pick the start point for the text leader line. 3. Pick the point where you want to place the text.
	 Draw a freehand markup. 1. In the model, pick a point where you want to start drawing. 2. Move the mouse to draw. 3. To finish, left-click the mouse.
	Select the color for the measurements and markups. In addition to the predefined set of colors, you can use your own custom colors: 1. Click the plus  button to open the color picker. 2. Define the suitable color. Use the color slider on the left to go to the desired color, and the transparency slider at the bottom. Then pick the desired shade in the color area with the color picker. 3. Click Save to save the color to the list of Custom colors. The custom colors remain on the list of colors even if the model is reopened.
 Remove all markups from the model.	Click the delete button at the bottom of the measurement tool list or the markup tool list to remove all the measurements or markups from the model. You cannot delete single measurements or markups.

Add views

1. In the **BCF Topics** side pane, select the BCF topic that you want to add views to.
2. Click  **Views** to open the views page.
You can see the views that have been added to the topic. A topic can have multiple views.



3. To add a new view, click .
A new view is added to the topic. The view is taken from the visible model view.
4. To delete a view, click  at the bottom corner of the selected view. Click **Preview** --> **Delete**.
Deleting views cannot be undone.

Note the following:

- When working with models uploaded from Tekla Structures as `.tekla` files, loading and saving topic views in Tekla Structures includes information about the selected and hidden objects.
- When working with IFC reference models in Tekla Structures, loading topic views that have been created in Trimble Connect include information about the selected and hidden objects.
- When working with IFC files that have been inserted as overlay models in Tekla Structures, loading topic views that have been created in Trimble Connect include information about the selected and hidden objects.
- For BCF topics that have been created in third-party applications, loading topic views in Tekla Structures displays the selected and hidden objects in the model view.

Add comments

1. In the **BCF Topics** side pane, select the BCF topic that you want to add comments to.
2. Click  **Comments** to open the comments page.
The comments made by different project members are listed as a comment thread showing who made the comment and when.
3. To add a new comment, click  **Add comment**.

4. Type any comments. You can also add attachments or an image.
 - Click  to add attachments. Attachments can be project files or local files.
 - Click  to add an image of the current model view.
5. Click **Comment**.
6. To edit or delete a comment, select the comment and click **Edit**, or **Delete** --> **Delete**.

Deleting comments cannot be undone.

Add markers

A marker can be used to specify the exact location of the topic in the model view by using x, y, and z coordinates.

You can add only one marker to each topic, but all the model markers are displayed in the model.

1. In the **BCF Topics** side pane, select the BCF topic that you want to add markers to.
2. Click  **Models** to open the models page.
3. To add a marker, click **Add a marker** and pick a point in the model where the marker is added.

The exact coordinates of the picked point are added to the marker.
4. To delete a marker, click  next to the marker coordinates and select **Remove**.

Link model objects

If a topic is relevant to a specific model objects, you can link the model objects to topics. The model object identifiers are saved to the topic data as references.

You can view the linked objects both in Trimble Connect and Tekla Structures with the `.tekla` and `.ifc` files and overlay models.

Note that BCF topics are not yet supported in the Trimble Connect 2D viewer.

1. In the **BCF Topics** side pane, select the BCF topic that you want to add model objects to.
2. Click  **Models** to open the models page.

3. To link the selected model objects to the topic, select the objects in the model and click **Link selected**.
The objects are linked to the topic. The total number of linked objects can be seen in the **Linked model objects** section title.
4. To view the linked model objects, click **View model objects**.
The objects are highlighted in the model view.
5. To remove some of the linked model objects from a topic, select the objects in the model and click **Unlink selected**.
6. To remove all linked model objects from a topic, click  and select **Unlink all**.

Note the following:

- When working with IFC reference models in Tekla Structures, objects linked to the BCF topics that have been created in Trimble Connect are highlighted.
- When working with IFC files that have been inserted as overlay models in Tekla Structures, objects linked to the BCF topics that have been created in Trimble Connect are highlighted.

Export BCF topics

You can export BCF topics as `.bcf` files or as in `.pdf` format.

Note that the BCF files contain only the topics data. Often the topics refer to models via 3D views. The models need to be exported separately as the model files are not included in the BCF files.

1. In the **BCF Topics** side pane, select the BCF topic that you want to export.

2. Click  at the top row of the topic and select **Export**.

The **Export BCF Topics** page opens.

3. Enter a name for the export and select the file format to export and the details to be included in the export.

Selecting the **Reference documents** does not include the actual documents in the export, but a reference to the original document that is located in a Trimble Connect project.

When the export is ready, it is shown in the **Exporting topics** section of the **BCF Topics** side pane.

4. To download the exported files, click **See export history**.

Exported files are available for download for 31 days after the export job is completed. After the time period the download button is expired and the original export file is not available from the export history.

Change the language of the BCF Topics side pane

You can change the language of the **BCF Topics** side pane, if needed. Note that changing the language in Tekla Structures does not affect the language of the **BCF Topics** side pane.

1. In Trimble Connect, go to your Trimble Connect profile.
2. In your **Language Preference**, select a language from the list.
This language selection is for Trimble Connect, and for the **BCF Topics** side pane in Tekla Structures.
3. Click **Save**.
4. Reopen the Tekla Structures model for the change to take effect.

Set and share the statuses of model objects using Status Sharing

Use **Status Sharing** to set, view, and change statuses of your model objects and assemblies and share the statuses between Tekla Structures, Trimble Connect, and Tekla PowerFab. Status of an object can be, for example, a manufacturing status or an erection status. The statuses are stored in a Trimble Connect project.

Before adding actions, and setting or viewing the statuses in Tekla Structures:

- Your Tekla Structures model needs to be linked to a Trimble Connect project. See instructions here: [Link a Tekla Structures model to a Trimble Connect project](#).

- On the **Trimble Connect** ribbon tab, click the  **Status Sharing** button to open the **Status Sharing** side pane window. You can see all the statuses set for the selected model objects in the linked Trimble Connect project, and add actions and statuses.
- Statuses are shared automatically with other users in the project, if you set them public.

If you are using **Status Sharing** between Tekla Structures and Tekla PowerFab, you can filter the actions in Tekla Structures so that only actions from Tekla PowerFab are visible.

Add, edit, and delete actions

Create actions for issues that you want to track or share the status for.

1. Click the three dots  to create a new action.
2. Select **Add action**.

- a. Enter a name for the action.
- b. Select whether the action is private.

Private actions are visible only to you and others using the same email address domain. If you clear the checkbox, the actions are visible to everyone, but only people with the same email address domain can set or modify those actions.

- c. Using the eye icons, select which status values you want to use in your action.

Note that each status has an assigned name and color and they cannot be changed.

- d. Click **Save**.

Status Sharing

Show only actions from Tekla PowerFab

New Action

Action name

Review

☒ Private

Status values

None

Enable

Commit

Started

Paused

Completed

This is the completed state

Cancel

Save

3. Switch the **Colorize statuses in model** on to enable the color visualization of model objects or assemblies based on their status.
4. To edit an action:
 - a. Select an action in the list of actions and click the three dots .
 - b. Click **Edit action**, change the action properties, and click **Save**.
5. To delete an action:
 - a. Select an action in the list of actions and click the three dots .

- b. Click **Delete action** and **OK** to confirm the deletion.

Show actions from Tekla PowerFab

If you are using **Status Sharing** between Tekla Structures and Tekla PowerFab, you can filter the actions in Tekla Structures so that only actions from Tekla PowerFab are visible.

Switch the **Show only actions from Tekla PowerFab** on to show only the actions from Tekla PowerFab and to filter out other ones.

Set and change statuses

Set the statuses in a selected action.

1. Select one or more objects in the model.
2. Go to the **Set Status** section.
3. Click one of the statuses available.
4. Select a date for the status.

The default date is **Today**, but you can select an earlier date for the status.

The status information is saved.

Visualize statuses on a timeline

To view all the statuses set on a specific date, use **Timeline**. The timeline visualizes the progress of the statuses. As you set or change statuses, the date of the change is saved.

1. Go to the **Timeline** section.
2. Set the interval for each step.

3. Click the  **Play** button, or use the slider, to visualize the statuses in the model from the earliest date a status was set to the present day. Click **Pause** to pause the timeline from playing.

Dates for the changed statuses are marked with a small triangle on the timeline.

Check the status history

You can check the history of all the statuses set for a selected object. Note that you cannot view the history of multiple objects simultaneously.

You can check the statuses for the current action or for all actions.

1. Select a model object or an assembly in the model.

2. Go to the **Status History** section.
Status History only displays information for a single selected model object or an assembly.
3. Select either **Selected Action** or **All Actions** to see the status history of the selected model object in a selected action or in all actions.

Visualize multiple actions on a timeline

If you have added at least two actions, you can use the **Multiple Actions** option to visualize multiple actions in the model at the same time. You can select which actions are visualized in the model and define their colorization priority.

When **Multiple Actions** is used, the synchronization with the server is paused and it resumes when you return back to the main dialog of **Status Sharing**.

1. In the list of actions, select **Multiple Actions**.
2. Select whether to visualize only the completed actions. Completed actions have the **Completed** status.
3. Use the eye icons to select which actions are visualized.
4. Define the colorization priority. Change the order of actions by dragging them to a suitable order.

The color of the action on the top of the list overrides the actions on lower on the list.

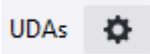
5. On the timeline, set the interval for each step.



6. Click the **Play** button to visualize the statuses in the model from the earliest date a status was set to the present day.

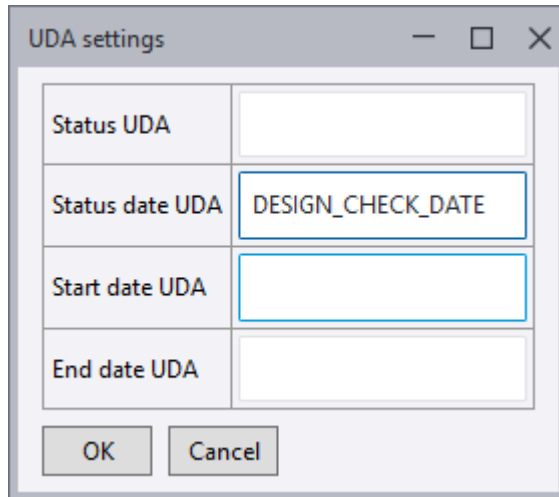
Use user-defined attributes (UDAs)

To be able to use the status values elsewhere in Tekla Structures, such as in reports, filters, drawing marks, and so on, you can save the status values to the model objects as UDAs.

1. Click the  **UDAs** settings button.

The **UDA settings** dialog opens.

2. Set the UDA names for the current status, current status date, start date and for the end date.



3. Click **OK**.

The  **Sync** button appears next to the **UDAs** settings button.

4. Click the  **Sync** button to synchronize the UDA information.

After the UDA information is synchronized, the UDA information is visible on the user-defined attributes tab of the selected model object and on the **Inquire** dialog. The synchronizing is done for all the objects which have statuses.

NOTE The status values and the UDAs are not kept in sync automatically. Clicking the **Sync** button synchronizes the status values only at a specific moment in time. When the status values are updated and modified over time, you need to manually update the synchronization. Click the **Sync** button to synchronize the UDAs as needed.

Trimble Connector

Trimble Connector enables the connection between Tekla Structures and Trimble Connect for Browser or Trimble Connect for Windows for managing the reference models and overlay models in the linked Trimble Connect project.

With Trimble Connector, you can:

- link a Tekla Structures model to a Trimble Connect project
- create a new Trimble Connect project
- download a reference model or reference model updates from a Trimble Connect project to a Tekla Structures model

- upload a reference model to a Trimble Connect project
- export Tekla Structures model objects as .ifc reference model to Trimble Connect projects

All operations between Tekla Structures and Trimble Connect use the project base point. This means that, for example, reference models from Tekla Structures are placed in relation to the project base point in Trimble Connect. If you have not defined a project base point, the model origin is used.

NOTE Trimble Connect related metadata and all reference models are located in the `..\TeklaStructuresModels\<model>\TConnect` folder. Exported reference model settings are stored to the `..\TeklaStructuresModels\<model>\Links` folder. Trimble Connector does not work correctly if you manually modify the files in these folders.

Launch Trimble Connector

You can launch Trimble Connector in multiple ways.

To launch Trimble Connector	Do this
Through the ribbon	On the Trimble Connect ribbon tab: Click  Models. The Trimble Connector - Models dialog box opens. For more information on managing reference models, see Manage reference models in a Trimble Connector (page 132).
Using File --> Import command	Click File --> Import --> Trimble Connect to download a reference model from any Trimble Connect project to a Tekla Structures model.
Using File --> Export command	Click File --> Export --> Trimble Connect to publish an IFC reference model of the open Tekla Structures model to any Trimble Connect project.

The **Trimble Connector - Models** dialog opens. You can link your model to a Trimble Connect project if you have not done that earlier. You can also create a new project.

Manage reference models in a Trimble Connector

Reference models are part of the Tekla Structures model, and they can be downloaded from, or exported to Trimble Connect projects.

On the **Trimble Connect** ribbon tab, click **Models** to start managing reference models.

The **Trimble Connector - Models** dialog opens. You can manage reference models on the **Reference models** tab, and overlay models on the **Overlay models** tab.

For more information about differences between reference models and overlay models, see [Should I use reference models or overlay models in Trimble Connect? \(page 140\)](#).

Upload reference models or reference model updates to a Trimble Connect project

You can upload both new Tekla Structures reference models or updated versions of Tekla Structures reference models to attached Trimble Connect projects.

New and updated reference models are marked in different ways:

Icon or label	Meaning
	The Tekla Structures reference model has not been uploaded to a Trimble Connect project.
	The newest version of the Tekla Structures reference model has not been uploaded to a Trimble Connect project.
	The reference model has the same version in Tekla Structures and in Trimble Connect.

1. Open the **Reference models** tab in the **Trimble Connector - Models** dialog.
2. To upload a new reference model or a new version of the reference model to the Trimble Connect project, click the  icon.

Download reference models or reference model updates from a Trimble Connect project

You can download and insert either new or updated reference models from a Trimble Connect project to a Tekla Structures model.

The reference models and their versions are marked with different icons depending on whether they are up-to-date:

Icon	Meaning
	The reference model has been updated in the Trimble Connect project after the last time that it has been downloaded to Tekla Structures. • Click  to download the latest version of the model.

Icon	Meaning
	The updated version of the reference model has not been downloaded to Tekla Structures. Click  to insert the version in the Tekla Structures model.
	The reference model version exists in the Tekla Structures model sub-folder but has not been inserted in the Tekla Structures model. Click  to insert the version in the Tekla Structures model.
	The reference model has the same version in Tekla Structures and in Trimble Connect.

- On the **Reference models** tab in the **Trimble Connector - Models** dialog, double-click a folder.
A list of reference models in that folder is shown.
- To show the versions of an reference model, click the arrow on the left side of the reference model name.
- Do either of the following:
 - Select the reference model that you want to download and click .
 - Select the updated reference model version that you want to download and click .

The new reference model or the updated reference model version is downloaded to a Tekla Structures model sub-folder and inserted to the Tekla Structures model.

Create new folders for reference models

- On the **Reference models** tab in the **Trimble Connector - Models** dialog, click .
- In the **Select folders** dialog, double-click the project to see the folders inside the project.
If a folder has sub-folders, you can view them by double-clicking the folder.
- Select one or more folders where you want to link the reference model and click **OK**.

You can also create a new folder by typing a name for the folder and clicking **Create**, or remove an existing folder from the list by hovering over the folder and clicking .

The selected folders are added to the **Folders** list on the **Reference models** tab in the **Trimble Connector - Models** dialog.

Export Tekla Structures model objects as an .ifc reference model to a Trimble Connect project

You can create an .ifc coordination view 2.0 file from Tekla Structures model objects and export it to a Trimble Connect project. You can create the file from selected model objects, or from all model objects.

1. Do one of the following:

To	Do this
Select to which Trimble Connect project and folder the .ifc reference model is exported	a. On the File menu, click Export --> Trimble Connect. The Trimble Connector - Export IFC to Trimble Connect dialog opens. b. In the list at the top of the dialog, select the Trimble Connect project. c. In the Folder list, select a folder in the selected Trimble Connect project.
Export the .ifc reference model to the linked Trimble Connect project	a. On the Trimble Connect ribbon tab, click Models. b. On the Reference models tab in the Trimble Connector - Models dialog, double-click the folder where you want to save the exported reference model. c. To start the export, click . The Trimble Connector - Export IFC to Trimble Connect dialog opens.

2. In the **Name** box, type a name for the exported model or model objects.
The name of the export needs to be unique within the project.
3. Select which model objects you want to export:

To export	Do this
All model objects	In the Export list, select All .
Selected model objects	a. In the Export list, select Selected.

To export	Do this
	b. Select the objects in the model view. To select the desired objects, ensure that you have the right selection switches activated.
Filtered model objects	a. In the Export list, select Filter . b. Do any of the following: - In the Filter list, select an existing filter. - To create a new filter, click  next to Filter list. For detailed instructions, see Create new filters.

4. Select which IFC settings you want to use:

To	Do this
Use existing IFC export settings	In the IFC export settings list, select the settings file. The settings file needs to be located in the model \attributes folder, so that you can select it in the IFC export settings list.
Create and use new IFC export settings	Click  next to the IFC export settings list. For more information, see Export in IFC format (page 229) .

The `.ifc` file does not include assembly information, which means that you can only export main parts. You can add additional property sets by saving a property set through **File** --> **Export** --> **IFC**. Use the file name `ifc.xml`.

If you do not select a settings file in the **IFC export settings** list, Tekla Structures will not know which object types you want to export, so only surface geometry is exported.

5. Click **OK**.

When the `.ifc` model has been exported, you can download the reference model to the Tekla Structures model. Select the reference model in the

Trimble Connector - Models dialog, and click . After a successful export, the model is marked with .

If the Tekla Structures model has an updated version of the exported reference model, click  to export the updated version of the reference model.

If you have not defined where the .ifc model is positioned in the **Export IFC** dialog, the exported IFC model is placed in relation to the project base point in the Trimble Connect 3D view. If a project base point has not been defined, the model is placed in relation to the model origin.

Manage overlay models in Trimble Connector

Overlay models are lightweight reference models that are stored in the attached Trimble Connect project. Overlay models can be quickly attached to the Tekla Structures model to show model objects on top of the Tekla Structures model. You can manage overlay models in many ways: for example, add new overlay models, adjust the scale and position of the overlay models, and inquire the properties of the overlay model objects.

Because overlay models are saved in the Trimble Connect project, you cannot use them in a Tekla Structures model unless the Tekla Structures model has been linked to a Trimble Connect project. Before you can start working with overlay models, link your Tekla Structures model to a Trimble Connect project. See instructions here: [Link a Tekla Structures model to a Trimble Connect project \(page 108\)](#).

To start managing overlay models:

1. On the **Trimble Connect** ribbon tab, click  **Models**.
The **Trimble Connector - Models** dialog opens. You can manage overlay models on the **Overlay models** tab, and regular reference models on the **Reference models** tab.
2. In the **Trimble Connector - Models** dialog, open the **Overlay models** tab.

Manage the visibility of overlay models

Do any of the following:

To	Do this
Only show overlay model objects within the current work area	Select the Show inside work area only check box.
Show a list of all folders and overlay models in the Trimble Connect project	In the list at the top, select Everything in project .
Show a list containing only the folders and overlay models that you	In the list at the top, select Used in this model .

To	Do this
can currently show or hide in this model	
Hide or show overlay models	- To hide an overlay model, click  on the left side of the model. - To show an overlay model, click  on the left side of the model. - To hide all overlay models in a folder, click  on the left side of the folder. - To show all overlay models in a folder, click . If a folder or its sub-folders do not have any overlay models that can be shown in Tekla Structures, the arrow symbol is not shown next to the eye icon. If a model cannot be converted to the right format and therefore, cannot be shown, a warning icon () is shown on the left side of the model.
Zoom to an overlay model	- In the list of overlay models, select the model to which you want zoom in. - Click . - Select Zoom to model. - Select the model view in which you want to zoom. - Click Yes to confirm zooming to the selected model view.

Add overlay models

- Select the folder in which you want to add a new overlay model.
- Click .
- Select **Attach model**.
- In the **Attach model** dialog, click **Browse...**, and browse to find the overlay model.
- Select the overlay model, and click **Open**.
- In **Location by**, select one of the following options:

Model origin inserts the model relative to 0,0,0.

Work plane inserts the model relative to the current work plane coordinate system.

Base point: <name of base point> inserts the model relative to the base point by using coordinate system values **East coordinate**, **North coordinate**, **Elevation**, and **Angle to North** from the base point definition in **Project properties**.

7. Select where you want to place the overlay model. You can enter coordinates in the **Offset** boxes, or pick a position for the overlay model origin.
8. Set the **Scale** of the overlay model if it is different from the one in the Tekla Structures model.

Note that you need to set the scale for a DWG or a file already in AutoCAD. When you define the measurement unit for a DWG or a DXF file and save the file in AutoCAD, the unit is recognized in Tekla Structures, and the overlay model is scaled correctly.

9. You can rotate the model around model Z axis by picking a location in the model or entering the desired value in the **Rotation** box.

The maximum number of decimals for the rotation value is 7.

10. Click **Attach model**.

The model version is added to the selected folder.

11. To show the new overlay model in the model view, click  next to the overlay model.

Create sub-folders for overlay models

You can create sub-folders within the Trimble Connect project to categorize your overlay models. For example, you can create different sub-folders for overlay models according to their file format, their type, or their position in the project.

1. Select the folder under which you want to add a sub-folder.
2. Click  on the right side of the folder.
3. Select **Create new folder**.
4. Name the sub-folder and click **Create**.

Adjust the scale and position of overlay models

A change in the model position or scale is applied to both Tekla Structures and Trimble Connect.

1. Select the overlay model whose position you want to adjust.

2. To show the model properties, click **Properties** at the bottom of the **Trimble Connector - Models** dialog.

Note that the properties are relative to the project base point.

3. Type new values for the scale, position, or rotation of the model.
4. To apply the changes to the Tekla Structures model view, click **Modify**.

To return to the initial scale and position of the model, click **Reset**.

Inquire overlay model objects

You can view the properties of objects and assemblies in overlay models by using the **Inquire** command.

1. Select an object or assembly in an overlay model.
2. Right-click the object or assembly.
3. Select **Inquire**.

The **Inquire object** dialog shows the properties of the selected object or assembly. The shown properties can differ depending on the overlay model and the model format. The name and the GUID of the overlay model are displayed at the top.

Remove an overlay model from currently used models

1. Ensure that you have the **Used in the model** list open.
2. Select the overlay model that you want to remove.
3. Click .
4. Select **Remove from used model** tree.

The overlay model is removed from the **Used in the model** list.

If you want to show the overlay model again, switch to the **Everything in project** list and click . The overlay model appears in the **Used in the model** list again.

Should I use reference models or overlay models in Trimble Connect?

In the following tables, see the pros and cons of reference models and overlay models, and the operations that you can perform in these model types in the linked Trimble Connect project.

Reference models	Overlay models
+ Parts of the Tekla Structures model, so more operations are available - Increase the size of the .db1 files	+ Fast to load and display + Allow each user to view the model versions that they need

Reference models	Overlay models
	+ Do not affect the size of the .db1 files - All operations are not available

Operation	Can you do it with reference models?	Can you do it with overlay models?
View the model on top of a model (page 178)	Yes	Yes
View the model in a drawing	Yes	No
Inquire objects in the model	Yes	Yes
Filter objects in the model	Yes	No
Manage changes between model versions (page 137)	Yes	Yes
Detect clashes	Yes	No
Convert objects to native objects (page 207)	Yes	No
Add user-defined attributes	Yes	No
Use layers (page 178)	Yes	No
Create tasks	Yes	No
Create views from objects	Yes	No
Fit work area	Yes	No
Hide objects	Yes	No
Hide all objects from the view with display settings	Yes	No
Manage categories in Organizer	Yes	No

Manage overlay model versions in Trimble Connector

You can have several versions of the same overlay models in your Trimble Connect projects, and view the differences between these versions in your Tekla Structures models. This way, you can see the progress of the project.

NOTE You need to save the new model versions with the same name and in the same folder as previous model versions.

Create overlay model versions

1. Create a new version of the overlay model.

You can use external software to create overlay model versions, such as *ArchiCad* or *Autodesk Revit*, to create IFC model versions, or upload

the Tekla Structures model to the Trimble Connect project as a `.tekla` file.

2. Do any of the following:

To upload	Do this
A new model version in the <code>.ifc</code> format	Do any of the following: - In the Trimble Connector - Models dialog, open the folder where the previous model version is stored, and click  next to the previous model version. - In Trimble Connect for Browser, open the folder where the original model is stored, and drag and drop the new version of the model to the folder.
A new model version in another format	a. In the Trimble Connector - Models dialog, select the folder where the original model version was saved. b. Click  and select Attach model. c. Browse to the folder where you saved the new model version, and select the model version. The model version is added to the selected folder.

3. To see the overlay model versions, select the overlay model, and click **Versions** to expand the **Versions** section.

4. Select which version of the model you want to show:

To show	Do this
The newest version of the model	Whenever the latest version of an overlay model is not shown, the  symbol appears. The  symbol is shown next to models whose old versions are shown, and folders in which you have saved the models whose old versions are shown. Click  next to the model or the folder in which the model is saved.
An older version of the model	Click  next to the version that you want to see.

Compare the differences between .tekla or .ifc overlay model versions

1. In the overlay model list, select an overlay model that has at least two versions in the attached Trimble Connect project.
2. At the bottom of the **Overlay models** tab, click **Versions**.
3. In the **Versions** section, do any of the following according to your needs:

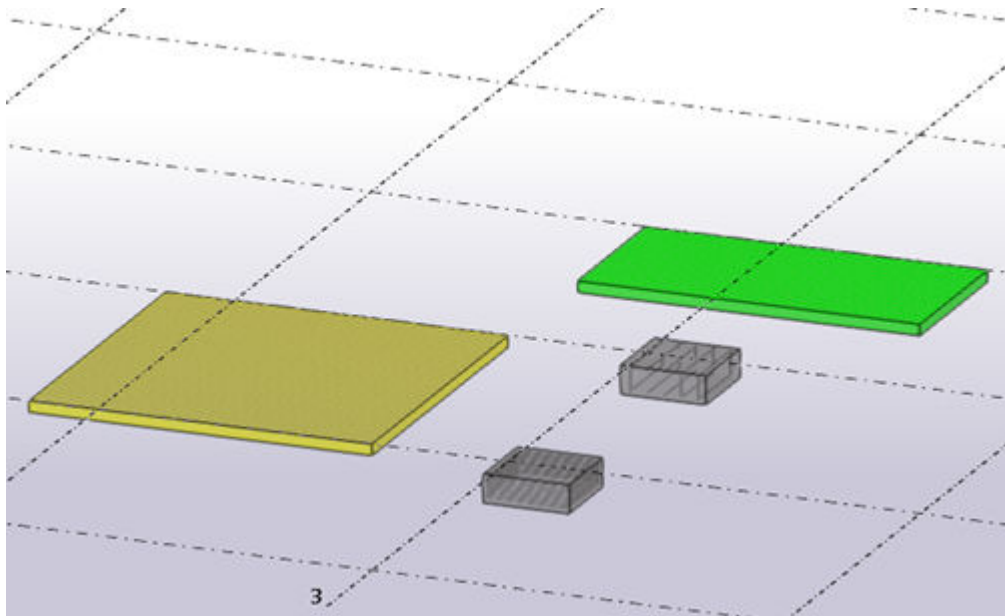
To	Do this
Define the properties to be compared	a. Click ... in the Versions section. b. In the Comparison sets dialog that opens, select checkboxes next to the properties that you want to compare. Only the selected properties will be used for comparing the model objects in the Changes list. c. To add new properties, click + and type the property name. d. To delete properties, click  next to the properties. e. To save the currently selected properties as a comparison set for future use, select a settings file in the list at the top of the Comparison sets dialog, or create a new settings file by typing a new name.  f. Click . g. Close the Comparison sets dialog.
Define how precisely properties are compared	a. Click  in the Versions section. b. In the Property Set Comparison Tolerances dialog, set the minimum units and values which will be considered as changes in properties. c. To save the current tolerances for future use, select a settings file in the list at the top of the Comparison sets dialog box, or create a new settings file by typing a new name.  d. Click . e. Close the Property Set Comparison Tolerances dialog.

4. In the **Versions** section, show two versions of the model by clicking  next to the model versions.

Note that you can compare only two versions of an overlay model at a time. If you set a third model version visible, the oldest visible version is hidden automatically, and the comparison is updated to show the differences between the two visible versions.

The changes between the versions are shown with the following colors in the model:

- Added objects = green
- Modified objects = yellow
- Deleted objects = red
- Existing objects that have not been modified = gray



5. To show which properties of modified objects have changed, click the corresponding row in the **Changes list**.

The changed properties are shown in the **Property details** side pane. Note that the side pane may not show changes in object rotation or location.

Compare the differences between overlay model versions in other formats

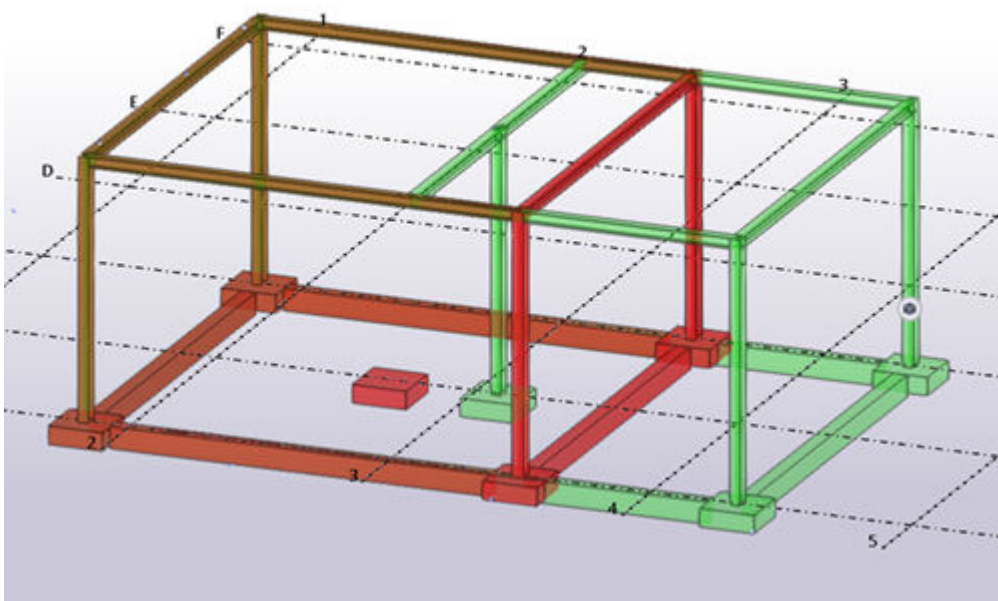
When you compare overlay model versions in formats such as .dgn or .dwg, the changes are shown by color-coding the objects in the overlay model.

1. In the overlay model list, select an overlay model that has at least two versions in the attached Trimble Connect project.
2. At the bottom of the **Overlay models** tab, click **Versions**.

3. In the **Versions** section, show two versions of the model by clicking  next to the model versions.

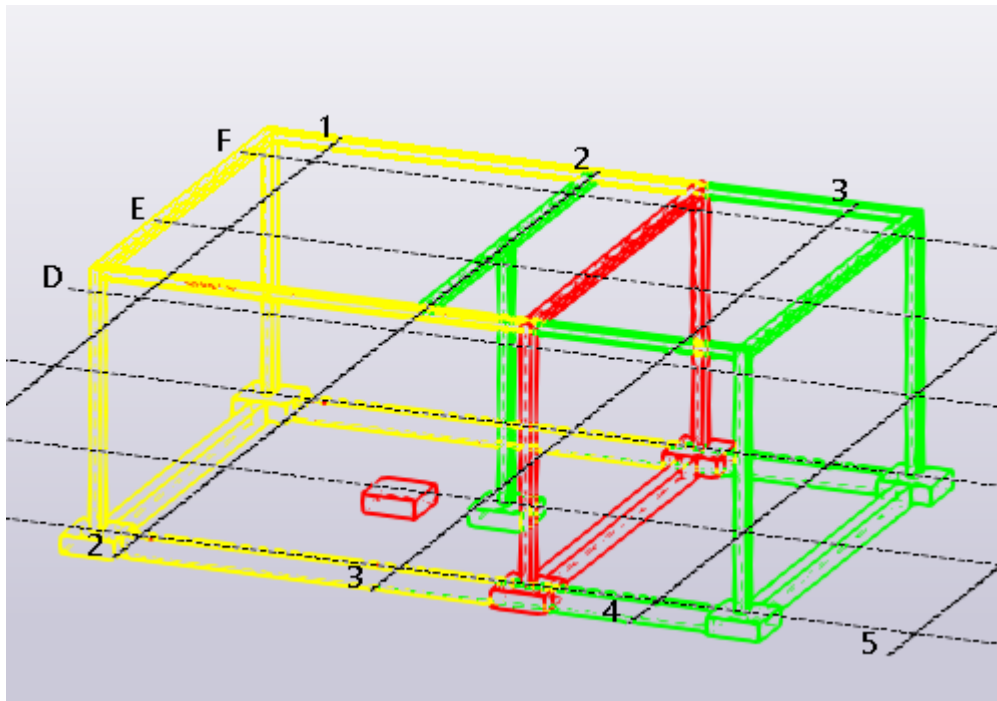
Note that you can compare only two versions of an overlay model at a time. If you set a third model version visible, the oldest visible version is hidden automatically, and the comparison is updated to show the differences between the two visible versions.

The model objects are color-coded according to the changes that have been made. The newest version of an object is shown in green, while the previous version is shown in red. If the object is the same in both versions, the object is shown in yellow or orange, depending on the rendering option.

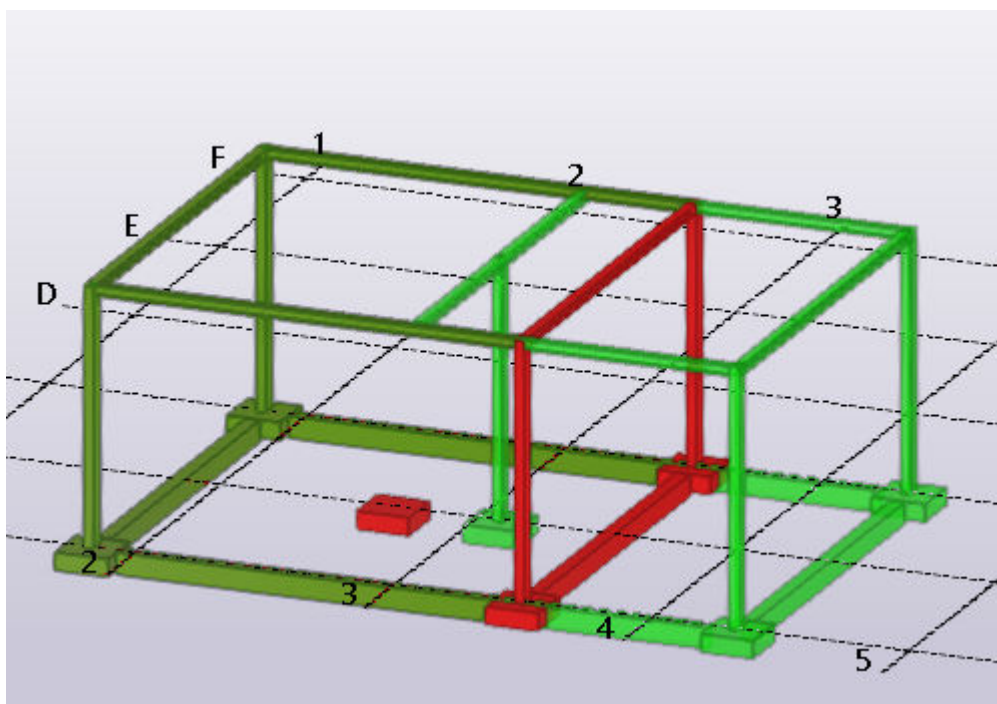


You can switch between different rendering options on the to better see the changes and overlapping objects. The same structure is shown below with two different rendering options.

With the **Components wireframe** option:



With the **Components rendered** option:



Match views and selections between Tekla Structures and Trimble Connect for Windows

If you are working in Tekla Structures and Trimble Connect for Windows at the same time, you can collaborate with the two applications. In practice, this means that you can match the zoom and projection of the 3D model views, and select the same objects in both applications.

Before collaborating, you need to do the following:

- Have a project open in Trimble Connect for Windows and a model open in Tekla Structures.
- Export the Tekla Structures model to Trimble Connect in the IFC format.

For more information, see [Manage reference models in a Trimble Connector \(page 132\)](#).

- Download and show the model in Trimble Connect for Windows.

Match the camera position, zoom level, and projection of model views

You can adjust the model views in Tekla Structures and in Trimble Connect for Windows to match each other as well as possible. When you do so, the camera position, zoom level, and view projection of the views are synchronized. You can select which model view is the principal model view to which you want to match the other model view.

- Do either of the following:

To	Do this
Adjust the Tekla Structures model view to match the Trimble Connect for Windows view	On the Trimble Connect tab, click  Match with Trimble Connect for Windows view.
Adjust the Trimble Connect for Windows model view to match the Tekla Structures view	On the Trimble Connect tab, click  Match with Tekla Structures view.

Select the same objects

- Do either of the following:

To	Do this
Select the currently selected Trimble Connect objects also in the Tekla Structures model	On the Trimble Connect tab, click  Select in Trimble Connect for Windows.
Select the currently selected Tekla Structures model objects also in Trimble Connect for Windows	On the Trimble Connect tab, click  Select in Tekla Structures.

1.4 Real-time collaboration with Live Collaboration for Tekla Structures (Preview)

With **Live Collaboration** for Tekla Structures you can collaborate in real time between 3D models without exporting or sharing any files. **Live Collaboration** works between multiple instances of Tekla Structures and Trimble Connect, enabling live model-based collaboration with a wider project team from your office. All collaborators can instantly see changes made by others, allowing for live design and review sessions by the project team members.

Tekla Structures 2025 introduces the **Live Collaboration** functionality as a Preview feature. In Trimble Connect, **Live Collaboration** is labeled as Beta. To find out more, see Preview features in Tekla Structures 2025.

As a part of the review process, Tekla Structures users can share their model modifications live to other Tekla Structures and Trimble Connect users, and see the modifications and the navigation of other collaborators in their Tekla Structures model. Model changes are visible to all collaborators, but each user can edit only their own model. This means that you can see other users' model objects as an overlay among your model objects in Tekla Structures, but you cannot edit them or convert them to native Tekla Structures objects. Trimble Connect users can also share models which are stored in the Trimble Connect project.

Before you start using **Live Collaboration**, check the following prerequisites:

- Your Tekla Structures model needs to be linked to a Trimble Connect project. See instructions here: [Link a Tekla Structures model to a Trimble Connect project](#).
- Invite your collaborators to the Trimble Connect project.

Start a live collaboration session in Tekla Structures

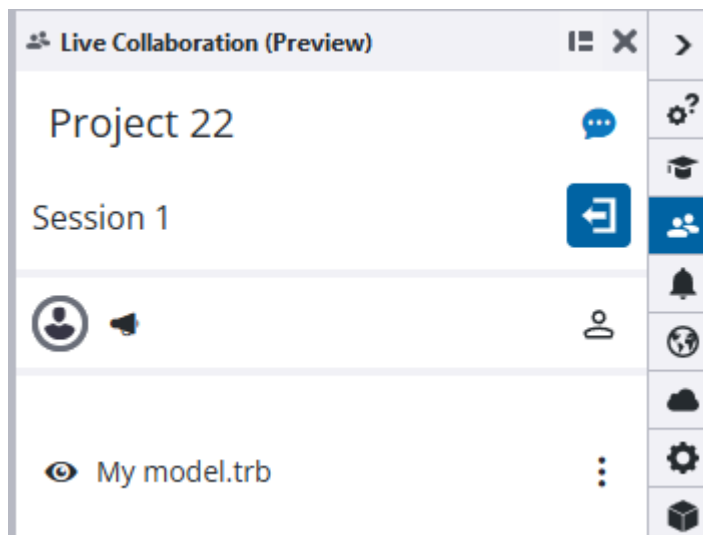
1. In the Tekla Structures side pane, click  to open the **Live Collaboration** side pane window.
2. To start a live collaboration session, click  next to the **Start a session or join a session with a link** box.
If needed, you can enter a name for the session. Otherwise the session name will consist of the date of the session.

If there are already sessions on the list of sessions, click  next to the session name to join it.

All the sessions of the collaborators are visible in the side pane, and you can join any of the sessions. The model names, collaborator names, and the used application names are visible for each collaborator. Collaborators can join the same session multiple times, from different applications, devices, or using different instances of the same application.

If needed, you can also share the link of the session, for example, in a calendar invite or in an email.

3. When the session has started, click **Share** to add your model to the session and make it visible to other collaborators.



4. Start working in the model or follow other collaborators.

To	Do this
Follow other collaborators' camera movements in the model	The camera movements of each collaborator are shown in the model as a head  icon with the collaborator's name next to it. Your head is only shown to other collaborators if you are using the perspective projection in your model. You can always follow the camera movements of other collaborators whether their projection in the model is set to orthogonal or perspective. If you are in orthogonal projection, your head is not shown to others in the 3D view.
Follow other collaborators in the model	To follow another collaborator in the model, click the profile picture  next to the collaborator's name in the side pane window. The profile picture gets a blue highlight. To stop following your collaborator, click the profile picture again.
Force other collaborators to follow your camera in the model	Click  to force others to follow your camera movements in the model. Other collaborators can see that you have locked the presenter state. To stop the enforced following, click  again.
Enter the private space	If you not wish other collaborators to see you in the model, click  to enter the private space. To exit the private space and make your changes visible again, click .
Show reference models that are added to the session	Click the eye icon to show or hide the reference models. To fit the model to the 3D view, click the three dots and select Fit to view.

5. To leave the session, click  .

If you want to return to a session, click  next to the session name.

6. To delete a session, click  next to the session name.

Trimble Live Collaboration feature compatibility

The following table lists some features and their **Live Collaboration** compatibility in Tekla Structures and Trimble Connect.

	Tekla Structures	Trimble Connect
Creating clip planes	yes	yes
Creating clip boxes	no	no
Working with Tekla Model Sharing	no models are shared but rendering is not working as expected	n/a
Modifying part colors	yes	yes
Hiding parts	yes	yes
Adding annotations	incomplete	yes
Adding measurements	incomplete	yes

2 Get started with import and export formats

Tekla Structures is highly interoperable. If you need to exchange model information with users of other software or systems, you can import and export information in many standard file formats or even establish a direct link with several other products.

- In most cases, the format used for the exchange is a [general industry standard format \(page 152\)](#) supported by many different tools.
- Formats may be supported for import, export or both. See [Tekla Structures data exchange formats \(page 153\)](#) for a listing. There you can also find tables of supported software listing the options you have for sharing data with many commonly used tools.
- When you are ready to exchange data, see [Import to and export from Tekla Structures \(page 172\)](#).
- You can install new capabilities such as new import and export formats or direct links to other software from the [Tekla Warehouse](#).
- If your organization has a capable programmer, you can even add your own customized import and export formats or direct links to other software and systems using Tekla Open API.

2.1 Industry standards

There are many industry standard file transfer formats. The principle ones supported by Tekla Structures are IFC, DSTV, SDNF, DGN, DXF, DWG, IGES, and STEP. Older formats are also included. For a tighter integration, you can link to Tekla Structures using the Tekla Open API technology.

The file name extension normally informs the user which format it is based upon. If you do not know what format it is, or the file does not import, then you will need to open the file in a text editor to look at the header information,

where the file type and the authoring application is usually noted. With CIS/2 files the authoring application and version number is sometimes written at the end of the file.

See also

[Tekla Structures data exchange formats \(page 153\)](#)

2.2 Tekla Structures data exchange formats

The following tables list the interoperability possibilities of Tekla Structures.

The **Compatible file formats** list includes the possible file formats for import and export in Tekla Structures.

The **Simplified Trimble to Trimble data exchange, Compatible software with direct links**, and **Compatible software (file-based workflows)** lists include software that are compatible with Tekla Structures.

Some of the listed software have a direct link with Tekla Structures. Many direct links are available in [Tekla Warehouse](#). When you have a direct link to an application, and you export the model from Tekla Structures using that particular application, the model is opened in the application. Tekla Structures and the particular application need to be installed on the same computer.

NOTE If you have a format or software that is not listed, please [contact your local support](#).

Compatible file formats

The following table lists many of the different formats you can use in Tekla Structures to [import and export data \(page 172\)](#). ✓ in a column means that you can import or export the format.

To use some of the formats, you may need to download an extension from [Tekla Warehouse](#).

Format	Import	Export	More information
3D geometry definition file format (.obj)	✓	✓	Download Multi converter from Tekla Warehouse.

Format	Import	Export	More information
aSa (.TEK)		✓	Download Rebar Export from Tekla Warehouse. Rebar quantities and production geometry for cut & bend
Adobe PDF (.pdf)	✓ *	✓ **	*Reference files in model **Standard reporting, documentation needs including 3D PDF capability.
Autodesk 3DS Max format (.3ds)	✓		Reference files only. Note that a unity-based renderer Trimble Connect Visualizer is available in Tekla Structures and Trimble Connect products.
AutoCAD (page 248) .dwg	✓	✓	3D geometry, 2D CAD drawings
AutoCAD (page 248) .dxf	✓	✓	Limited CAD data file for 3D geometry, 2D CAD geometry
BIM Collaboration format (page 114) (.bcf)	✓	✓	From Tekla Structures 2024 onwards, BCF Topics is supported in Tekla Structures as a Trimble Connect web-service. Alternatively, you can download a non-server functionality called BCF Comment tool , from Tekla Warehouse. External software houses such as Revizto, Kubus (BIM Collaboration) also offer functionality for Tekla Structures.
Blender files (.blend)	✓		Reference files only.
BVBS (page 530) (.abs)		✓	Available in Tekla Structures. Rebar quantities and production geometry for cut & bend, mesh, lattice girder.
Collada (.dae)	✓	✓	Download Multi converter from Tekla Warehouse.
Conversion files (.cnv)	✓	✓	Text-based mapping file for Tekla Structures profile, twin profile, and material names with names used in other

Format	Import	Export	More information
			software. Edit in a text editor, such as Notepad.
Comma separated value files (.csv)	✓	✓	You can import and export hardware layout points in CSV files.
DSTV (page 364) (.nc, .stp, .mis)	✓ *	✓ **	*3D analytical geometry **Part data for manufacturing systems
EJE (page 405)		✓	US environment, Imperial role only
Elematic ELiPLAN, ELiPOS, Plant Control, FloorMES, WallMES (.eli)	✓ *	✓ **	*Production status and dates **Element and material quantities, production geometry for casting, plotting and cutting, design status and notes
FabTrol Kiss (.kss)		✓	Model data, attributes
FabTrol MIS Xml (.xml)	✓	✓	Status information
Filmbox (.fbx)	✓		Files can be referenced for 3D collaboration (page 173) .
GL Transmission Format (.glft)	✓		Files can be referenced for 3D collaboration (page 173) .
HMS (page 569) (.sot)		✓	Element and material quantities, production geometry for casting, plotting, design status and notes
IBB Betsy (.fa, .f, .ev)		✓	Element and material quantities
IFC2x3 (.ifc)	✓ *	✓ **	*BIM model, 3D geometry, 2D geometry, attributes. The IFC2X3 format (extrusion) can also be used in IFC object conversion (page 207) to get native Tekla Structures members. **BIM model, 3D geometry, 2D geometry, attributes For a list of IFC applications certified by buildingSMART

Format	Import	Export	More information
			international, see Certified Software .
IFC4 (.ifc)	✓	✓	For a list of IFC applications certified by buildingSMART international, see Certified Software .
IFC4.3 (.ifc)	✓	✓	For a list of IFC applications certified by buildingSMART international, see Certified Software .
IFCXML 2X3 (.ifcXML)	✓	✓	For a list of IFC applications certified by buildingSMART international, see Certified Software .
IFCZIP 2x3 (.ifcZIP)	✓	✓	For a list of IFC applications certified by buildingSMART international, see Certified Software .
Initial Graphics Exchange Specification (IGES (page 406)) (.iges, .igs)	✓	✓	Files can be referenced for 3D collaboration (page 173) .
LandXML (page 286) (.xml)	✓		
Microsoft Project (.xml)	✓ *	✓ **	*Schedule information for Task manager **Schedule information to external project management software
Microstation (page 253) (.dgn)	✓ *	✓ **	*3D geometry **3D geometry, drawings
Oracle Primavera P6 (.xml)	✓ *	✓ **	*Schedule information for Task manager **Schedule information to external project management software
Plant Design Management System (.pdms)		✓	

Format	Import	Export	More information
Point cloud (page 296) (.e57, .las, .laz, .pts, .ptx, .js, .tzf, .tdx)	✓ *		*classification is supported
Polygon File Format (.ply)	✓		Files can be referenced for 3D collaboration (page 173) .
Potree (page 296) (.js)	✓	✓	Potree file structure is created when reading in other point cloud formats and can then be copied to a new location.
RIB iTWO-Export (.cpixml)		✓	Quantities, material data, status data
SketchUp (page 295) (.skp)	✓	✓	Popular 3d geometry file format
Staad ASCII (.std)	✓ *	✓ **	*Use FEM import (page 357) . **Use Staad.Pro . Modification of profiles in Staad.Pro handled in Tekla Structures.
Steel Detailing Neutral Format (.sdf, .sdnf, .dat)	✓	✓	3D geometry Used in getting data to another software where native links do not exist.
Steel 2000 (page 405)		✓	
STEP (page 406) AP203 (.stp, .step)	✓	✓	Files can be referenced for 3D collaboration (page 173) .
STEP (page 406) AP214 (.stp, .step)	✓	✓	Files can be referenced for 3D collaboration (page 173) .
STEP (page 406) AP242 (.stp, .step)	✓	✓	Files can be referenced for 3D collaboration (page 173) .
.tekla (page 110)	✓	✓	Tekla internal format using TrimBIM , which is based on IFC file schema
Tekla Collaboration (.tczip)	✓	✓	Format used to zip IFC data, TrimBIM data, and metadata for some workflows, such as with Aveva E3D. Format can be read by Trimble Connect.

Format	Import	Export	More information
Tekla PowerFab (page 414) (.pftx, .zip)	✓ *	✓ **	*Status data **Model data, attributes, drawings, NC files, TrimBIM, also IFC files for combining and estimating
Tekla-FabTrol Report (.xsr)		✓	
Tekla Structural Designer model (page 333) (.tsmd)	✓	✓	Analysis & Design model - newer format used in integration using inbuilt API processes.
Tekla Structural Designer neutral (page 333) (.cxl)	✓ *	✓ *	*Analysis & Design model - older format, to be eventually replaced by the .tsmd format.
Tekla Structures shape (.tsc)	✓ *	✓ **	*Import shapes **Export shapes
TrimBIM (.trb)	✓	✓	Trimble lightweight 3D geometry and metadata file format
Trimble Field Link (page 321) (.tfl, .tflx, .txt, .cnx)	✓	✓	
TubeNC (.xml)		✓	Part geometry for manufacture
Unitechnik (page 448) (.uni, .cam)		✓	Element and material quantities, process information, production geometry for precast formwork, plotting, mesh-welding

Simplified Trimble to Trimble data exchange

Work smarter, easier, and more collaboratively with connected data, solutions, and workflows. Tekla Structures can be purchased as part of a [cost effective bundle of Trimble solutions](#). Below the workflow file formats are given in more

detail. Note that it is possible to purchase bundles of software under a single license.

Trimble product	Import to Tekla Structures	Export from Tekla Structures
Plancal	IFC2X3 (.ifc) AutoCAD (.dwg, .dxf)	IFC2X3 (.ifc) AutoCAD (.dwg, .dxf)
Projectsight	PDF	PDF
Realworks	.dwg, .dxf, .dgn, .las, laz, .pts, .tdx, .xml, .e57	.dwg, .trb, .dgn, .dxf, .ascii
Quadri		.ifc, LANDXML (.xml), .skp
SketchUp	SketchUp (.skp) AutoCAD (.dwg, .dxf)	SketchUp (.skp) AutoCAD (.dwg, .dxf)
Tekla PowerFab	Tekla PowerFab Connector (page 414) Import from Tekla PowerFab (page 443) available in Tekla Structures File menu Direct link via Trimble Connect: Issue management service (.bcf) Production management: Fabrication Status information (via Status Share)	Tekla PowerFab Connector (page 414) Direct link via Trimble Connect: Issue management service (.bcf) Production release (.pftx, .zip) PDF AutoCAD formats (.dwg, .dxf) Microstation (.dgn) BIM formats (.ifc, .trb) NC files (.nc1) Preliminary/Advanced Bill of Material (ABM) release (.trb) Estimating release (.ifc)
Tekla Structural Designer	Direct link (.tsmd) or .cxl format neutral file	Direct link (.tsmd) or .cxl format neutral file
Tekla Tedds	Direct data link: Tekla Tedds Integrator (page 343)	Direct data link: Tekla Tedds Integrator (page 343)
Trimble Business Centre	LandXML (.xml) Point clouds (.las, .laz, .js, .e57, .tdx, .tzf)	
Trimble Connect	Collaboration workflows: Project & Team information Project controls: BCF Topics	Collaboration workflows: Project controls: BCF Topics Digital construction information:

Trimble product	Import to Tekla Structures	Export from Tekla Structures
	Digital construction information: 3D models: .ifc, .skp, .swg AutoCAD formats (.dwg, .dgn) PDF	.ifc 2D AutoCAD formats (.dwg, .dgn) PDF
Trimble Field Link	Trimble Field Link (.tfl) Point clouds (.e57)	Trimble Field Link (.tfl) IFC2X3 (.ifc) Point data (.csv, .txt, .tflx)

Compatible software with direct links

The following tables list the software that have a direct link with Tekla Structures to [import and export data \(page 172\)](#).

Many direct links are available in [Tekla Warehouse](#).

The tables also list the file formats that can be used if the direct link is not available.

Fabrication and production workflow support

Product	Company	Import to Tekla Structures	Export from Tekla Structures
BeamMaster	AGT		Direct Link
PEMA WeldControl	Pemamek		Direct Link
Pipelabo	Maruhide		Direct Link
ProCAM	HGG	Direct Link	Direct Link
Pro-Fit	Zeman		Direct Link
Raptor	Peddinghaus		Direct Link
Sicam	Controlled Automation		Direct Link
Steel Projects PLM	Steel Projects	Direct Link	Direct Link
StruM.I.S	StruM.I.S	Direct Link	BSWX (.bswx)
Vacam	Voortman		Direct Link

Design phase workflow support

Product	Company	Import to Tekla Structures	Export from Tekla Structures
AxisVM	Inter-CAD Kft.	Direct Link	Direct Link or .ifc
Microstation	Bentley	AutoCAD (.dwg, .dxf) CIS/2 LPM6 design (.stp, .p21, .step) IFC2X3 (.ifc) Microstation (.dgn) Steel Detailing Neutral Format (.sdf, .sdnf) STEP AP203/AP214/AP242 (.stp, .step)	AutoCAD (.dwg, .dxf) IFC2X3 (.ifc) Microstation (.dgn) STEP (page 406) AP203/AP214/AP242 (.stp, .step)
ProjectWise	Bentley	Projectwise Drive AutoCAD (.dwg, .dxf) CIS/2 LPM6 design (.stp, .p21, .step) IFC2X3 (.ifc) Microstation (.dgn)	Projectwise Drive AutoCAD (.dwg, .dxf) IFC2X3 (.ifc) Microstation (.dgn)
Diamonds	Buildsoft	Direct Link KISS (.kss)	Direct Link KISS (.kss)
StruXML	StruSoft	Direct Link IFC2X3 (.ifc)	Direct Link IFC2X3 (.ifc)
IDEA StatiCa	IDEA StatiCa	PDF, .ifc	Direct Link: Requires IDEA StatiCa on the same machine. Link is installed through the IDEA software. IDEA StatiCa can also export .ifc models from designed connections. The reference connection model can be inserted as a reference model in Tekla Structures.

Product	Company	Import to Tekla Structures	Export from Tekla Structures
			Use the Export to IDEA StatiCa extension in Tekla Warehouse to export Tekla Structures connections directly to IDEA StatiCa connection (bypassing Checkbot).
Joints For Tekla	Progetto Archimede		Direct Link
BIM Connector	Lantek	Direct Link	Direct Link
LIRA-SAPR	LIRA-SAPR	Direct Link (Default, Russia)	Direct Link (Default, Russia)
LIRA 10	LIRA SOFT	Direct Link (Russia)	Direct Link (Russia)
Midas Gen	MIDAS	Direct Link	Direct Link
ModeSt	Tecnisoft	Direct Link	Direct Link
PowerConnect	Buildsoft	Direct Link	Direct Link
BIM Expert	Buildsoft	Direct Link	Direct Link
Qnect	Qnect	Direct Link	Direct Link
RFEM	Dlubal	Direct Link CIS/2 LPM6 analytical (.stp, .p21, .step) IFC2X3 (.ifc)	Direct Link CIS/2 LPM6 analytical (.stp, .p21, .step) IFC2X3 (.ifc)
RISA 3D (Suite)	Risa Technology	Direct Link (US market) AutoCAD (.dxf) CIS/2 LPM6 analytical (.stp, .p21, .step) CIS/2 LPM6 design (.stp, .p21, .step) Steel Detailing Neutral Format (.sdf, .sdnf)	Direct Link (US market) AutoCAD (.dxf) CIS/2 LPM6 analytical (.stp, .p21, .step) CIS/2 LPM6 design (.stp, .p21, .step)
RisaConnection	Risa Technology	Direct Link (certain markets)	Direct Link (certain markets)

Product	Company	Import to Tekla Structures	Export from Tekla Structures
Robot Structural Analysis Professional	Autodesk	Direct Link CIS/2 LPM6 analytical (.stp, .p21, .step) CIS/2 LPM6 design (.stp, .p21, .step)	Direct Link CIS/2 LPM6 analytical (.stp, .p21, .step) CIS/2 LPM6 design (.stp, .p21, .step)
RSTAB	Dlubal	Direct Link CIS/2 LPM6 analytical (.stp, .p21, .step) IFC2X3 (.ifc)	Direct Link CIS/2 LPM6 analytical (.stp, .p21, .step) IFC2X3 (.ifc)
SAP2000	Computers & Structures, Inc.	Direct Link	Direct Link
ETABS	Computers & Structures, Inc.	Direct Link AutoCAD (.dwg, .dxf) CIS/2 LPM6 analytical (.stp, .p21, .step)	Direct Link AutoCAD (.dwg, .dxf) CIS/2 LPM6 analytical (.stp, .p21, .step)
SCIA	Nemetschek	Direct Link AutoCAD (.dwg, .dxf) IFC2X3 (.ifc) Steel Detailing Neutral Format (.sdf, .sdnf)	Direct Link AutoCAD (.dwg, .dxf) IFC2X3 (.ifc) Steel Detailing Neutral Format (.sdf, .sdnf)
S-FRAME	S-FRAME Software Inc.	Direct Link Autodesk (.dxf)	Direct Link Autodesk (.dxf)
STAAD.Pro	Bentley	Direct Link (only geometry started in Tekla Structures can be round tripped) AutoCAD (.dwg, .dxf) CIS/2 LPM6 analytical (.stp, .p21, .step) Steel Detailing Neutral Format (.sdf, .sdnf) ISM	Direct Link AutoCAD (.dwg, .dxf) CIS/2 LPM6 analytical (.stp, .p21, .step) Staad ASCII file (.std) ISM

Compatible software (file-based workflows)

The following table lists Tekla Structures compatible software and the formats that you can [import to and export from \(page 172\)](#) Tekla Structures.

For a list of IFC applications certified by buildingSMART international, see [Certified Software](#).

To find out more about the various import and export tools, see [Import to and export from Tekla Structures \(page 172\)](#).

Product	Company	Import to Tekla Structures	Export from Tekla Structures
Adapt	Nemetschek	AutoCAD (.dwg)	AutoCAD (.dwg)
Advanced Steel	Autodesk	CIS/2 LPM5 analytical (.stp, .p21, .step) IFC2X3 (.ifc) Steel Detailing Neutral Format (.sdf, .sdnf)	CIS/2 LPM5 analytical (.stp, .p21, .step) IFC2X3 (.ifc) Steel Detailing Neutral Format (.sdf, .sdnf)
Allplan/Planbar	Nemetschek	AutoCAD (.dwg, .dxf) IFC2X3 (.ifc) Microstation (.dgn)	AutoCAD (.dwg, .dxf) IFC2X3 (.ifc) Microstation (.dgn)
ANSYS	ANSYS	IGES (.iges, .igs)	IGES (page 406) (.iges, .igs)
ArchiCAD	Graphisoft / Nemetschek	AutoCAD (.dwg) IFC2X3 (.ifc) IFC4 (.ifc)	AutoCAD (.dwg) IFC2X3 (.ifc) IFC4 (.ifc)
Armaor	Ariadis		BVBS (.abs)
Artube	Adige		STEP (page 406) (.stp, .step) IGES (page 406) (.iges, .igs) IFC (.ifc)
aSa Rebar	Applied Systems Associates Inc		aSa Rebar file (.TEK)
ASI analysis	Applied Science International LLC		Staad ASCII file (.std)
AutoCAD	Autodesk	AutoCAD (.dwg, .dxf)	AutoCAD (.dwg, .dxf)

Product	Company	Import to Tekla Structures	Export from Tekla Structures
AutoCAD Civil 3D	Autodesk	AutoCAD (.dwg, .dxf) Microstation (.dgn) LandXML files (.xml)	AutoCAD (.dwg, .dxf)
AutoPLANT	Bentley	AutoCAD (.dwg, .dxf)	AutoCAD (.dwg, .dxf)
AutoVue	Oracle		AutoCAD (.dwg, .dxf) IFC2X3 (.ifc) STEP (page 406) AP214 (.stp, .step)
Aveva E3D	AVEVA	Workflow installer for Tekla Structures Microstation (.dgn) Steel Detailing Neutral Format (.sdf, .sdnf, .dat) .ifc based Tekla Collaboration files (.tczip)	Installer for Import/export Aveva E3D/PDMS from/to Tekla Structures Microstation (.dgn) Steel Detailing Neutral Format (.sdf, .sdnf, .dat) .ifc based Tekla Collaboration files (.tczip)
AviCAD	Progress/ EBAWE		Unitechnik (.cam) BVBS (.abs)
Bentley Building Systems	Bentley	AutoCAD (.dwg, .dxf) IFC2X3 (.ifc) Microstation (.dgn) STEP AP203/AP214 (.stp, .step)	AutoCAD (.dwg, .dxf) IFC2X3 (.ifc) Microstation (.dgn) STEP (page 406) AP214 (.stp, .step)
Bentley OpenRoads Designer	Bentley	LandXML files (.xml)	
Betsy	IBB – Consultants & Engineers		Betsy (.fa, .f, .ev) RIB iTWO (.cpixml)
Cadmatic	Cadmatic	AutoCAD (.dwg, .dxf) IFC2X3 (.ifc)	AutoCAD (.dwg, .dxf) IFC2X3 (.ifc)

Product	Company	Import to Tekla Structures	Export from Tekla Structures
CADWorx Plant	Intergraph / Hexagon	AutoCAD (.dwg, .dxf) CIS/2 LPM6 analytical (.stp, .p21, .step) CIS/2 LPM6 design (.stp, .p21, .step)	AutoCAD (.dwg, .dxf) CIS/2 LPM6 analytical (.stp, .p21, .step) CIS/2 LPM6 design (.stp, .p21, .step)
CAESAR II	Intergraph / Hexagon	AutoCAD (.dwg)	AutoCAD (.dwg)
ConSteel	ConSteel Solutions Limited		ASCII
Corobs	Müller Opladen		TubeNC (.xml)
DDScad	Graphisoft	IFC2X3 (.ifc) AutoCAD (.dwg, .dxf)	IFC2X3 (.ifc) AutoCAD (.dwg, .dxf)
Digital Project	Gehry Technologies	AutoCAD (.dwg, .dxf) IGES (.iges, .igs) Steel Detailing Neutral Format (.sdf, .sdnf) STEP AP203/AP214 (.stp, .step)	AutoCAD (.dwg, .dxf) Steel Detailing Neutral Format (.sdf, .sdnf) STEP (page 406) AP214 (.stp, .step)
ebos	Progress Software Development		Unitechnik (.cam) ProgressXML (.pxml)
ELiPLAN , Plant Control, FloorMES, WallMES	Elematic	ELiPLAN (.eli)	ELiPLAN (.eli)
ELiPOS	Elematic		ELiPLAN (.eli)
ETABS	Computers & Structures, Inc.	AutoCAD (.dwg, .dxf) CIS/2 LPM6 analytical (.stp, .p21, .step) Steel Detailing Neutral Format (.sdf, .sdnf)	AutoCAD (.dwg, .dxf) CIS/2 LPM6 analytical (.stp, .p21, .step) Steel Detailing Neutral Format (.sdf, .sdnf) STEP (page 406) AP214 (.stp, .step)

Product	Company	Import to Tekla Structures	Export from Tekla Structures
FabTrol MRP (FabTrol is end-of-life, contact us regarding Tekla PowerFab)	FabTrol	FabTrol MIS XML (.xml)	FabTrol MIS XML (.xml) FabTrol KISS File (.kss) Tekla-FabTrol Report (.xsr)
FXTube	Mazak		STEP (page 406) (.stp, .step) IGES (page 406) (.iges, .igs) IFC (.ifc)
GSA	Oasys	CIS/2 LPM6 analytical (.stp, .p21, .step) Rhino/Grasshopper	CIS/2 LPM6 analytical (.stp, .p21, .step) Rhino/Grasshopper
GT Strudl	Hexagon	AutoCAD (.dxf) CIS/2 LPM6 analytical (.stp, .p21, .step)	AutoCAD (.dxf)
HMS	HMS		HMS (.sot)
HOOPS	Tech Soft 3D		AutoCAD (.dwg, .dxf)
Inventor	Autodesk	AutoCAD (.dwg, .dxf) IGES (.iges, .igs) STEP AP203/AP214 (.stp, .step)	AutoCAD (.dwg, .dxf) STEP (page 406) AP214 (.stp, .step)
iTWO	RIB Software AG		CPIxml (.xml)
LEIT2000, iTWO-MES	RIB SAA		Unitechnik (.cam)
LP-System	Lennerts & Partner		BVBS (.abs)
MagiCAD	Progman	AutoCAD (.dwg) IFC2X3 (.ifc)	AutoCAD (.dwg) IFC2X3 (.ifc) Hole Reservation Manager
MasterFrame	MasterSeries	DSTV96 (.nc, .stp, .mis)	DSTV96 (.nc, .stp, .mis)
Mesh Welding	EVG (Filzmoser)		Unitechnik (.cam) BVBS (.abs)

Product	Company	Import to Tekla Structures	Export from Tekla Structures
Mesh Welding	A.W.M.		Unitechnik (.cam)
Mesh Welding	Progress / EBAWE		Unitechnik (.cam) ProgressXML (.pxml)
Microstation	Bentley	AutoCAD (.dwg, .dxf) IGES (.iges, .igs) Microstation (.dgn) STEP AP203/AP214 (.stp, .step)	AutoCAD (.dwg, .dxf) IGES (page 406) (.iges, .igs) Microstation (.dgn) STEP (page 406) AP214 (.stp, .step)
Multiframe	Daystar Software Inc.	AutoCAD (.dxf) Steel Detailing Neutral Format (.sdf, .sdnf)	AutoCAD (.dxf) Steel Detailing Neutral Format (.sdf, .sdnf)
Nastran	Hexagon	AutoCAD (.dwg) IGES (.iges, .igs)	AutoCAD (.dwg) IGES (page 406) (.iges, .igs)
NavisWorks	Autodesk	NWS	Autodesk Data Exchanger, Autodesk Desktop Connector AutoCAD (.dwg, .dxf) CIS/2 LPM6 analytical (.stp, .p21, .step) IFC2X3 (.ifc) IFC4 (.ifc) Microstation (.dgn)
NX (Unigraph)	Siemens	AutoCAD (.dwg, .dxf) IGES (.iges, .igs) STEP AP203/AP214 (.stp, .step)	AutoCAD (.dwg, .dxf) STEP (page 406) AP214 (.stp, .step)
PDMS/E3D	AVEVA	Tekla Collaboration files (.tczip) Microstation (.dgn) Steel Detailing Neutral Format (.sdf, .sdnf, .dat)	Tekla Collaboration files (.tczip) Microstation (.dgn) Steel Detailing Neutral Format (.sdf, .sdnf, .dat) Tekla Collaboration files (.tczip)

Product	Company	Import to Tekla Structures	Export from Tekla Structures
			Export from Tekla Structures to Aveva E3D/PDMS Import/export Aveva E3D/PDMS from/to Tekla Structures
PDS	Intergraph / Hexagon	Microstation (.dgn) Steel Detailing Neutral Format (.dat)	Microstation (.dgn) Steel Detailing Neutral Format (.dat)
PDS	Peikko Group Corporation	Plug-ins	Plug-ins
PRIAMOS	GTSdata		CPIxml (.xml) Unitechnik (.cam)
ProStructures	Bentley	Steel Detailing Neutral Format (.sdf, .sdnf)	AutoCAD (.dwg, .dxf) Microstation (.dgn) Steel Detailing Neutral Format (.sdf, .sdnf)
Pro/Engineer	PTC	IGES (.iges, .igs) STEP AP203/AP214 (.stp, .step)	STEP (page 406) AP214 (.stp, .step)
ProFit	Progress/ EBAWE		BVBS (.abs)
Prokon	Prokon	CIS/2 LPM6 analytical (.stp, .p21, .step)	CIS/2 LPM6 analytical (.stp, .p21, .step)
PythonX	Lincoln Electric		DSTV
RAM Structural System	Bentley	AutoCAD (.dwg, .dxf) CIS/2 LPM6 analytical (.stp, .p21, .step) CIS/2 LPM6 design (.stp, .p21, .step)	AutoCAD (.dwg, .dxf) CIS/2 LPM6 analytical (.stp, .p21, .step) CIS/2 LPM6 design (.stp, .p21, .step)
Revit	Autodesk	IFC2X3 (.ifc) AutoCAD (.dwg, .dxf)	IFC2X3 (.ifc) Revit (.rvt) - extension in Tekla Warehouse Autodesk Desktop Connector

Product	Company	Import to Tekla Structures	Export from Tekla Structures
		Autodesk Desktop Connector Autodesk Data Exchanger	AutoCAD (.dwg, .dxf) Autodesk Data Exchanger
Rhinoceros / Grasshopper	McNeel North America	Tekla Rhino / Grasshopper live link Geometry Gym link IGES (.iges, .igs) STEP AP203/AP214 (.stp, .step)	Tekla Rhino / Grasshopper live link Geometry Gym link STEP (page 406) AP203/AP214 (.stp, .step)
RinasWeld	Kranendonk		IFC2X3 (.ifc)
SACS	Bentley	AutoCAD (.dxf) Steel Detailing Neutral Format (.sdnf)	
SAFE	Computers & Structures, Inc.	AutoCAD (.dwg, .dxf) CIS/2 LPM6 analytical (.stp, .p21, .step) IGES (.iges, .igs)	AutoCAD (.dwg, .dxf) CIS/2 LPM6 analytical (.stp, .p21, .step)
Schnell Software	Schnell Software		BVBS (.abs) Unitechnik (.cam)
SDS/2	Nemetschek	AutoCAD (.dwg, .dxf) CIS/2 LPM6 analytical (.stp, .p21, .step) CIS/2 LPM6 design (.stp, .p21, .step) Microstation (.dgn)	AutoCAD (.dwg, .dxf) CIS/2 LPM6 analytical (.stp, .p21, .step) CIS/2 LPM6 design (.stp, .p21, .step) CIS/2 LPM6 manufacturing (.stp, .p21, .step) Microstation (.dgn)
Smart 3D (SmartPlant / SmartMarine)	Intergraph / Hexagon	Smart 3D Interoperability extension CIS/2 LPM6 design (.stp, .p21, .step) Microstation (.dgn) IFC2X3 (.ifc), with SmartPlant 3D	CIS/2 LPM6 analytical (.stp, .p21, .step) CIS/2 LPM6 design (.stp, .p21, .step) Microstation (.dgn)

Product	Company	Import to Tekla Structures	Export from Tekla Structures
SOFiSTiK	SOFiSTiK	Tekla Rhino/Grasshopper live link AutoCAD (.dwg, .dxf) IFC 2x3 (.ifc)	Tekla Rhino/Grasshopper live link AutoCAD (.dwg, .dxf)
Solibri	Solibri		IFC2X3 (.ifc)
SolidEdge	Siemens	AutoCAD (.dxf) Microstation (.dgn) IGES (.iges, .igs) STEP AP203/AP214 (.stp, .step)	AutoCAD (.dxf) Microstation (.dgn) STEP (page 406) AP214 (.stp, .step)
SolidWorks	Dassault	AutoCAD (.dwg, .dxf) IGES (.iges, .igs) IFC2X3, IFC4 (.ifc) STEP AP203/AP214 (.stp, .step)	AutoCAD (.dwg, .dxf) IFC2X3, IFC4 (.ifc) STEP (page 406) AP214 (.stp, .step)
Soulé	Soulé Software Inc.		.xml BVBS (.abs)
SPACE GASS	SPACE GASS	Rhino / Grasshopper CIS/2 LPM6 analytical (.stp, .p21, .step)	Rhino / Grasshopper CIS/2 LPM6 analytical (.stp, .p21, .step)
TurboCAD	IMSI Design	AutoCAD (.dwg, .dxf) Microstation (.dgn) STEP AP203/AP214 (.stp, .step)	AutoCAD (.dwg, .dxf) Microstation (.dgn) STEP (page 406) AP214 (.stp, .step)
UniCAM	Unitechnik		Unitechnik (.cam, .uni, .uxml)
Vernon	Lincoln Electric		TubeNC (.xml)
VectorWorks	Nemetschek	IFC2X3, IFC4 (.ifc) IGES (.iges, .igs)	AutoCAD (.dwg, .dxf) IFC2X3, IFC4 (.ifc)

3

Import to and export from Tekla Structures

Tekla Structures has several tools you can use to import and export physical and reference models and the information they contain.

For details about compatible software in import and export, see [Tekla Structures data exchange formats \(page 153\)](#).

Conversion files (.cnv) map Tekla Structures profile, twin profile, and material names with names used in other software. For more information, see "Conversion files" in the Manage Tekla Structures product guide.

NOTE The import and export functionality is not available in all Tekla Structures configurations.

You can use import and export in Tekla Structures for several purposes:

- You can import reference models to Tekla Structures. For example, you can import an architectural model, a plant design model, or a heating, ventilating and air-conditioning (HVAC) model as a reference model. Reference models can also be simple 2D drawings that are imported and then used as a layout to directly build the model on.
- You can import 2D or 3D models created by other software, then detail or modify the structural objects using Tekla Structures. Once the model is complete, you can export it, and return it to the architect or engineer for review.
- You can create reports from the imported models from most of the formats.
- You can export Tekla Structures models for use in Analysis & Design (several formats). Then you can import the Analysis & Design results back to the Tekla Structures model.
- Various model transfers can be completed for the engineering and contractor phase of the project.

- You can import shapes from many formats. Shapes are used in defining items.
- You can export data for use in manufacturing information systems and in the fabrication phase:
 - You can export Computer Numerical Control (CNC) data for use by automated cutting, drilling and welding CNC machinery.
 - You can export Manufacturing Information Systems (MIS) data so that fabricators can track project progress, for example.

Click the links below to find out more about the various types of import and export:

[Reference models and compatible formats \(page 173\)](#)

[Trimble Connector \(page 131\)](#)

[IFC \(page 203\)](#)

[DWG and DXF \(page 248\)](#)

[DGN \(page 281\)](#)

[LandXML \(page 286\)](#)

[PDF \(page 288\)](#)

[SketchUp \(page 295\)](#)

[Point clouds \(page 296\)](#)

[Layout manager \(page 311\)](#)

[Analysis and design systems \(page 332\)](#)

[Steel fabrication \(page 364\)](#)

[Automated precast fabrication \(page 446\)](#)

[CAD \(page 575\)](#)

[Import user-defined attribute values \(page 582\)](#)

In addition to these built-in import and export tools, you have a variety of links to other applications available in [Tekla Warehouse](#) that you can download.

[Multi Converter: Export to IFC, STEP, IGES, OBJ ,STL, DGN, DWG, DXF, or SKP files](#)

[Export into AutoDesk Revit format \(RVT\)](#)

3.1 Reference models and compatible formats

A reference model is a file that helps you to build a Tekla Structures model. A reference model may be created in Tekla Structures or another software or modeling tool and then inserted to Tekla Structures.

For example, an architectural model, a plant design model, or a heating, ventilating and air-conditioning (HVAC) model can be used as a reference model. Reference models can also be simple 2D drawings that are inserted and then used as a layout to directly build the model on. You can snap to reference model geometry.

Reference models of different formats, such as IFC, IFC4, IFCzip, IFCxml, tcZIP, DXF, DWG, DGN, XML, LandXML, STP, IGS, SKP and PDF, are converted by the TrimBimConverter to the TrimBIM (.trb) format at reference model insert. The .trb file is saved in the current model folder. The reference cache is created in the cache folder based on the advanced option `XS_REFERENCE_CACHE` when the reference model is set visible, which happens automatically at insert and update.

Examples of supported file types:

- AutoCAD files .dwg, .dxf (supported version ACAD2023 and earlier)
- IFC files .ifc, .ifczip, .ifcxml.

You can [convert IFC reference objects \(page 207\)](#) into native Tekla Structures objects.

- IGES files .igs, .iges
- LandXML files .xml
- MicroStation files .dgn, .prp
- PDF files .pdf
- Tekla Collaboration files .tczip
- SketchUp files .skp (supported version SketchUp 2021 and earlier)
- STEP files .stp, .STEP
- Filmbox files .fbx
- COLLADA files .dae
- Autodesk 3DS Max format files .3ds
- Geometry definition file format .obj
- Blender files .blend
- GL Transmission Format files .glft
- Polygon File Format files .ply
- Tekla files .tekla
- TrimBIM files .trb

The **Add model** dialog box lists the extensions of all formats that are currently supported by Tekla Structures.

Some reference models are automatically subdivided or split into reference model objects.

TIP You can disable the roll-over highlight, which may speed up zooming.

Reference model plug-ins in Tekla Warehouse

Reference model plug-ins are available as `.tsep` plug-ins in Tekla Warehouse. Tekla Structures installation contains the plug-ins, but you can get newer ones from Tekla Warehouse. First download the needed package from Tekla Warehouse, and then import it to the **Applications & components** catalog.

One example of the plug-ins is the [Teigha reference model import plug-in for Revit](#).

Reference models in drawings

You can show reference models in drawings and adjust their visibility settings.

See also

[Insert a reference model \(page 175\)](#)

[Modify reference model details \(page 183\)](#)

[Lock reference models \(page 184\)](#)

[View reference models \(page 178\)](#)

[Detect changes between reference model versions \(page 185\)](#)

[Define a comparison set for reference model change detection \(page 191\)](#)

[Export reference model change detection results to Excel \(page 195\)](#)

[Reference model objects \(page 199\)](#)

[Inquire reference model contents \(page 198\)](#)

[Examine reference model hierarchy \(page 200\)](#)

Insert a reference model

You can insert reference models in a Tekla Structures model. You can use the reference models to overlay different discipline models with your own model. These disciplines can be architect, plant engineer, services engineer, or other structural disciplines.

Note the following:

- All characters below 256 are allowed in a reference model file name: both ASCII (0 - 127) and extended ASCII (128 - 255). If the file name contains unsupported characters, you will get a warning message.
 - Reference models should not be inserted very far from the Tekla Structures model origin.
1. Open a Tekla Structures model where you want to insert a reference model.

2. To insert the reference model, go to the **File** menu, and select **Import --> Insert reference model**.

Selecting this command opens both the **Reference models** pane and the **Add model** dialog.

You can also open the **Reference models** pane first by clicking the

Reference models button in the side pane , and then click the **Add model** button.

3. In the **Add model** dialog, if you have any previously created reference model properties files, load the desired file by selecting the file from the properties file list at the top.
4. In the **Add model** dialog, browse for the reference model file by clicking **Browse....**

You can also drag reference models from Windows Explorer, and insert several models at a time.

For a list of compatible formats, see [Reference models and compatible formats \(page 173\)](#).

5. Select a group for the model or enter the name of a new group.

If you do not enter a name for the group, the reference model is inserted in the **Default** group.

You can also drag models to an existing group and create new groups. If you create a new group, and do not add any reference models in the group immediately, the group is saved for future use.

6. In **Location by**, select one of the following options:

Model origin inserts the model relative to 0,0,0.

Work plane inserts the model relative to the current work plane coordinate system.

Base point: <name of base point> inserts the model relative to the base point by using coordinate system values **East coordinate**, **North coordinate**, **Elevation**, and **Angle to North** from the base point definition in **Project properties**.

If you are inserting a IFC2x3 reference model that has a project location available, you can enable the project location by setting the new model-specific advanced option `XS_USE_PROJECT_LOCATION_IN_IFC2X3_IMPORT` to `TRUE`, and the reference model is inserted in the project location, away from the Tekla Structures model origin.

7. Select where you want to place the reference model. You can enter coordinates in the **Offset** boxes or pick a position for the reference model origin.

The maximum number of decimals for coordinates is 13.

Do not insert reference models very far from the Tekla Structures model origin. When there is a big offset, we recommend that you use **Base point**.

8. Set the **Scale** of the reference model if it is different from the one in the Tekla Structures model.

Note that you need to set the scale for a DWG or a DXF file already in AutoCAD. When you define the measurement unit for a DWG or a DXF file and save the file in AutoCAD, the unit is recognized in Tekla Structures, and the reference model is scaled correctly.

The maximum number of decimals for scale is 13.

9. You can rotate the model around model Z axis by picking a location in the model or entering the desired value in the **Rotation** box.

The maximum number of decimals for the rotation value is 7.

10. Click **More** to show more details, and add the **Code**, **Title**, **Phase** and **Description** of the reference model.

By default, the title is the same as the name of the inserted reference model. You may want to use the name of the discipline or the company instead, for example. The code could be a site number, project number, or accounting number. Write the description according to the company conventions. The phase is the design phase of the reference model (not the phase in the Tekla Structures model).

Below is an example of these details when you inquire the reference model.

Group	: Basement
Code	: 123456
ref_description	: Basement
Title	: First phase
RevisionPhase	: 1a

You can also [modify all the details \(page 183\)](#) after you have inserted the model.

11. Click **Add model**.
12. If the inserted reference model lies outside the work area and is not fully or at all visible in the model view, Tekla Structures displays a warning message. Click **Expand** to extend the work area to see the reference model in the model view.

The reference model is inserted in the current phase of the Tekla Structures model.

Note that for IFC reference models, the elevation offset value is not read from the inserted reference model.

When a reference model is inserted or updated, reference model data is copied to Tekla Structures model internal data storage located in the <current model>\datastorage\ref folder. The reference model is visible even if the original file is removed from its original location. The reference model data in this folder should not be touched.

You can [convert inserted IFC reference objects \(page 207\)](#) into native Tekla Structures objects.

What if the reference model is not visible?

If you cannot see the DWG reference model that you inserted, see support article ["DWG reference file not visible"](#) for more information.

NOTE One person only should update the reference model (click **Refresh**) to avoid duplicate object data.

When you want to update the reference model, do not delete the old reference model from an open Tekla Structures model and replace it with a new one, because then you would lose the work done on reference objects in the old model. Use the [change detection \(page 185\)](#) functionality instead.

TIP To clip only reference models and point clouds with the clip plane tool, select the **Clip only reference objects** checkbox in **View --> Clipping**. If you do this, the native objects are not clipped.

See also

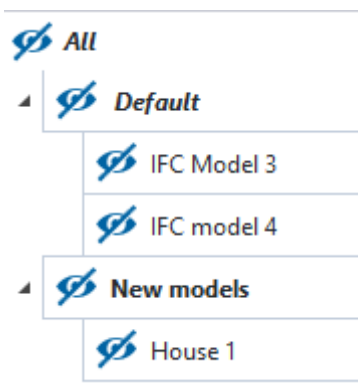
[Modify reference model details \(page 183\)](#)

View reference models

There are many ways you can select what you want to show about the reference models and how.

For details about inserting reference models, see [Insert a reference model \(page 175\)](#).

To	Do this
Open the Reference models list	Do either of the following: - Go to the File menu, and select Import --> Insert reference model. - Click the  Reference models button in the side pane on the right side of the Tekla Structures main window.
Hide and show reference models	Click the eye button  next to the model you want to hide.

To	Do this
	The button changes to  and the reference model is hidden in the 3D view. Click the eye button again to show the model.
Hide and show a group of reference models	- Click the eye button  next to the group you want to hide. The group eye button and the reference model eye buttons all change to , and all the reference models included in the group are hidden in the Tekla Structures model. - Click the eye button again to show all the models in the group. - If a group contains both hidden and visible models, the eye button for the group looks like this . - If there are no reference models in a group, the eye button looks like this .
Hide or show all reference models	Click the eye button  All. The eye buttons for all groups and reference models change to , and all reference models are hidden in the Tekla Structures model. 
Highlight the reference model in the 3D view	Click the reference model in the Reference models list.
Show reference model details	Double-click the reference model in the Reference models list.

To	Do this
Show reference model object details	1. Double-click the reference model in the Reference models list. 2. Ensure that the  Select assemblies selection switch (for assemblies) or  Select objects in assemblies selection switch (for parts) is active. 3. Point the reference model in the model view, hold down Shift and scroll to the hierarchy level where the desired reference model object is located. 4. Point the object and double-click it to open the reference model object details.
Rotate the reference model around model Z axis.	• In the reference model details, enter the desired value in the Rotation box. You can also pick the rotation.
Hide and show reference model layers	1. Double-click the reference model in the Reference models list to open the details. 2. Click the small arrow on the Layers row to show the list of layers. 3. You can show and hide individual layers or all layers: • To hide all layers, click the eye button  on the Layers row. • To hide individual layers, click the eye buttons  of the individual layers. • To hide several layers, holding down Ctrl, click the desired layers and then click the eye button of one of the selected layers. • If the Layers list contains both hidden and visible layers, the eye button for the Layers row looks like this . • If you hide all layers, the eye button for the Layers row changes to .

To	Do this
	If you hide individual layers, the eye button for the hidden layers changes to . Note that layer visibilities do not affect model visibility, which means that the model eye icon is visible even though all layers are hidden.
Detect changes between different versions of reference models	For details about change detection, see Detect changes between reference model versions (page 185). For details about comparison sets, see Define a comparison set for reference model change detection (page 191).
Refresh all reference models	- If the file name or path has not changed, open the Reference models list and click the  Refresh button. All models that are not up to date are reloaded. If a reference model is not found, a warning sign  is displayed, and missing reference models are listed. - If the file name or path has changed, open reference model details, browse for the new file and click Modify. You can also refresh locked reference models, if you have set the advanced option <code>XS_REFRESH_ALSO_LOCKED_REFERENCE_MODELS</code> to <code>TRUE</code> in File --> Settings --> Advanced options --> Import.
Refresh a single reference model	Do one of the following: - Select the reference model in the Reference models and click the  Refresh button. - In the displayed message box, select Selected. - Double-click the reference model in the Reference models list to open the details. - Click the  Refresh button.

To	Do this
	If the original model path model is found, and the model has changed, the model is reloaded. A warning sign  is displayed if the reference model is not found and data needed to draw the model is missing.
Refresh the reference model when settings have changed	Hold down Ctrl and click the  Refresh button. You need to do this when you have changed the <code>LargeTessellationPerCircle</code> setting in the <code>TrimBimPlugin.config</code>, for example. The default value is 192, and if you have problems with the performance, you can decrease the value in <code>TrimBimPlugin.config</code>, which is located in the <code>.bin\plugins\referenceplugins\trimbim</code> folder. Changing this setting affects all new inserted and updated reference models.
View user-defined attributes	- Double-click the reference model in the Reference models list to open the details. - Click the small arrow on the User-defined attributes row to show the list of user-defined attributes. - The user-defined attributes that are specified for reference models in the <code>objects.inp</code> file are listed in the User-defined attributes list. Enter or select a value from the list. By default, the <code>objects.inp</code> is located in <code>..\ProgramData\Trimble\Tekla Structures\<version>\environments\common\inp</code>. You may also have some <code>objects.inp</code> files that you modify and keep in firm or project folders. These files are read in certain order. To use user-defined attributes in your reference models, you must add the UDAs to the <code>objects.inp</code> file if your

To	Do this
	environment does not contain the necessary reference model UDAs.
Clip reference models with clip planes	To create clip planes only to reference model objects and point clouds, go to View --> Clipping and select the Clip only reference objects checkbox.
Give the reference model better visibility in the Tekla Structures model	For example, you can change reference model color so that it is different from the Tekla Structures model color. For more information, see Changing reference model appearance .
Speed up the reference model zooming	In the model, go to File --> Settings and disable Rollover highlight .

Related information

See also

[Modify reference model details \(page 183\)](#)

[Reference model objects \(page 199\)](#)

[Examine reference model hierarchy \(page 200\)](#)

[Lock reference models \(page 184\)](#)

[How are units defined in imported DWG files in Tekla Structures?](#)

Modify reference model details

After you have inserted a reference model, you can modify its details.

Limitation: Coordinates given in the **Details** section are always relative to model coordinates. You can modify the coordinate system only if model coordinate system is used in the reference model.

- Click the  **Reference models** button in the side pane on the right side of the Tekla Structures main window.
You can also go to the **File** menu, and select **Import** --> **Insert reference model**. Close the **Add model** dialog.
- In the **Reference models** list, double-click the reference model that you want to modify.
- Click the arrow on the **Details** row, and change the desired details:
 - Change **Code**, **Title**, **Phase** and **Description** of the reference model.
The code could be a site number, project number, or accounting number. By default, the title is the same as the name of the inserted

reference model. You may want to use the name of the discipline or the company instead, for example. Write the description according to the company conventions. The phase is the design phase of the reference model (not the phase in the Tekla Structures model).

- You can insert another version of the reference model using the **File** box. For more information about version handling, see [Detect changes between reference model versions \(page 185\)](#).
- In the **Group** box, you can select a new group for the reference model.
- You can also change the **Location by** selection.

By default, the **Location by** change does not keep the reference model location. When you click **Modify**, the model position changes according to **East coordinate**, **North coordinate** and **Elevation** setting differences. If you want to calculate new offsets and keep the current reference model location, select the checkbox next to the **Location by** setting.

- You can change the **Offset** by entering new coordinates or by picking a new offset.
- You can change the **Rotation** by entering a new value or picking a new location.

There may be additional rotation boxes available for rotation around X and Y axis. If the reference model already contains X or Y rotations, the additional X and Y boxes are not active.

- Change the **Scale**, if necessary.
- Click the arrow on the **User-defined attributes** row, and enter values for the user-defined attributes.

You may enter strings (texts), select dates or enter numeric information depending on the type of the user-defined attribute. The reference model user-defined attributes are defined in their own section in the `objects.inp` file. If you have several `objects.inp` files, they are read in a specific reading order.

4. Click **Modify**. The changes that you made are implemented in the reference model.

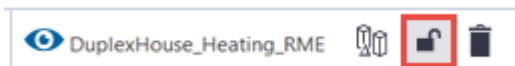
See also

[Insert a reference model \(page 175\)](#)

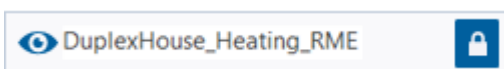
Lock reference models

You can prevent reference models from moving and from detail updates by locking the reference models.

1. Click the  **Reference models** button in the side pane on the right side of the Tekla Structures main window.
You can also go to the **File** menu, and select **Import --> Insert reference model**. Close the **Add model** dialog.
2. Move your mouse over the desired reference model in the **Reference models** list.
The **Lock/Unlock** button is displayed.



3. Click the **Lock/Unlock** button.
Now the reference model is locked. You can only add values for user-defined attributes and work with layers, but you cannot modify the details in any other way or move the model.



To lock multiple reference models, select the models from the list and click the **Lock/Unlock** button  of one of the reference models.

To unlock the reference model, click the **Lock/Unlock** button again.

See also

[Reference models and compatible formats \(page 173\)](#)

[Modify reference model details \(page 183\)](#)

Detect changes between reference model versions

You can check the changes between different IFC reference model versions in Tekla Structures using change detection (change management). You can use change detection to detect changes between reference models from different disciplines, such as engineer or detailer. Changes are detected on object level. You can also compare Tekla Structures models if you have exported a Tekla Structures model into IFC format at least twice.

Tekla Structures stores versions of the reference models for change detection. Versioning is also needed for visualizing sharing changes and object conversion change management.

Limitations

- Property comparison works only for IFC or IFC-based reference models. The following formats are supported:
 - .ifc

- .ifcxml
- .ifczip
- .tczip
- Deleted objects are not highlighted and cannot be selected.

Change detection

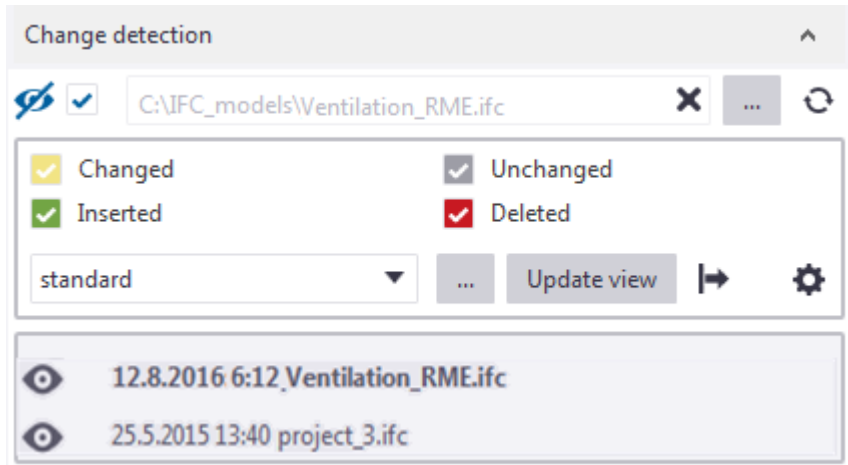
You can show changes between two stored reference model versions or between stored version and browsed reference model file version. In both of these cases you need to activate change detection:

1. Click the  **Reference models** button in the side pane on the right side of the Tekla Structures main window.
You can also go to the **File** menu, and select **Import --> Insert reference model**. Close the **Add model** dialog.
2. Open a reference model by double-clicking the model in the **Reference models** list.
3. Open the **Change detection** list by clicking the arrow on the **Change detection** row.

Change detection between stored version and browsed model file version

The file path box has automatically the full file path to the current reference model original file. If a reference model file with the same name has changed, you can run the change detection and skip steps 1 and 3 below .

1. Click ... and browse for an earlier version of the reference model.
2. Select the **This model is newer** checkbox next to the file path if you want to define that the file shown in the box is newer.
3. Ensure that you have both the original reference model and the browsed reference model version visible by setting the eye buttons active  in the **Change detection** section.
4. To change the comparison set if needed, click the ... button and define the set you want to use. Then click **Update view**. The comparison set contains the properties that you want to use in version comparison.
5. To change property set comparison tolerances, click the **Property set comparison tolerances** button .



You can do any of the following in the changes list and in the property details list:

- Export change detection results to Excel by clicking  **Export to Excel**. The exported Excel file contains all or changed properties that are visible in the changes list. The information is exported in the current language.
- Click a row in the changes list to open the related property details list in the side pane. The content of the property details list depends on the comparison rules that you are using. The details list also indicates how the individual properties have changed in the **Old value** and **New value** columns.

Status	Type	Name	GUID	ID	Name	Old value	New value
Changed	IFCFOOTING		1MfXYO0000Ap4...	352	Application full...	Tekla Structures	Tekla Structures
Changed	IFCFOOTING	FOOTING	1MfXYO0000GZ4qD...	328	Application ide...	Multi material...	Multi material...
Deleted	IFCFOOTING		1MfXYO0000EZ4q...	0	Change action	NOCHANGE	NOCHANGE
New	IFCBEAM		1MfXYO0000S34q...	618	Creation date	25.01.2016	25.01.2016
New	IFCBEAM		1MfXYO0000T34q...	614	Description	1000*1000	2000*2000
New	IFCFOOTING		1MfXYO0000U34q...	610	Extrusion [mm]	x = 0.00 y = ...	x = 0.00 y = ...
New	IFCFOOTING		1MfXYO0000V34q...	606	Family name	Undefined	Undefined
New	IFCFOOTING		1MfXYO0000W34...	602	GUID	1MfXYO0000G...	1MfXYO0000GZ...

Note that in the property details list, if you by accident remove one of the columns, you can bring it back by right-clicking the column title and selecting the column from the context menu. You can then drag the column to the desired location.

- To show the object in the model, select the **Select objects in the model** checkbox, and then click a row in the changes list. Note that you cannot select deleted objects.
- The older state of an object is drawn to the model view when you select the corresponding object in the changes list.
- To highlight the object in the changes list, select the **Get selected objects from model** checkbox, and then click an object in the model.

- To zoom to the selected object in the model, select the **Zoom to selected** checkbox, and then click a row in the changes list. You can also zoom to deleted objects.
- The older state of a reference model object is drawn to the 3D view in orange color when you select the corresponding object.
- To show only changes in the property details list, select the **Show only changes** checkbox, and then click a row in the changes list.
- You can search for specific items using the search box at the bottom.
- If the changes list disappears, you can bring it back by clicking the  **Changes list** button in the side pane. If the details list disappears, you can bring it back by clicking the  **Property details** button in the side pane. These two buttons are only visible when **Change detection** is active.

Update reference model and detect changes between versions

You can update a reference model with another version of the model, and detect the changes between these two reference model versions.

1. Open another version of the reference model by browsing to it in the **File** box in reference model details and clicking **Modify**.

This updates the original reference model with the changed information in the other reference model version.

You can open several versions, but you can only compare two versions at a time.

You do not need to copy the reference models to the model folder.

2. On the **Change detection** row, click the arrow on the row to open the **Change detection** list.

In the **Change detection** list, the current version is bolded. The newest version is at the top and the oldest at the bottom.

3. Ensure that both models are visible by setting the eye buttons active  in the **Change detection** list.

Comparison is active only when two eye buttons are active . You cannot have more than two eye buttons active at the same time. If you activate a third reference model in the list, the older version

from previously visible model is automatically set inactive , and the comparison is done between the two models that have the active eye.

4. Set another version as the current version in the **Change detection** list by right-clicking the version in the list and selecting **Set as current**.
5. To change the comparison set, click the ... button and define the set you want to use. Then click **Update view**. The comparison set contains the properties that you want to use in version comparison.

- To delete a version, right-click the version in the **Change detection** list, and select **Remove**.

The current model version is modified, and this modification is shared in multiuser mode or Tekla Model Sharing.

When you remove a version, you are asked if you want to set the model as current and save changes.

You need to pay special attention to versioning and updating in a project. For example, if you remove a version, the current model is updated and you may end up with conflicts.

- Select any or all of the checkboxes for the following options: **Changed**, **Unchanged**, **Inserted** and/or **Deleted**, and then click the **Update view** button, which is displayed when you select an option.

For example, select **Inserted** to show with green color the objects that were inserted between the two versions.

The changes list and the property details list are displayed. The changes list content is based on the IFC content and has all physical object types. The colors are the same as the ones in **Change detection**.

- You can do any of the following in the changes list and in the details list:

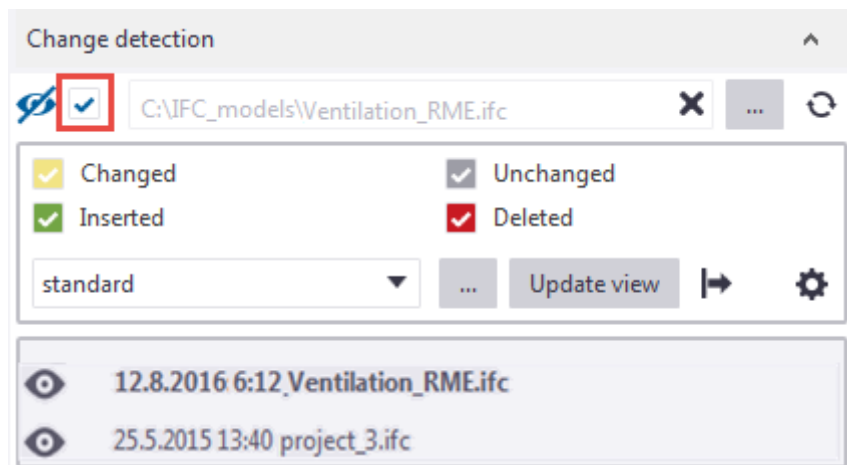
Status	Type	Name	GUID	ID	Name	Old value	New value
Changed	IFCFOOTING		1MFXYO0000Ap4...	352	Application full...	Tekla Structures	Tekla Structures
Changed	IFCFOOTING	FOOTING	1MFXYO0000GZ4qD...	328	Application ide...	Multi material...	Multi material...
Deleted	IFCFOOTING		1MFXYO0000EZ4q...	0	Change action	NOCHANGE	NOCHANGE
New	IFCBEAM		1MFXYO0000S34q...	618	Creation date	25.01.2016	25.01.2016
New	IFCBEAM		1MFXYO0000T34q...	614	Description	1000*1000	2000*2000
New	IFCFOOTING		1MFXYO0000U34q...	610	Extrusion [mm]	x = 0.00 y = ...	x = 0.00 y = ...
New	IFCFOOTING		1MFXYO0000V34q...	606	Family name	Undefined	Undefined
New	IFCFOOTING		1MFXYO0000W34q...	602	GUID	1MFXYO0000G...	1MFXYO0000GZ...

- Click a row in the changes list to open the related property details list in the side pane. The property details list contains at least the name, location as origin and property set properties, basically the content is the same as in the reference object inquiry report. The details list also indicates how the individual properties have changed in the **Old value** and **New value** columns.
- To highlight the object in the model, select the **Select objects in the model** checkbox, and then click a row in the changes list. Note that you cannot select deleted objects.
- To highlight the model object in the changes list, select the **Get selected objects from model** checkbox, and then click an object in the model.
- To zoom to the selected object in the model, select the **Zoom to selected** checkbox, and then click a row in the changes list. You can also zoom to deleted objects.

- To show only changes in the property details list, select the **Show only changes** checkbox, and then click a row in the changes list.
- The older state of a reference model object is drawn to the 3D view in orange color when you select the corresponding object.
- You can search for specific items using the search box at the bottom.
- If the changes list disappears, you can bring it back by clicking the  **Changes list** button in the side pane. If the details list disappears, you can bring it back by clicking the  **Property details** button in the side pane. These two buttons are only visible when **Change detection** is active.

Change comparison order

- Select the **This model is newer** checkbox to define that the file shown in the file path box is newer than the other compared file. If the file has been updated, it appears in the box automatically and the checkbox is selected.



- It is possible to compare as newer (default) or older.

Select the **This model is newer** checkbox next to the file path box if you want to define that the file shown in the box is newer.

Macro for selecting Tekla Structures native objects

The **Select Corresponding Objects Based On Ifc Objects Selection** macro is useful for cases where you exported native objects to IFC, inserted the IFC model back to the same native model, and then you want to select the corresponding Tekla Structures objects. You may need to select the corresponding objects when you want to add your own UDAs to all updated and selected native objects, for example.

Remove old reference model versions automatically

You can remove old reference model versions automatically with the advanced option `XS_REFERENCE_MODEL_KEEP_VERSIONS_COUNT`.

See also

[Insert a reference model \(page 175\)](#)

[Convert IFC objects into native Tekla Structures objects \(page 207\)](#)

Define a comparison set for reference model change detection

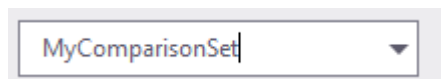
Change detection in Tekla Structures compares different versions of the reference model based on a comparison set, which tells you whether Tekla Structures considers a change in a property a change or not. You can use the `standard` property comparison set, or define a comparison set of your own.

In the reference model, when change detection is active, the changes list shows all deleted, changed, new and not changed objects. The property details list only contains those properties that are defined by the current comparison set rules to be compared.

When you save a comparison file, both the `standard` file and a customized comparison set file are saved to the `\attributes` folder under model folder. The `standard` file can only be removed from model folder if it exists in another location. If saving or removing the standard file is not successful, you will get an error message.

Create a new comparison set

1. Open two versions of the same reference model.
2. In **Change detection**, click the **Comparison sets** button ... to open the **Comparison sets** dialog.
3. Enter a name for the comparison set.



4. Add a new comparison rule by clicking the **Add row** button  and typing or copying and pasting the property name.
 - You can copy and paste property names directly from the property details list in change detection.
 - To include more properties within one rule, use asterisk (*), for example:
 - X* (all that starts with X)
 - *X (all that ends with X)
 - If you want to compare only one property set property, clear the **Property sets** checkbox and create a separate rule for that property. If

you want to compare all property sets but not one property, select the **Property sets** checkbox and create rule for that property and leave its check box empty.

- Note that comparison rules are case insensitive.
 - All rules in comparison set affect the comparison if the reference model version has a corresponding property.
5. Add more rules in the same way as in step 2 and 3.
 6. To delete a rule, select the rule and click the **Delete row** button . You cannot delete fixed comparison rules, like **Geometry**, **Location**, **Rotation**, **Materials**, **Profiles**, **Products**, **Common attributes** or **Property sets**, but you can exclude those from comparison by leaving the checkboxes next to them empty.
 7. Ensure that you have the checkbox selected next to all the comparison rules you want to include in the comparison set. If you do not want to include a rule, clear the checkbox.

☐	Geometry	
☐	Location	
☐	Rotation	
☐	Materials	
☐	Profiles	
☐	Products	
☐	Property sets	
☐	Common attributes	
☒	Creation date	
☒	IFC object type	
☐		

TIP You can also exclude attributes already included in a property set by adding a separate row for that specific attribute and then ensuring that you do not add a check mark in the checkbox next to that specific attribute.

8. Click the **Save** button .
9. Close the comparison set dialog by clicking the **Close** button . If you have not saved your changes, you will be asked if you want to keep the changes when you close the dialog.
10. Click the **Update view** button.

Properties in comparison set

A comparison set may contain the following types of properties:

- Free property set properties, such as BaseQuantities.NetVolume
- Fixed properties that always exist in the comparison set file, but can be excluded from the comparison

The fixed properties are listed below:

Property type	Description
Geometry	Object dimensions
Location	The coordinates of the object in the model
Rotation	The rotation coordinates of the object
Material	Material name and grade
Profile	Profile name
Product	IfcProduct parameters that vary object type by type. Some properties are optional. Below examples of product properties for IfcColumn: Application full name Application identifier Change action Creation date Description Family name Given name Is set last modified date Last modified date Middle names Name Object type Organization description Organization names Organization roles Roles

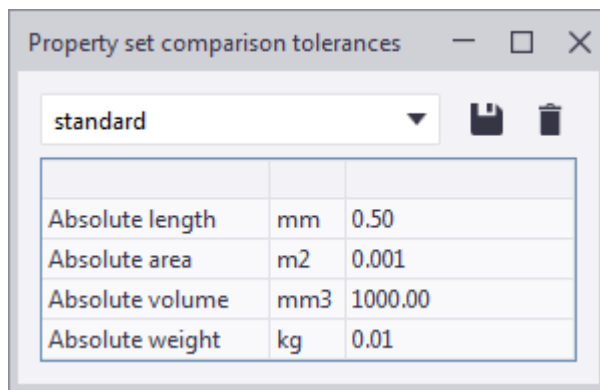
Property type	Description
	State Version
Common attributes	Below examples of common attributes for IfcColumn: External Use Fire Rating Load bearing Reference COLUMNNTYPE->GUID GUID
Property sets	Whatever has been added to IFC properties. Below examples of property set properties for IfcColumn: BaseQuantities.Length [mm] BaseQuantities.NetWeight [kg] BaseQuantities.NetVolume [mm ³] BaseQuantities.OuterSurfaceArea [m ²] Tekla Common.Bottom elevation Tekla Common.Class Tekla Common.Phase Tekla Common.Preliminary mark Tekla Common.Top elevation Tekla Quantity.Area per tons [m ²] Tekla Quantity.Gross footprint area [m ²] Tekla Quantity.Height [mm] Tekla Quantity.Length [mm] Tekla Quantity.Net surface area [m ²] Tekla Quantity.Weight [kg] Tekla Quantity.Width [mm] Tekla Quantity.Volume [mm ³]

Define property comparison tolerances

In reference model version comparison, you can modify the property comparison tolerance settings to get relevant changes more easily. You need two versions from the same IFC model.

The changed row appears as light yellow if the tolerance is bigger than the difference.

1. Open two versions of the same reference model.
2. In the **Reference models** pane, open the **Change detection** section and activate the change detection.
3. Click the **Property set comparison tolerances** button .
4. Change the tolerances by modifying the values.



5. Apply the changes by closing the dialog and clicking **Update view**.
The changed row appears as light yellow.

Property sets: BaseQuantities.Length [mm]	1000.00	1001.00
Property sets: BaseQuantities.NetVolume [mm³]	1000000000.00	1001000000.00
Property sets: BaseQuantities.NetWeight [kg]	1000.00	1001.00
Property sets: BaseQuantities.OuterSurfaceArea [...]	6000000.00	6004000.00
Property sets: IFC object type	Parametric	Parametric

You can also save the tolerances in the **Property set comparison tolerances** dialog.

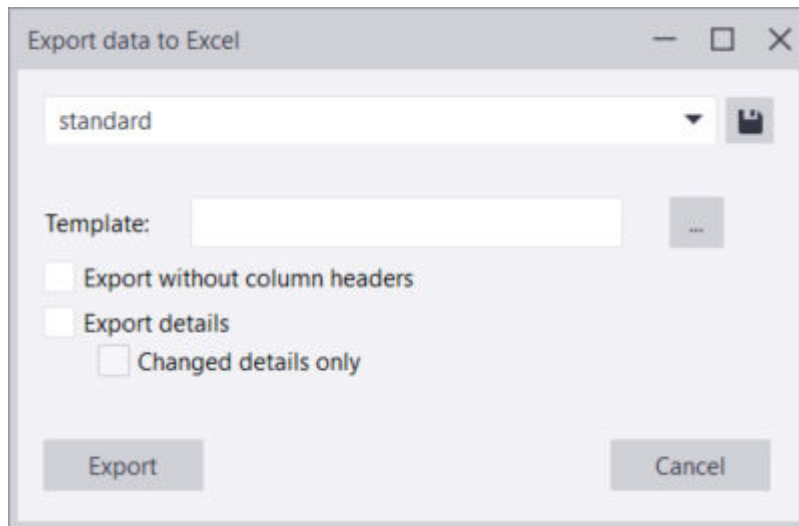
Export reference model change detection results to Excel

The exported Excel file contains all or changed properties that are visible in the reference model changes list. The information is exported in the current language.

Objects that are filtered out using [comparison set \(page 191\)](#) filtering are not exported.

Columns in export:

- **Status**
 - **Name**
 - **Profile**
 - **Material**
 - **Type**
 - **GUID**
1. When the [reference model change management \(page 185\)](#) is active and the changes list is displayed, click ➔ **Export to Excel**.
 2. Filter which properties are shown in the property changes list and exported to the Excel file by using the [comparison set \(page 191\)](#) filtering.
 3. In the **Export to Excel** dialog, define the needed settings:



- **Template:** Select a new Excel template for the export.
 - **Export without column headers:** If you do not want to show the column headers in the Excel sheet, select this option.
 - **Export details:** Exports all property details. Property details are shown collapsed by default. When you open the collapsed details by clicking the plus (+) button, all details are listed under titles **Name**, **Old value** and **New value**.
 - **Changed details only :** Only exports those property details that have changed between reference model versions.
4. If you want to save the settings in a properties file to be loaded and used in other exports, enter a name and click **Save**.
 5. When you are ready, click **Export**.
- The changes list is exported to an Excel spreadsheet.
- If you want, you can save the Excel where ever you want.

Example of the exported Excel when the **Export details** option has not been selected.

	A	B	C	D	E	F
1	Status	Name	GUID	Material	Type	Profile
2	Changed	1k54BEPQz0FAoZF0\$W6I1h		STEEL/S235JR	IFCCOLUMN	HEA400
3	Changed	14uu17k3D9th9iqYAUt1J		STEEL/S235JR	IFCDISCRETEACCESSORY	
4	Changed	39aBB4KSf0PQzSS31LUw8W		STEEL/S235JR	IFCDISCRETEACCESSORY	
5	Changed	3QkoB0iyv5bRNdzWlmdDsG		STEEL/S235JR	IFCDISCRETEACCESSORY	
6	Changed	3uQ8_XDfX5TPum3PI5UUvL		STEEL/S235JR	IFCDISCRETEACCESSORY	
7	Changed	1Bg_F28Xz1o914nBZpmLGz		Undefined	IFCMECHANICALFASTENER	
8	Changed	3Ql1lcOFz0fx07qTgvB8hU		Undefined	IFCMECHANICALFASTENER	
9	Up-to-date	0sjDQuFc182Q1v\$13SsaGK		STEEL/S235JR	IFCDISCRETEACCESSORY	
10	Up-to-date	0Um8A0msX9KBFkVZMeGHc\$		STEEL/S235JR	IFCDISCRETEACCESSORY	
11	Up-to-date	17CIUg\$_XEUhjr4Mzxzb8q		STEEL/S235JR	IFCDISCRETEACCESSORY	
12	Up-to-date	1ka4rcJQ5Bt9ugGNul8jmj		STEEL/S235JR	IFCDISCRETEACCESSORY	
13	Up-to-date	1NNo_9Qyj448hTkileoGhb		STEEL/S235JR	IFCDISCRETEACCESSORY	
14	Up-to-date	1OnHtXnqT8ewtSpBOr8nLe		STEEL/S235JR	IFCDISCRETEACCESSORY	
15	Up-to-date	25ZZMv\$yv9\$RFaMLWmjTm1		STEEL/S235JR	IFCDISCRETEACCESSORY	
16	Up-to-date	2Y_C4wMfABxr2GVDDtBCC		STEEL/S235JR	IFCDISCRETEACCESSORY	
17	Up-to-date	36CKqNWA98qvVvXfbRBe1u		STEEL/S235JR	IFCDISCRETEACCESSORY	
18	Up-to-date	3GoRPuPZTAefPZ658W7K44		STEEL/S235JR	IFCDISCRETEACCESSORY	
19						

Example of the exported Excel when the **Export details** option has been selected. If you include details in the export, all property details are listed, and the detail rows are by default collapsed. You can open the details by clicking the plus (+) button.

	A	B	C	D	E
43	Changed	14uu17k3D9th9iqYAUt1J	STEEL/S235JR	IFCDISCRETEACCESSORY	
78	Changed	39aBB4KSf0PQzSS31LUw8W	STEEL/S235JR	IFCDISCRETEACCESSORY	
113	Changed	3QkoB0iyv5bRNdzWlmdDsG	STEEL/S235JR	IFCDISCRETEACCESSORY	
148	Changed	3uQ8_XDfX5TPum3PI5UUvL	STEEL/S235JR	IFCDISCRETEACCESSORY	
149		Name	New value	Old value	
150		BaseQuantities.CrossSectionArea [albl_Units_m2]	0.02	0.02	
151		BaseQuantities.GrossArea [albl_Units_m2]	13,77	13,77	
152		BaseQuantities.GrossVolume [albl_Units_mm3]	114480000	114480000	
153		BaseQuantities.NetArea [albl_Units_m2]	13,77	13,77	
154		BaseQuantities.NetVolume [albl_Units_mm3]	109958400	109958400	
155		Tekla Quantity Area per tons [albl_Units_m2]	15,2	15,2	
156		Tekla Quantity Gross footprint area [albl_Units_m2]	0	0	
157		Tekla Quantity Height [albl_Units_mm]	390	390	
158		Tekla Quantity Length [albl_Units_mm]	7200	7200	
159		Tekla Quantity Net surface area [albl_Units_m2]	14,1	14,1	
160		Tekla Quantity Volume [albl_Units_mm3]	100000000	100000000	
161		Tekla Quantity Weight [albl_Units_kg]	898,7	898,7	
162		Tekla Quantity Width [albl_Units_mm]	300	300	
163		albl_ApplicationFullName	Tekla Structures	Tekla Structures	
164		albl_ApplicationIdentifier	Multi material modeling	Multi material modeling	
165		albl_ChangeAction	NOCHANGE	NOCHANGE	
166		albl_Description	HEA400	HEA400	
167		albl_FamilyName	Undefined	Undefined	
168		albl_GivenName			
169		albl_IFCObjectType	albl_Parametric	albl_Parametric	
170		albl_IsSetLastModifiedDate	albl_False	albl_False	
171		albl_LastModifiedDate			
172		albl_Material	STEEL/S235JR	STEEL/S235JR	
173		albl_MiddleNames			
174		albl_Name	COLUMN	COLUMN	
175		albl_ObjectType	HEA400	HEA400	
176		albl_OrganizationDescription			
177		albl_OrganizationNames	Trimble Solutions Corporation	Trimble Solutions Corporation	
178		albl_OrganizationRoles			
179		albl_Roles			
180		albl_Version	Next	Next	
181		albl_status titel state	0	0	

Example of the exported Excel when the **Export details** and **Changed details only** options have been selected.

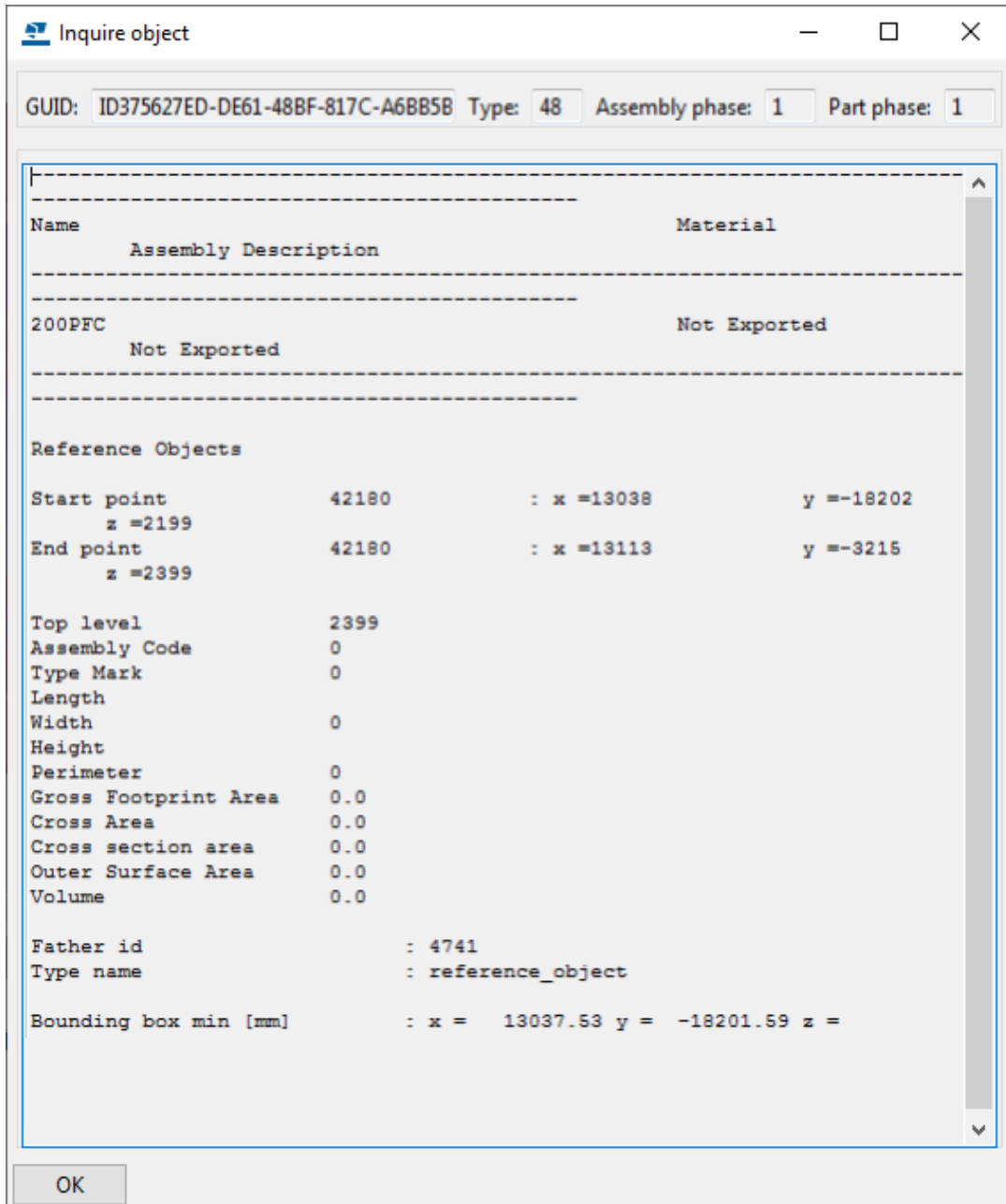
1	Status	Name	GUID	Material	Type	Profile
2	Changed		1k54BEPQz0FAoZF0\$W6I1h	STEEL/S235JR	IFCCOLUMN	HEA400
6	Changed		14uu17k3D9th9iqIYAUt1J	STEEL/S235JR	IFCDISCRETEACCESSORY	
19	Changed		39aBB4KSf0PQzSS31LUw8W	STEEL/S235JR	IFCDISCRETEACCESSORY	
30	Changed		3QkoB0iyv5bRNdzWlmdDsG	STEEL/S235JR	IFCDISCRETEACCESSORY	
41	Changed		3uQ8_XDfX5TPum3PI5UUvL	STEEL/S235JR	IFCDISCRETEACCESSORY	
42		Name	New value		Old value	
43	Changed		1Bg_F28Xz1o914nBZpmLGz	Undefined	IFCMECHANICALFASTENER	
44	Changed		3QI1lcOFz0fx07qTgvB8hU	Undefined	IFCMECHANICALFASTENER	
45	Up-to-date		0sjDQuFc182Q1v\$I3SsaGK	STEEL/S235JR	IFCDISCRETEACCESSORY	
46	Up-to-date		0Um8A0msX9KBfKvZMeGHc\$	STEEL/S235JR	IFCDISCRETEACCESSORY	
47	Up-to-date		17CIUg\$_XEUhjr4Mzxzb8q	STEEL/S235JR	IFCDISCRETEACCESSORY	
48	Up-to-date		1ka4rcJQ5Bt9ugGNul8jmj	STEEL/S235JR	IFCDISCRETEACCESSORY	
49	Up-to-date		1NNo_9Qyj448hTkileoGhb	STEEL/S235JR	IFCDISCRETEACCESSORY	
50	Up-to-date		1OnHtXngT8ewtSpBOR8nLe	STEEL/S235JR	IFCDISCRETEACCESSORY	
51	Up-to-date		25ZZMv\$yv9\$RFaMLWmjTm1	STEEL/S235JR	IFCDISCRETEACCESSORY	
52	Up-to-date		2Y_C4wlMfABxr2GVDDtBCC	STEEL/S235JR	IFCDISCRETEACCESSORY	
53	Up-to-date		36CKqNwA98qvVvXfbRBe1u	STEEL/S235JR	IFCDISCRETEACCESSORY	
54	Up-to-date		3GoRPuPZTAefPZ658W7K44	STEEL/S235JR	IFCDISCRETEACCESSORY	

Inquire reference model contents

You can inquire the contents of a reference model. This is something you might want to do after importing a reference model into Tekla Structures.

1. On the ribbon, click  **Object**.
2. In your Tekla Structures model, click the reference model you want to examine.

The contents of the reference model are listed in the **Inquire object** dialog.



See also

[Insert a reference model \(page 175\)](#)

Reference model objects

Some types of reference models are automatically subdivided into *reference model objects*, which is an individual part of an imported reference model. You can define user-defined attributes separately for each reference model object and use them for reports and the view and selection filters. They can

also be moved to a Tekla Structures model that is currently being worked on. Information included in a reference model object can be saved in the model database.

The reference model objects are read-only.

Whether the reference model supports splitting depends on the file format and file structure. `.ifc` models are always automatically subdivided, and `.dwg` files that include any of the following objects, are also automatically subdivided:

- block table
- polyface mesh
- polygon mesh
- proxy object (for example, ADT)
- ACIS objects (3DSolid, Body, Region)

The file formats `.dgn`, `.prp`, `.skp`, `.step`, and `.iges` are not subdivided.

TIP To report a needed reference object attribute you can inquire a reference object in the model to see the property name and then in Template Editor, add that property name to be reported in a Reference* row.

See also

[Reference models and compatible formats \(page 173\)](#)

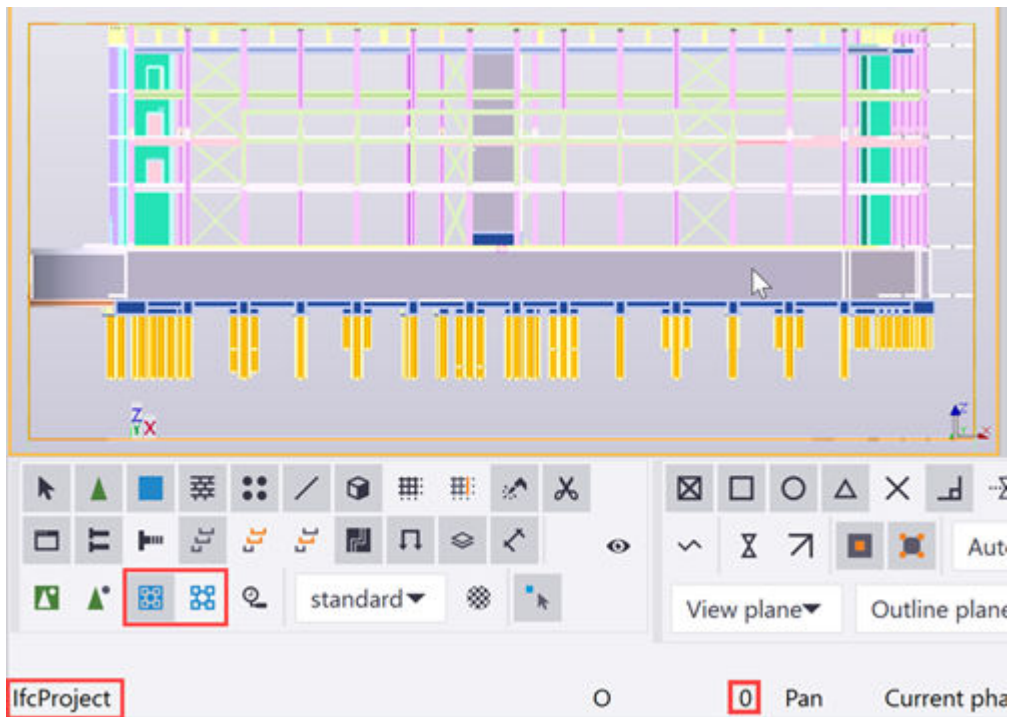
Examine reference model hierarchy

You can view the reference model hierarchy and check the hierarchy level of different objects. You can also add user-defined attributes to the reference model objects. The added attributes can be used for filtering, for example. Additionally, you can view the native reference object attributes and properties.

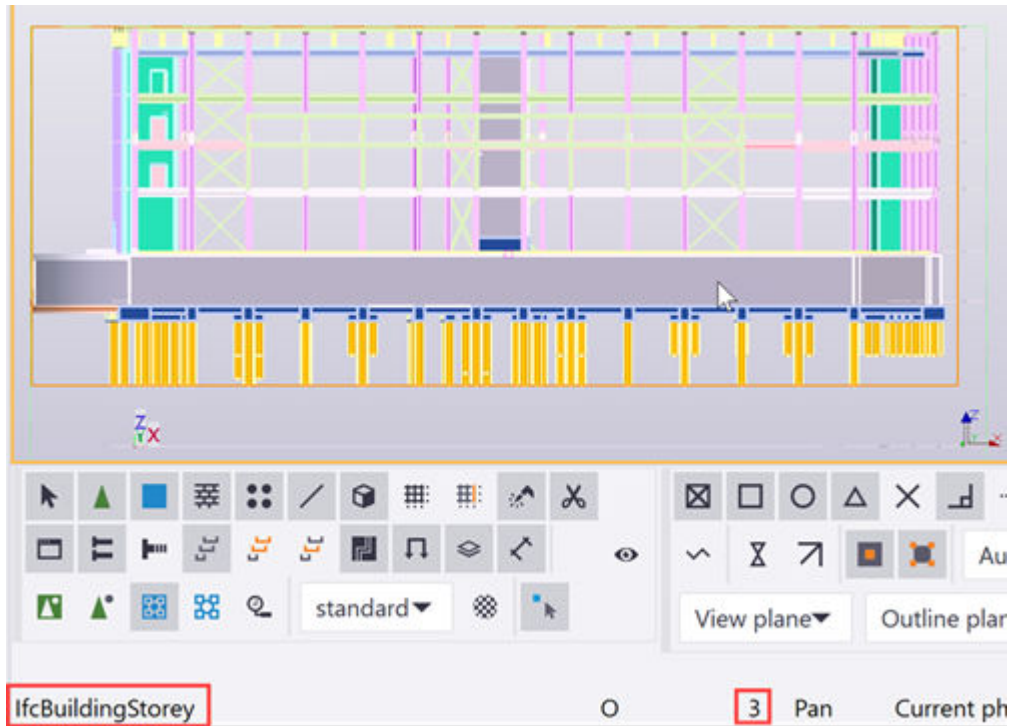
1. Ensure that the **Select assemblies** selection switch  (for assemblies) or **Select objects in assemblies** selection switch  (for parts) is active.
2. Point the reference model, hold down **Shift** and scroll using the middle mouse button to the hierarchy level where the reference object is. Notice that if the cursor is too close to a grid, the hierarchy is not scrolled.
3. Do any of the following:
 - To inquire the native reference object properties and attributes, right-click the object and select **Inquire**.
 - To view or modify the user-defined attributes of a reference object, double-click the object to open the reference model object details.

TIP There are many more commands available for the selected reference model objects. Check rest of the commands on the context menu.

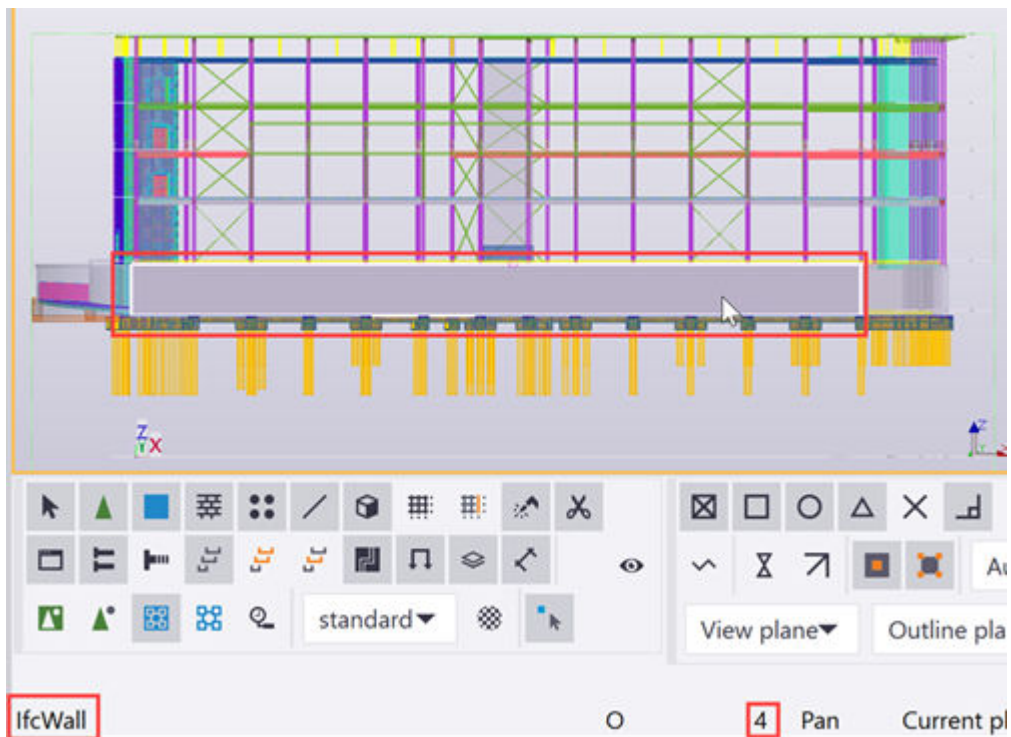
Below is an example of a reference model. When you want to scroll the hierarchy, the **Select assemblies** selection switch or the **Select objects in assemblies** selection switch must be active. The 0 level IfcProject in the example is the upmost level.



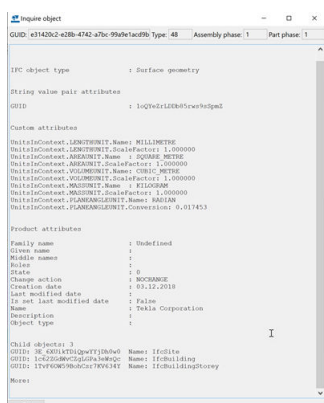
In the image below you can see one of the reference objects on the third level, IfcBuildingStorey, of the same reference model.



As you can see, the level 4, Ifcwall, shows an individual part. In this case, it is a wall.



In the example below, one of the reference objects on the lowest level has been inquired.



Reference model assemblies

Imported IFC reference models can contain assemblies. You can select reference model assemblies in the model view and view assembly level information in Tekla Structures.

- You can add user-defined attributes to reference model assemblies.
- You can use the **Inquire** command to view information on reference model assemblies. For example, you can view GUIDs of child objects.
- You can create reports to view information on reference model assemblies.

3.2 IFC

IFC stands for Industry Foundation Classes, the set of internationally standardized object definitions for use in the construction industry. IFC is developed as an open standard by buildingSMART.

IFC offers a high-level common language for the sharing of intelligent objects, such as building elements, between disciplines across the building life cycle. The principal benefit of IFC is the object description – not only does the IFC protocol preserve the full geometric description in 3D, but it also knows its location and relationships, as well as all the properties (or parameters) of each object.

For a list of IFC applications certified by buildingSMART international, see [Certified software](#).

See also

IFC interoperability concepts (page 204)

Insert IFC models as reference models (page 206)

[Insert a reference model \(page 175\)](#)

[Convert IFC objects into native Tekla Structures objects \(page 207\)](#)

[IFC export \(page 222\)](#)

IFC interoperability concepts

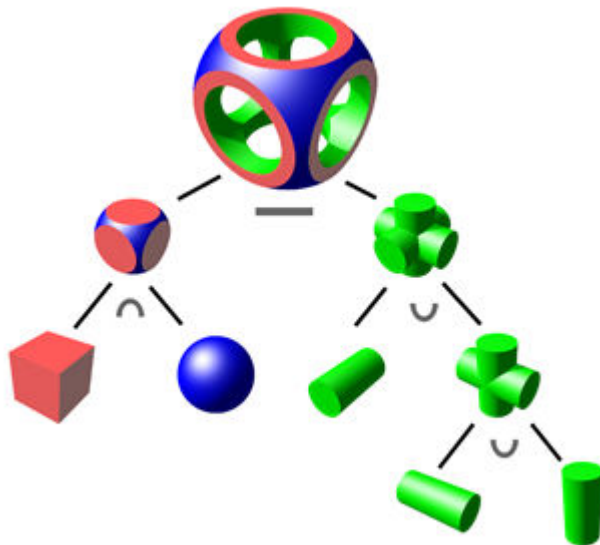
Some common terms and concepts used in IFC import, export, and conversion are explained below.

B-rep

B-rep or *boundary representation* is a method for representing shapes using the limits. A solid is represented as a collection of connected surface elements, showing the boundary between solid and non-solid.

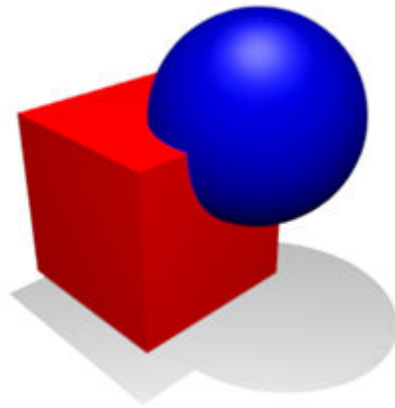
CSG

CSG or *Constructive Solid Geometry* is a technique used in solid modeling. CSG allows a modeler to create a complex surface or object by using Boolean operations to combine simpler objects.

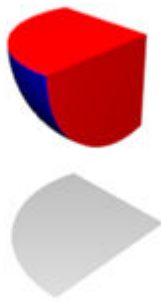


Boolean operations on sets

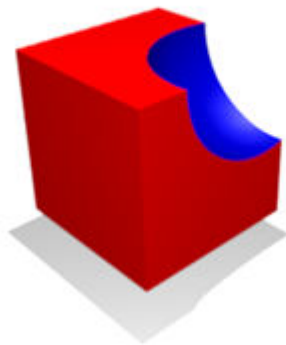
Union:



Intersection:



Difference:



Extrusion

Sweeping is allowing a two-dimensional planar cross section to sweep through space.

Revolved extrusion

A revolved extrusion or a solid of revolution is a solid object that is obtained by rotating a plane cross section around a straight line (the axis) that lies on the same plane.

Arbitrary profiles

In addition to parameterized profiles, there is a free profile shape type called *arbitrary profiles*. These profiles are defined by an ifcCurve, which may have linear and curved segments. Thin wall profiles can be defined by a centerline and a thickness. Other profiles are defined by a closed shape. Closed profile shape may or may not have inner voids.

Parameterized profiles

There are several parameterized profiles available in the IFC specification. Those include standard hot-rolled steel I, L, T, U, and Z profiles, cold formed C profiles, and generic rectangle and circle profiles with or without a hollow. These profiles are defined with their parameters, such as width, height, web thickness and flange thickness.

Insert IFC models as reference models

You can insert IFC models as reference models to Tekla Structures, and optionally convert the inserted IFC objects into native Tekla Structures objects directly by using the direct conversion, or convert the selected IFC reference objects using conversion change management. You can use inserted IFC reference models, for example, in clash checking, reporting and scheduling.

Insert a reference model

1. Open a Tekla Structures model where you want to insert the IFC reference model.

2. Go to the **File** menu, and select **Import --> Insert reference model**.

This opens the **Reference models** list and the **Add model** dialog.

You can also open the **Reference models** list by clicking the **Reference**

models button in the side pane  and then click the **Add model** button.

3. Click the following link and follow the instructions for inserting the reference model: [Insert a reference model \(page 175\)](#).

You can check the changes between different IFC reference model versions in Tekla Structures using [change detection \(page 185\)](#). You can [convert the inserted IFC objects into native objects \(page 207\)](#).

Supported IFC schemas and IFC applications

- Tekla Structures supports the following IFC schemas:
 - IFC2X3 (recommended)
 - IFC4
- For a list of applications/utilities that are purported, by their developers, to provide IFC insert and/or export functionality, see [List of all IFC applications](#).

Certification

- The IFC insert IFC2X3 functionality has the IFC certification granted by buildingSMART international. For a list of IFC-certified applications, see [Certified Software](#).

Supported entities

The IFC reference model insert in Tekla Structures supports all the sub-objects of the `IfcBuildingElement` class and sub-objects of the `IfcProduct` class including:

- Architectural entities
- Structural entities
- Building services entities

Supported formats

- IFC (`.ifc`) and ifcXML (`.ifcXML`) formats are supported.
- You can use compressed (`.ifcZIP`) or uncompressed insert files.
- IFC4 does not support ifcXML.
IFC4.3 format files are supported in Tekla Structures 2023.

See also

[Convert IFC objects into native Tekla Structures objects \(page 207\)](#)

Convert IFC objects into native Tekla Structures objects

You can convert most linear IFC reference objects such as beams, columns, braces, plates, slabs, footings and walls into native Tekla Structures objects. Conversion also supports polybeams that have curved sections, and have originally been exported from Tekla Structures, and string, int and double type UDAs. The purpose of converting IFC objects in Tekla Structures is to help in the creation of the structural model and to avoid rework in an early modeling phase.

In IFC object conversion, IFC objects are converted either as items or as extrusions. Conversion as *item* means that an IFC object is converted as a

Tekla Structures item, where the 3D shape defines the geometry of the item. Conversion as [extrusion \(page 204\)](#) means that an IFC object is converted as a part (column, beam, plate, etc.) that has a profile extruded to create the length of the part.

In IFC object conversion you need to do the following:

1. Before converting, check that the profiles and units in the IFC reference model are compatible with your environment.
2. Check the object conversion settings in the **IFC object conversion settings** dialog and change them, if needed.
3. Convert the IFC objects to native Tekla Structures objects. There are two alternative ways available in object conversion:
 - Converting all selected reference model objects at one go using the **Convert IFC objects** command on the **Manage** tab.
 - Converting using the IFC object conversion change management. You can also perform an update conversion with a new reference model revision using the change management.

For more information about the profile conversion logic, see section "Profile conversion logic" below. Limitations are listed in section "Limitations in IFC object conversion" below.

Is object conversion always necessary?

In Tekla Structures, reference model objects can be used in a way similar to the native objects, for example, in clash detection, reporting and scheduling. There is no need to have everything as native, because the reference model objects can also be used in many ways. For example, reference model objects can be shown in drawings and they can be listed in reports.

The reference files have the benefit compared to the copied files that the content of the files is automatically updated by the designer of that design discipline.

Check and change the IFC object conversion settings

Before you start converting, check the conversion settings and change them if necessary.

1. On the **File** menu, click **Settings --> IFC object conversion settings**.
2. In the **IFC object conversion settings** dialog, check and change the conversion settings:

Create report after conversion	Not used any longer. The changes list replaces the report.

Set handles to top flange	Set the reference lines of beams to top flange. If Set handles to top flange is not selected, the reference lines of beams are located in the middle of the beams. This setting is not used for polybeams for better conversion results.
Convert B-rep object	Convert B-rep objects into Tekla Structures objects. You can select conversion to item and conversion to extrusion separately for concrete material and other material, for example, steel. The selected options are applied to direct conversion and in conversion change management. B-rep objects are converted to items, and the items are added to the shape catalog. The items belong to class 996.
Primary profile mapping	Profile name Map profiles primarily by comparing the profile names between the IFC model and Tekla Structures profile catalog. Dimensions: Map profiles primarily by comparing the object dimensions. If the IFC object converter cannot map profiles with the method you select as primary, it applies the secondary (unselected) method.
Tolerance	Enter values for dimension comparison. The unit of measurement is based on the environment. The r value in Tolerance affects only rectangular hollow profiles. It is used to distinguish hot rolled profiles from cold rolled profiles.

3. Copy properties from the IFC object property sets to be used as user-defined attributes of converted Tekla Structures objects:
 - a. Click **Add** to add a row and enter the name of the IFC property in the **Property** box.

Write the IFC property as it is shown in the **Inquire** dialog (without the prefix EXTERNAL.).

Dots (.), underscores (_), and spaces are allowed in the property set name.
 - b. Enter the name of the user-defined attribute in the **UDA** box.

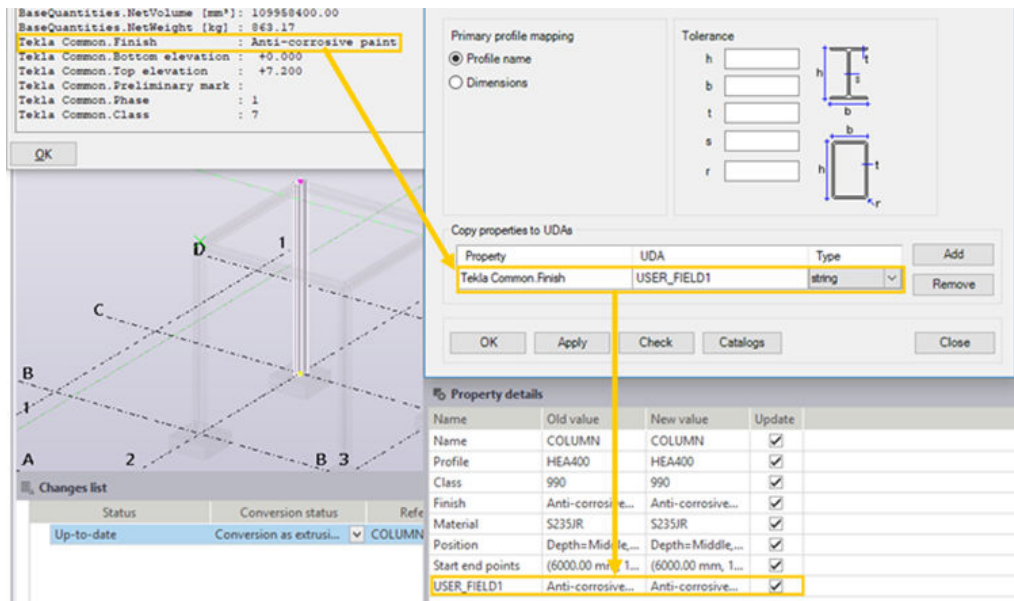
The maximum length of the user-defined attribute name is 20 characters. The user-defined attribute that you add here must also be included in the `objects.inp` file. Ensure that the attribute name is unique. Enter the original name of the user-defined attribute.

For the following, also the translated name is supported: Profile name, Description, Ifc type (type), Object type, Phase, Material, Finish, Profile, and Name.

Note that you can copy the Object type property to UDA with ObjectType.

- c. Click **Type** to select the format of the attribute.

The possible formats are string, integer or double. The type specifies the IFC property datatype, not the UDA datatype.



4. Before you convert IFC objects into native Tekla Structures objects, check the profiles and materials to ensure that the conversion will be successful, and map the profiles or material manually in the following way:

- a. Click the **Check** button.

Tekla Structures displays any missing profiles or materials on the **Missing Profiles** and **Missing Materials** tabs in the **Missing Mapping** dialog.

- b. Select an appropriate option in the Tekla Structures profile and Tekla Structures material lists to define a mapping for the missing profiles or materials.

An IFC part profile name can be mapped with a Tekla Structures profile. The mapping of profiles works for IFC data that has a profile name but does not include enough information for conversion. You can change your mappings later if needed. The maps are used in conversion only if the profiles are not found from Tekla Structures catalogs. The profile conversion follows a certain logic described below.

Material mapping works for both existing and not found materials.

- c. Click **Update Mapping Catalogs and Close**.

You can also open and modify the catalog files in a text editor. To do this, click the **Catalog** button. When you are done, reopen the IFC object conversion settings to take the new settings in use. The files are located in the \attributes folder under the model folder:

TeklaStructuresCatalogMaterials.txt contains all materials

TeklaStructuresCatalogProfiles.txt contains all profiles

MappedMaterials-default.txt maps the materials

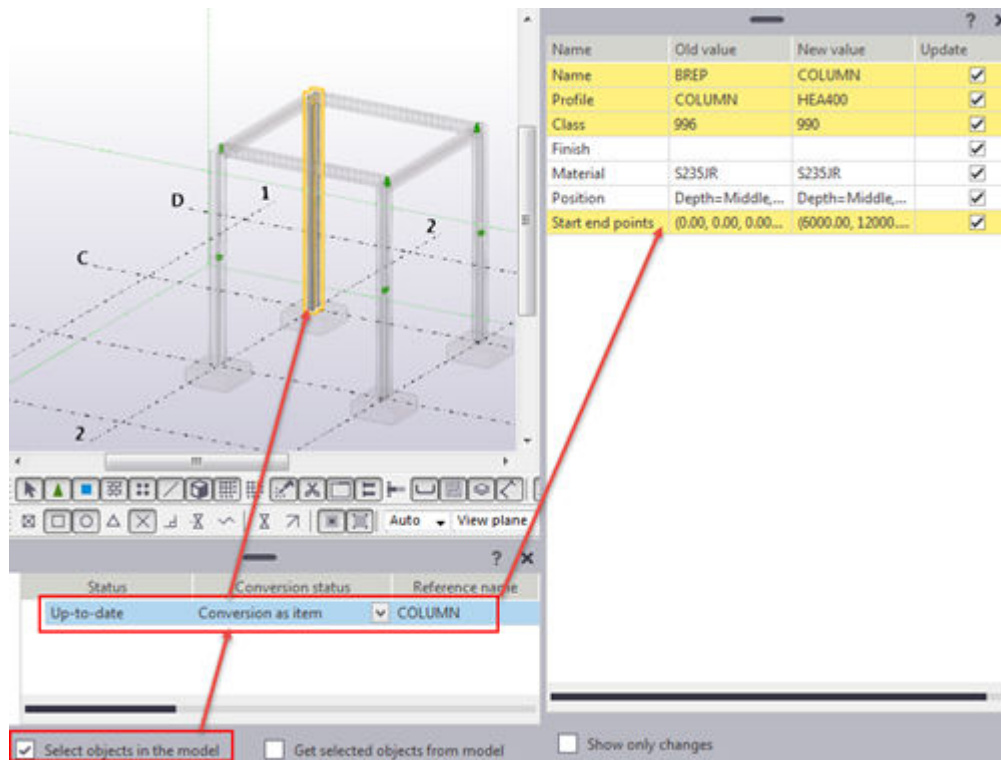
MappedProfiles-default.txt maps the profiles

5. Click **OK** in the **IFC object conversion settings** dialog. Now you can convert the IFC objects using one of the two available ways.

Convert selected IFC objects at one go

You can convert all imported IFC objects at one go using the current object conversion settings. You need to have at least two or more revisions of the same model.

1. Open the **Reference models** list by clicking the **Reference models** button  in the side pane.
2. Click the **Add model** button, browse for the model in the **Add model** dialog, and click **Add model** again.
3. In the model, select the objects that you want to convert.
4. Go to the ribbon, and on the **Manage** tab, click **Convert IFC objects**. The selected objects are converted on the basis of IFC conversion settings. Conversion is done automatically for objects that have not been converted earlier. Converted IFC object are listed in the changes list at the bottom. Each object is on a row of its own, and cuts are listed hierarchically under the related object.



- To select objects in model, activate the **Select objects in the model** checkbox, and then click an object row. This also selects the related native object.
- To highlight the object in the changes list and show its details, select the **Get selected objects from model** checkboxes, and then click an object in the model.
- To zoom to the selected object in the model, select the **Zoom to selected** checkbox, and then click a row in the changes list. The **Zoom to selected** checkbox is disabled if the **Select objects in the model** is not selected.
- To show only changes in the property details list, select the **Show only changes** checkbox, and then click a row in the changes list.

Note that in the property details list, if you by accident remove one of the columns, you can bring it back by right-clicking the column title and selecting the column from the context menu. You can then drag the column to the desired location.

- The status of an object may be **New** (green) **Changed** (yellow), **Deleted** (red), or **Up-to-date** (blue or gray, when the conversion change management is reopened), or **Error** (lilac).
- The **Conversion status** column shows the resulting conversion status.
- The properties of a converted object are listed in the property details list that appears in the side pane when you click an object in the changes list.

5. You can update an object in the list by changing its conversion status to **Conversion** and clicking **Apply changes**.
6. If the lists disappear, click the following buttons that are only visible when the conversion changes list is active:
 -  The **Changes list** button brings back the changes list.
 -  The **Property details** button brings back the property details list.

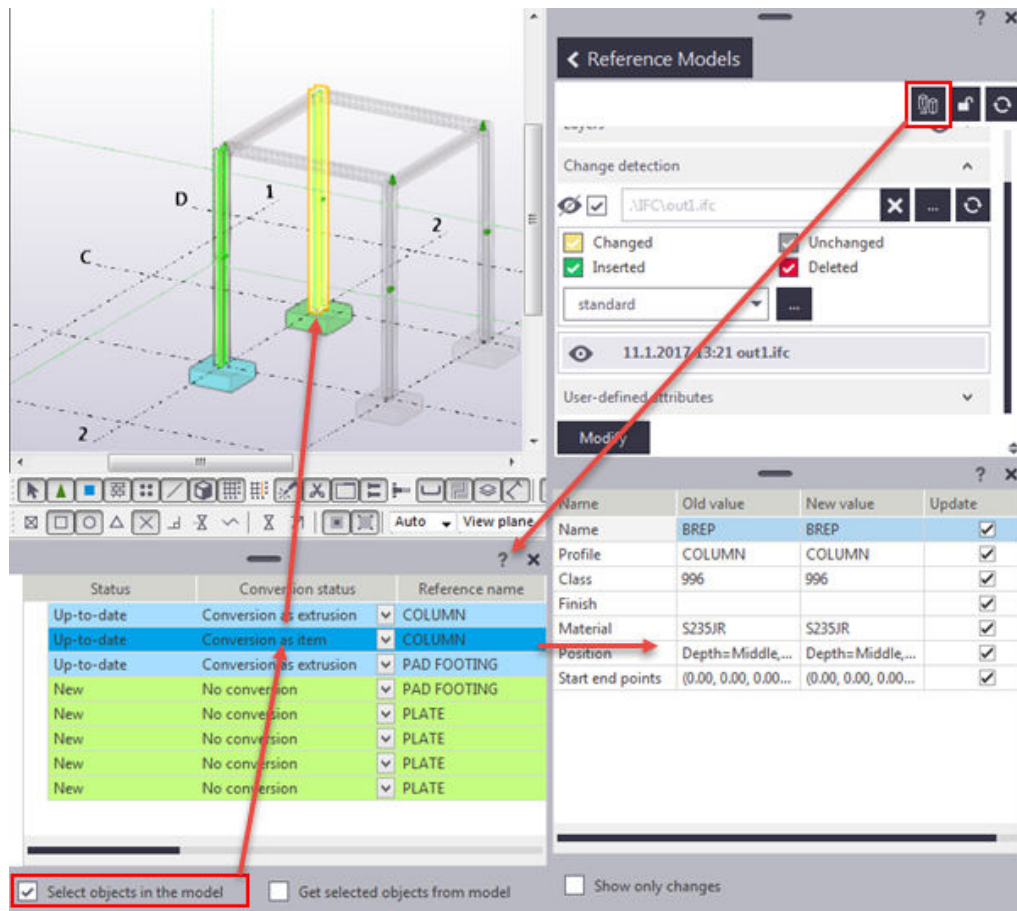
Convert IFC objects using conversion change management - first conversion

Object conversion change management provides change detection and change management on object level. Conversion change management is needed in the initial data change management to reduce the challenges in construction projects. Objects are not converted automatically but you need to convert the objects using the conversion changes list.

1. Open the **Reference models** list by clicking the **Reference models** button .
2. Click **Add model**, browse for the model in the **Add model** dialog, and click **Add model** again.
3. Double-click the model in the **Reference models** list to open it, and then click the **Start IFC object conversion change management** button .

The current conversion status is displayed in the changes list and conversion management is activated. The status is based on reference model object physical changes and IFC conversion settings. The properties of a reference object are listed in the property details list that appears separately for each object when you click an object in the changes list.

Use the **Select objects in the model**, **Get selected objects from model**, and **Zoom to selected** checkboxes to review the model and the changes and details lists.



The reference object status and conversion status logic and colors:

Status	Conversion status	Color
New	No conversion	Green
Changed	Conversion as item or Conversion as extrusion	Yellow
Deleted	Conversion as item or Conversion as extrusion	Red
Up-to-date	Conversion as item or Conversion as extrusion	Blue (gray when the conversion change management is reopened)
Error	No conversion	Lilac

- Convert objects by selecting the desired object rows, selecting **Conversion** in the **Conversion status** column and clicking **Apply changes**. The conversion is based on conversion settings. You can select multiple objects.

- After conversion, the conversion status is either **Conversion as item** or **Conversion as extrusion** depending on the result of the conversion.
 - B-reps (page 204) are shown as **Surface geometry**, parametric (page 204) profiles as **Parametric** and arbitrary (page 204) shapes as **Arbitrary**. Assembly is also **Arbitrary**, and so are the reference objects that are selected with the **Select objects in assemblies** or **Select objects in components** selection switches.
 - If B-rep (**Surface geometry** in the **Reference type** column) conversion is selected, conversion is done as item, if not error.
 - If object is extrusion (page 204) (**Arbitrary** or **Parametric** in the **Reference type** column), it is converted as extrusion.
 - You can force conversion to be item by selecting **Conversion as item**. In this case, an extrusion object is also converted as item. The conversion does not check if same shape is already available, meaning new shape will always be created.
 - You can force conversion to be extrusion by selecting **Conversion as extrusion**. In this case, B-rep is also converted as extrusion, profile is by mapping, or by bounding box if there is no mapping. This conversion result is not always as preferred.
 - If the conversion fails, the result is written to the **Conversion status** column, and the row color is lilac.
5. If the lists disappear, click the following buttons that are only visible when the conversion management is active:
-  The **Changes list** button brings back the changes list.
 -  The **Property details** button brings back the property details list.

Convert IFC objects using conversion change management - update conversion

If a previously converted reference object has changed in a newer reference model revision, you can compare the older and newer revisions of the reference model and update the conversion.

1. Open the **Reference models** list by clicking the **Reference models** button in the side pane .
2. Open the older reference model revision by double-clicking it in the **Reference models** list.
3. Update the reference model with a new revision of the reference model by selecting a new revision file in the **File** list in the **Details** section and clicking **Modify**.

4. Click the **Start IFC object conversion change management** button .
5. Go through the changes:
 - Select the **Select objects in the model** and **Zoom to selected** checkboxes to see the changed objects clearly in the model.
 - Click the changed row to see detailed changes in property details in the side pane.
6. You can update previously converted objects partially by selecting the **Update** checkbox next to a certain property in the property details pane. For example, if you only want to update the profile information, only select the **Update** checkbox next to the **Profile** row in the property details pane.
7. To convert all objects with changed conversion status, select all rows, change the **Conversion status** to **Conversion** and click **Apply changes**.
 - The objects that have a changed conversion status are converted on the basis of the current IFC object conversion settings.
 - You can update previously converted native model objects based on previous conversion type and settings by selecting **Conversion** in the **Conversion status** column. You cannot change the type from extrusion to item, in this case you need to delete the native objects and force conversion.
 - If the reference object status is **Deleted**, select **Conversion** and click **Apply changes**. This removes the native object and the link to the removed reference objects.

Macro for selecting converted IFC objects

The **Select Converted Objects BasedOn Ifc Objects Selection** macro selects the objects that have been converted to native Tekla Structures objects. You may want to select the converted objects to check the properties of the native Tekla Structures objects, for example. This macro is located in the **Applications** section of the **Applications & components** catalog.

Class values

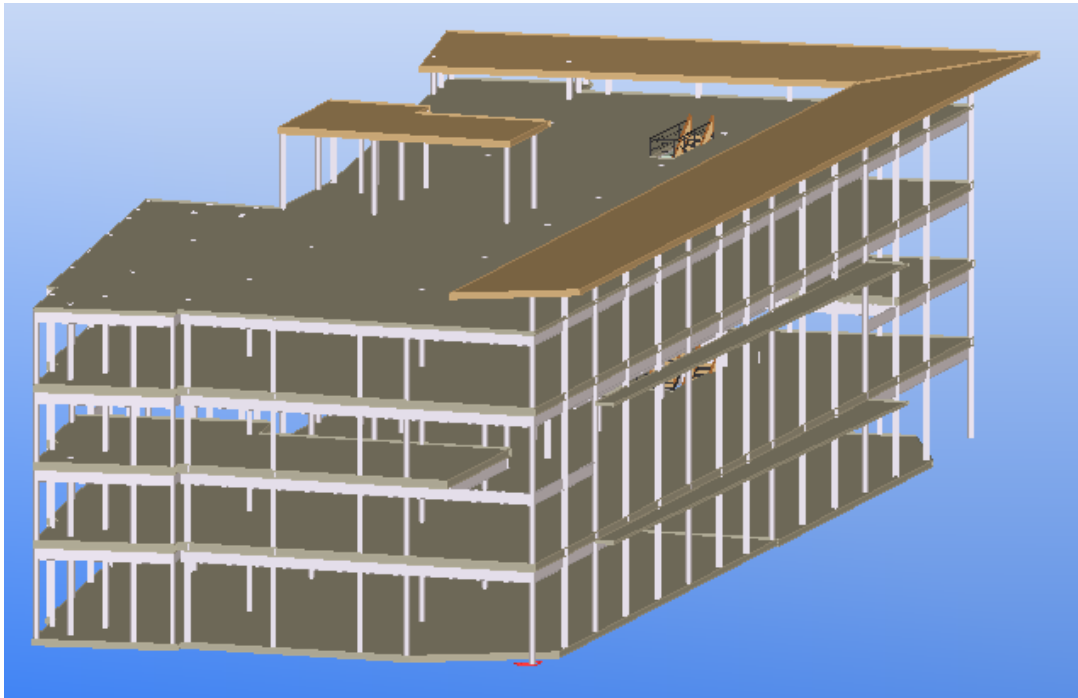
The status of the converted object is reported in the changes list in the **Class** column. Sometimes the input data in the IFC model is not adequate

to successfully create the converted object. The following table explains what the class values mean.

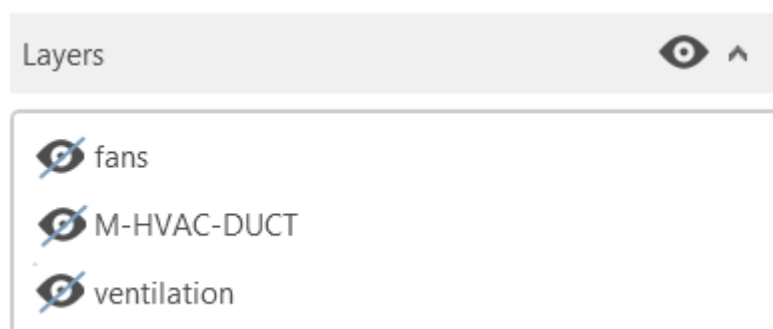
Class value	IFC object data	Converted object description
990	Parametric profile with a name	There is enough information in the IFC model to convert the object successfully.
991	Parametric profile without a name	Tekla Structures determines the name of the object based on the objects profile.
992	Arbitrary profile with a name	The profile of the converted object may be incorrectly rotated because there is no parametrized profile data in the IFC model.
993	Arbitrary profile without a name	The profile of the converted object may be incorrectly rotated because there is no parametrized profile data in the IFC model. The profile name is set to UNKNOWN.
994	B-rep piece with a name	The profile may be an extrema box due to the lack of profile data in the IFC model.
995	B-rep piece without a name	The profile may be an extrema box due to the lack of profile data in the IFC model. The profile name is set to UNKNOWN.
996	B-rep piece	The object is converted using the Convert B-rep object option in converter settings. The converted B-rep object is either an item or a concrete item and is added to the shape catalog.

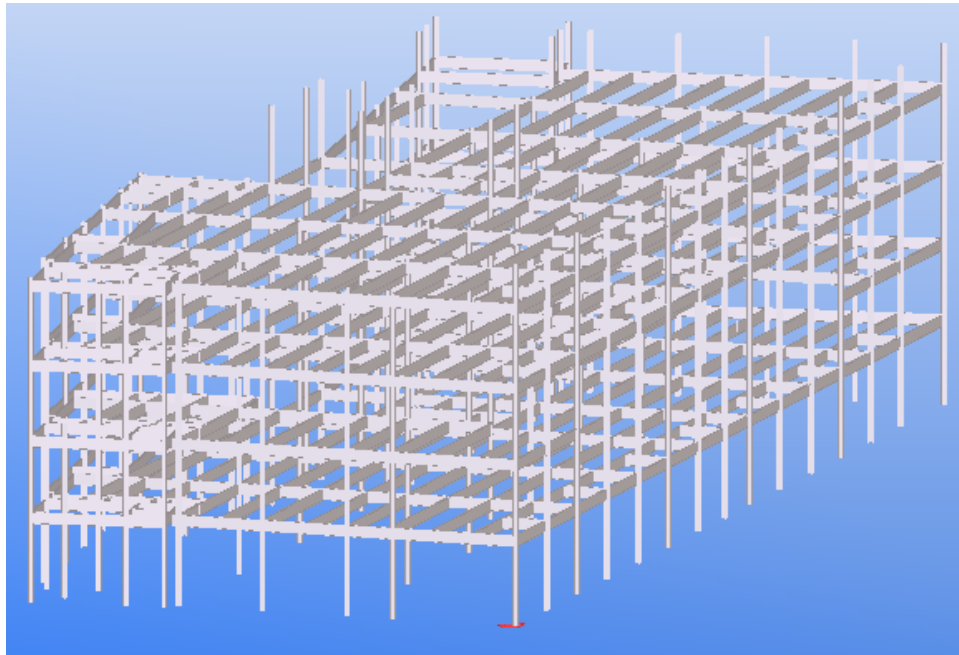
Example: Convert IFC objects into Tekla Structures objects at one go

In this example, an IFC model is used as a basis for your structural model. The beams and columns are converted into native Tekla Structures objects.



1. Hide irrelevant IFC layers:
 - a. Click the **Reference models** button  in the side pane.
 - b. In the **Reference models** list, double-click the reference model to open the details.
 - c. Open the **Layers** list by clicking the down arrow on the right.
 - d. Hide the unnecessary layers by clicking the eye button next to the layer.





2. Select all visible IFC objects.
3. On the **Manage** tab on the ribbon, click **Convert IFC objects**.
Tekla Structures converts the reference objects.
4. Check the profiles and materials of the IFC objects and map missing material:
 - a. On the **File** menu, click **Settings --> IFC object conversion settings**.
 - b. Click **Check**.
Tekla Structures lists the missing profiles and materials.
 - c. View the **Missing Profiles** and **Missing Materials** tabs.
Tekla Structures lists a missing reference part material **Concrete Block**.
 - d. Select **CONCRETE_UNDEFINED** from the list.

Concrete Block	CONCRETE_UNDEFINED ▼
 - e. Click **Update Mapping Catalogs and Close**.
 - f. Select the **Create report after conversion** checkbox.
 - g. Click **OK** in the **IFC object conversion settings** dialog.
5. On the **Manage** tab, click **Convert IFC objects** again.

Tekla Structures converts the objects.

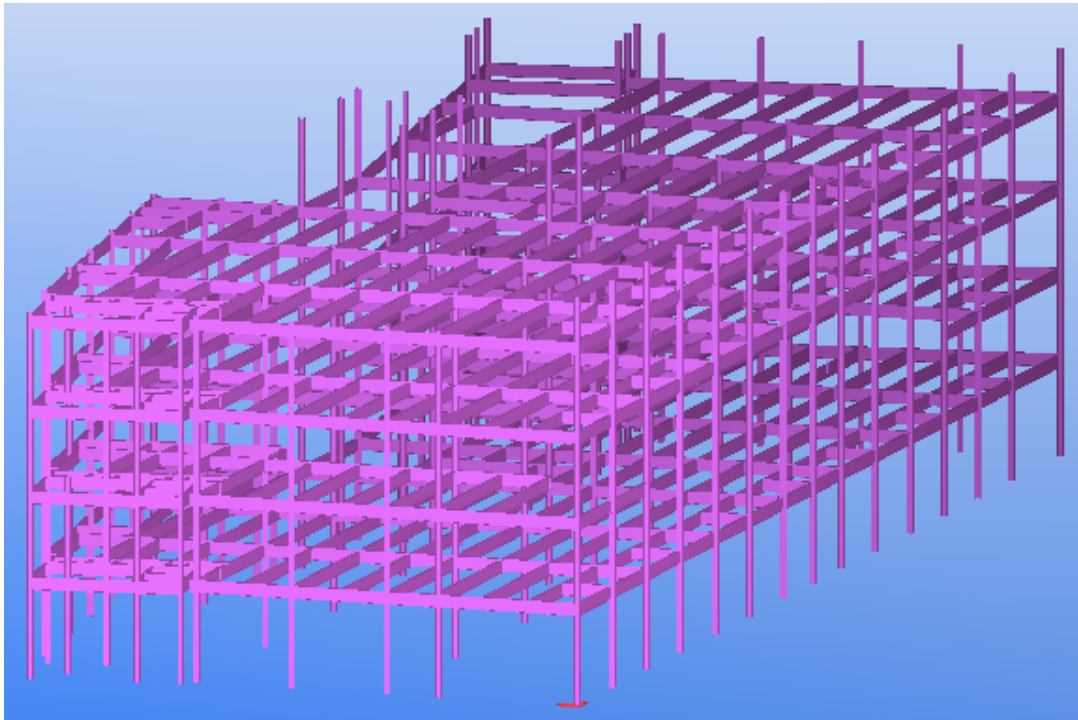
TEKLA STRUCTURES CONVERTED PARTS

ID	NAME	Profile	Initial Profile	Class
Id: 124779	BEAM	W610X82	W610X82	992
Id: 124772	BEAM	W610X82	W610X82	992
Id: 124765	BEAM	W610X82	W610X82	992
Id: 124758	BEAM	W610X82	W610X82	992
Id: 124751	BEAM	W610X82	W610X82	992
Id: 124744	BEAM	W610X82	W610X82	992
Id: 124737	BEAM	W610X82	W610X82	992
Id: 124730	BEAM	W610X82	W610X82	992
Id: 124723	BEAM	W610X82	W610X82	992
Id: 124716	BEAM	W610X82	W610X82	992
Id: 124709	BEAM	W610X82	W610X82	992
Id: 124702	BEAM	W610X82	W610X82	992
Id: 124695	BEAM	W610X82	W610X82	992

The **Class** for all the converted objects is 992. That means that the profile of the converted object may be incorrectly rotated because there is no parametrized profile data in the IFC model.

6. Check the conversion changes list:
 - Select objects in the changes list to highlight them in the model: Use the buttons **Select objects in the model** and **Zoom to selected**.
 - Compare the converted objects with the IFC objects.
 - Use the **Inquire object** button on the ribbon to view detailed information on objects.

Below is an image of converted beams and columns.



Profile conversion logic in IFC object conversion

You can map an IFC part profile name with a Tekla Structures profile. If a profile is not mapped, Tekla Structures uses a certain logic in converting profiles in the IFC object conversion.

When a [parametric profile \(page 204\)](#) is used in the IFC model, the I, L, U, C, T, Z, Rectangle and Circular type profiles can be defined parametrically:

1. If the IFC file has been created with Tekla Structures, the original profile name is used.
2. If a profile with the same name is found from the Tekla Structures profile catalog, that profile will be used.
3. Otherwise, Tekla Structures checks the parameter values to find a corresponding profile. If found, that will be used.
4. Otherwise, a default parametric profile is used.

When an [arbitrary profile \(page 204\)](#) used in the IFC model, the profile shape is defined with polygon:

1. If the IFC file has been created with Tekla Structures, the original profile name is used.
2. If the shape is detected and found from Tekla Structures profile catalog, that profile will be used. The shape detection supports the standard types of hot rolled profiles.

3. Otherwise, a new profile is created based on the description of the arbitrary profile.

When B-rep (page 204) geometry used in the IFC model, the object is defined with surfaces, and profile geometry information is not available:

1. If corresponding item exists in Tekla Structures model, it will be used.
2. Otherwise, a new item will be created and used.

If **Conversion as item** is used for [extrusion \(page 204\)](#) type of part, a new item is always created.

Limitations in IFC object conversion

Tekla Structures converts most linear IFC objects to native Tekla Structures objects. However, there are some limitations in the conversion.

Tekla Structures is dependent on the quality of the IFC model, because it uses information available in the model when converting objects.

The following limitations exist in the IFC object conversion:

- The IFC4.0, IFC4.1, and any newer IFC4 formats are not supported in the IFC object conversion.
- If the IFC model does not comply with the IFC standard, it might not be converted as expected.
- Bolts, reinforcement and welds cannot be converted to native Tekla Structures objects.
- The following physical elements are currently supported: IfcBeam, ifcColumn, ifcMember, ifcPile, ifcFooting, ifcPlate, ifcDiscreteAccessory, ifcSlab, ifcWall, ifcWallStandardCase, ifcRailing and ifcBuildingElementPart.
- Only SweptSolid, Brep, CSG and Clipping representations are supported.
- Multiple representations for one object are not supported.
- Profile offset is not supported.
- Sometimes, chamfers may be converted incorrectly.

IFC export

You can export Tekla Structures models as IFC models.

You can export all basic parts in the Tekla Structures model such as beams, columns, braces, slabs, panels, plates, reinforcing bars, pours, and bolts with nuts and washers.

Tekla Structures exports the model objects on the basis of the export settings you define, including the property sets.

The IFC export functionality in Tekla Structures supports the IFC2X3, IFC4 and IFC4.3 schemas. The IFC export functionality has the IFC certification granted by buildingSMART International [Certified Software](#).

Certified model view definitions:

- IFC2x3 Coordination view 2.0
- IFC4 Reference view
- IFC4.3 Bridge view

IFC (.ifc) and ifcXML (.ifcXML) formats are supported, ifcXML in IFC2x3 only. You can use compressed (.ifcZIP) or uncompressed import files.

To	Click the link to find out more
Define the resulting IFC entities for the exported Tekla Structures model objects and the IFC export settings, and then export the Tekla Structures model or a part of it into an IFC file	Export in IFC format (page 229)
Modify existing IFC property sets and the bindings between property sets and IFC entities, modify the properties included in property sets, and add buildingSMART property sets	Modify property sets for IFC export (page 223)

Modify property sets for IFC export

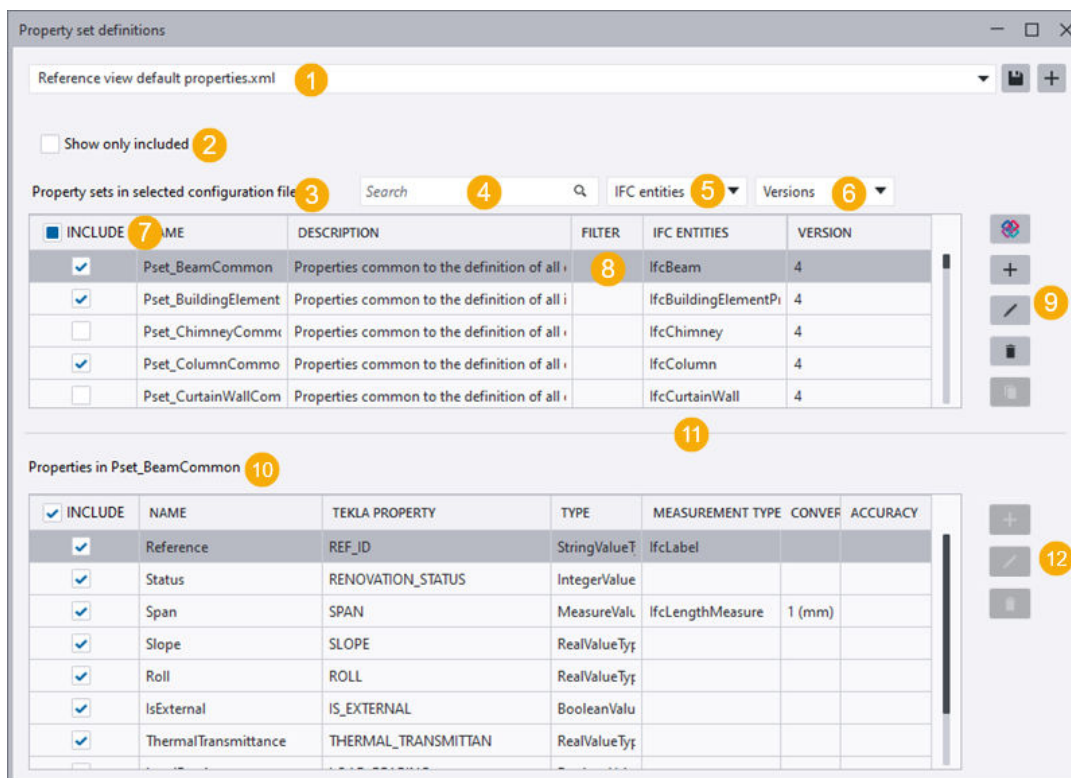
If the IFC export does not give the results that you expect, you can modify the property set definitions in the current IFC property set configuration files.

When Tekla Structures exports an IFC file, it uses the configuration file you selected in the **Property sets** list to export property sets with the exported IFC entities. The list of configuration files includes predefined files located in your environment folders and files stored in the \AdditionalPsets folder under the current model folder.

You can also create a new property set configuration file. For details about creating a custom IFC property set configuration file, see [Create new property sets for IFC export](#).

The **Property set definitions** dialog allows you to add modify the property sets needed in the IFC export. In addition to modifying the current property sets, you can:

- modify properties in a property set
- add buildingSMART property sets
- include or exclude property sets or properties



(1) The name of the selected property set configuration file. In the list, you can see all the available configuration files stored in your environment folders, and select the desired file. The file is loaded automatically after selection.

Use the **Save** button to save the changes in the configuration file after you have added or modified the property sets. You can also give a new name for the configuration file and save it. New and modified configuration files are saved in the `\AdditionalPsets` folder under the current model folder. You can also read configuration files from the following folders:

XS_FIRM

XS_PROJECT

XS_SYSTEM

Use the button to clear the contents of the displayed configuration file and create a new configuration file.

(2) To show in the list only the property sets and properties that you have selected using the **Include** checkbox, select **Show only included**.

(3) Property sets in the current configuration file. You can drag property sets up or down in the list.

(4) Search for a specific property set. The list of property sets might be very long, and the search could be very useful when you want to find and select a specific property set.

(5) Show only the property sets for the selected IFC entities.

(6) Show only the property sets for the selected IFC versions.

(7) To export all property sets and all properties in the list, select the **Include** checkbox on the title row for the property set or properties section. To export only the needed property sets and properties for different export purposes, select the checkbox next to a specific property set or property.

(8) Filters allowing you to further limit for which objects to export the property set. For example, specify a filter to further limit which IfcBeam objects to export the property set for, like for steel beams only.

(9) Command buttons for working with property sets:



Add buildingSMART property sets. The property sets beginning with *Pset_* or *Qto_* are buildingSMART property sets. The buildingSMART property sets are protected, and you cannot change the IFC entities that they are exported with, or edit the names of the properties they contain. However, you can edit the properties in the buildingSMART property sets, and select to include or exclude them.



Add a property set.



Edit the selected property set.



Delete the selected property set.



Duplicate the selected property set. You can then modify the property set so that the properties are the same but the filtering criteria are different, for example.

(10) Properties in the selected property set. You can drag properties up or down in the list.

(11) To enlarge the property set section or the property section, drag the dialog divider up or down.

(12) Command buttons for working with properties:



Add a property in the selected property set.



Edit the selected property.



Delete the selected property from the selected property set.

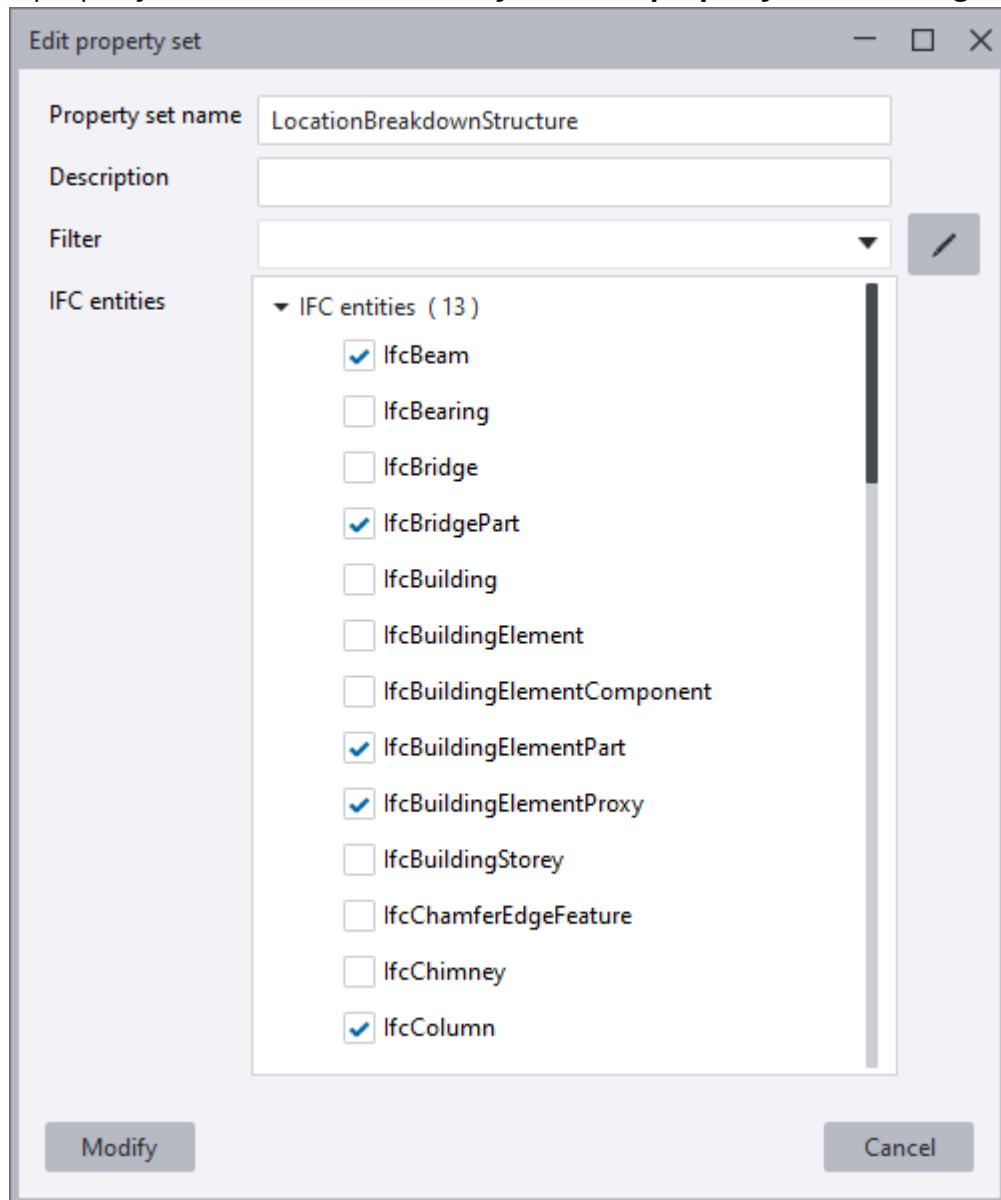
Modify a property set

You can modify the existing property sets.

The buildingSMART property sets (starting with prefixes *Pset_* or *Qto_*) are protected, and you cannot modify those. However, you can modify the

properties included in buildingSMART property sets, see section "Modify properties in a property set" below.

1. On the **File** menu, click **Export --> IFC** or **Export --> IFC4**.
2. Select an existing property set from the **Property sets** list and click the  **Edit** button.
3. In the **Property set definitions** dialog, in the property set section, select a property set and click  **Modify selected property set** on the right.



4. Modify the property set name and description.

The property set name may contain any text, including spaces. Do not start the name with prefixes *Pset_* or *Qto_*, they are reserved for buildingSMART property sets.

5. Modify the included IFC entities: select new entities, or clear the selection of the entities that you do not want to include in the property set.
6. You can use a filter to further limit for which objects to export the property set.

For example, you can specify a filter to further limit which IfcBeam objects to export the property set for, like for steel beams only.

Do one of the following:

- Select an existing filter from the list of filters.
 - To specify a new filter, click the  **Display filter** button. In the **Object group - IFC property export** dialog, create a filter, set **Filter type** to **IFC property export**, and save it.
7. To save the modified property set, click **Modify**.
 8. To save changes in the property set configuration file, click  **Save**.

New and modified configuration files are saved in the \AdditionalPsets folder under the current model folder. You can also read configuration files from the following folders:

XS_FIRM

XS_PROJECT

XS_SYSTEM

For details about adding new property sets in a configuration file, see Create new property sets for IFC export.

Modify properties in a property set

You can modify the properties in an existing property set. You can also modify the properties in the buildingSMART property sets.

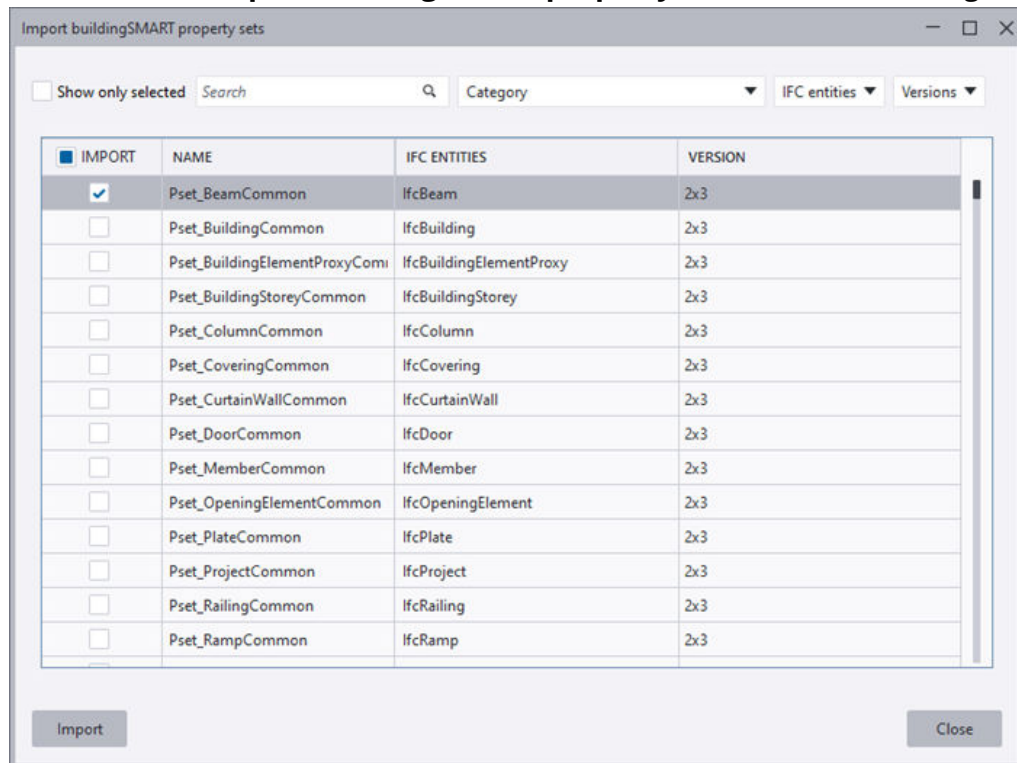
1. Open a property set configuration file in the **Property set definitions** dialog.
2. Select a property set from the property set list, and then select a property from the property list.
3. Click the  **Modify selected property** button.
4. Modify the property. You can change the name of the property and the **Type** of the property. For more information about the types and other properties, see Create new property sets for IFC export.

- Click **Modify**.
- To save the changes in property set configuration file, click  **Save**.

Add a buildingSMART property set

You can add buildingSMART property sets to property set configuration files.

- In the **Property set definitions** dialog, open the property set configuration file where you want to add buildingSMART property sets.
- Click the  **Import buildingSMART property sets** button on the right.



- Select the property sets that you want to add. To do this, select the **Import** checkbox next to the property set. You can search for property sets using the **Search** box. You can also limit the number of the displayed property sets by selecting the desired property set categories, IFC entities, or IFC versions.
- Click **Import**. The selected buildingSMART property sets are added in the property set list. The buildingSMART property sets are protected, and you cannot edit those, but you can exclude the unnecessary buildingSMART property sets from the export, and change and edit the mapped Tekla properties.
- To save the changes in property set configuration file, click  **Save**.

Include or exclude property sets or properties

You can keep a property set or a property in the configuration file, but exclude it from the export.

You can also exclude buildingSMART property sets and properties.

1. On the **File** menu, click **Export --> IFC** or **Export --> IFC4**.
2. Select an existing property set from the **Property sets** list and click the  **Edit** button.
3. Do one of the following:
 - To export all property sets in the list, select the **Include** checkbox on the title row of the property set section.
 - To export all properties for the selected property set, select the **Include** checkbox on the title row of the properties section.
 - To export only the needed property sets, select the checkboxes next to the property sets.

☒	WorkflowAssembly
☒	LocationBreakdownStructureAssembly
☒	CenterOfGravity
☐	StartEndPoints

- To export only the needed properties for the selected property set, select the checkboxes next to the properties.

☒	WIDTH
☒	HEIGHT
☐	CLASS_ATTR

4. To save the changes in property set configuration file, click  **Save**.

Export in IFC format

You can export Tekla Structures model or a part of the model in the IFC format.

Before exporting

- Decide whether you are going to use the export hierarchy from Organizer, export hierarchy defined in the part UDAs, or the export hierarchy defined in project property UDAs. Define the needed export hierarchy. See below for instructions.
- Define the IFC entities for Tekla Structures model objects. See below for instructions.

- [Modify the IFC property sets \(page 223\)](#) if necessary. You can also define new property sets.
- If you export the IFC file using the base point, define the base point.
- To have pour objects and pour units (from Tekla Structures 2018 onwards) in your model, set `XS_ENABLE_POUR_MANAGEMENT` to `TRUE` in the **Advanced options** dialog.
- The advanced option `XS_EXPORT_IFC_REBARSET_INDIVIDUAL_BARS` affects how bars that are created by rebar sets are exported. If the advanced option is set to `FALSE`, bars are exported in groups. If the advanced option is set to `TRUE`, bars are exported as individual bars. The default value is `FALSE`.

NOTE In the IFC file 'Total number' always shows 1 for groups created by rebar sets, and 'Total weight' and 'Weight' show one bar weight. Use the `NUMBER_OF_BARS_IN_GROUP` and `WEIGHT_TOTAL_IN_GROUP` attributes to export the values of the group to the IFC file.

- If you want to export B-rep objects as exact solids in the IFC2x3 export, set the advanced option `XS_EXPORT_BREP_AS_EXACT_SOLID` to `TRUE`. The default value is `FALSE`.

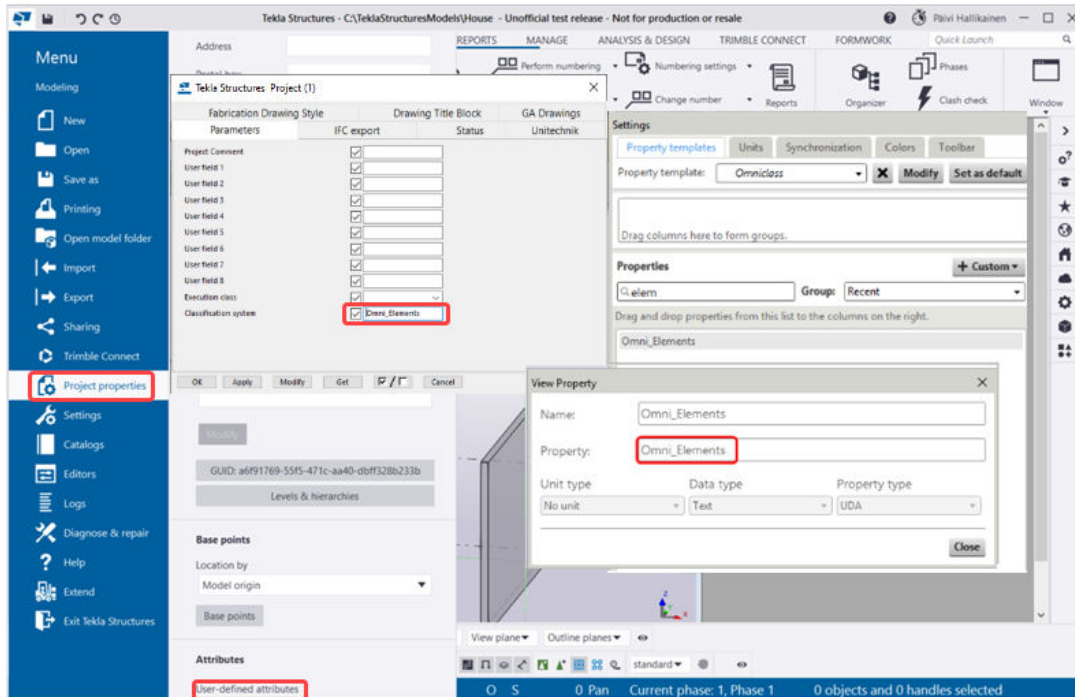
If you export B-reps as exact solids, the IFC file size increases, and the export takes more time.

- To get smooth edges to the export, you may need to set the advanced option `XS_CS_CHAMFER_DIVIDE_ANGLE` to 10.
- Add classification information to assemblies if needed, see instructions below.
- If you are going to export to AutoDesk Revit, see [Tekla Structures Base point for coordination with Autodesk Revit](#).

NOTE For the IFC export of rebar assemblies, use the **File --> Export --> IFC4** command. Rebar assemblies do not work in the IFC2x3 export.

Add classification information to assemblies

In the IFC export you can add classification information to assemblies by entering the name of the classification system in the user-defined attributes in **Project properties**. The classification system is written to the `IFCCLASSIFICATION` field in the export file. You can define the classification values for the assemblies in Organizer or in the UDA dialog of the assemblies. Note that classification information is written to the assembly level only.



Check and modify user-defined attributes of the exported objects

If you do not select **Spatial hierarchy** from **Organizer** in the IFC export settings, the export uses the IFC export hierarchy you define in the part UDAs. You also need to modify the part UDAs to define the load bearing information, and select the IFC export type.

1. Double-click an object, for example a column, to open part properties, and click the **User-defined attributes** button.
2. On the **Structural information** tab, set **Load bearing** to **Bearing**, if you want to define the user-defined attribute `LOAD_BEARING` for the exported object.

Set this option to **No** for all non-load bearing objects. **Bearing** is the default value.

3. Go to the **IFC export** tab, and in the **IFC export type** list, select **Auto** or **B-rep**:
 - The **Auto** option will automatically select what kind of Swept Solid IFC object a Tekla object becomes in the IFC.
 - If **Auto** fails for some reason (such as with a deformation), the export reverts to **B-rep** automatically, and creates a mesh-based IFC object with less intelligence. These objects are data heavy but still geometrically correct.
 - **B-rep** will force the IFC object to be always mesh based.
4. If you are going to use the part-level export hierarchy, define the **IFC building name** and the **IFC building storey name**.

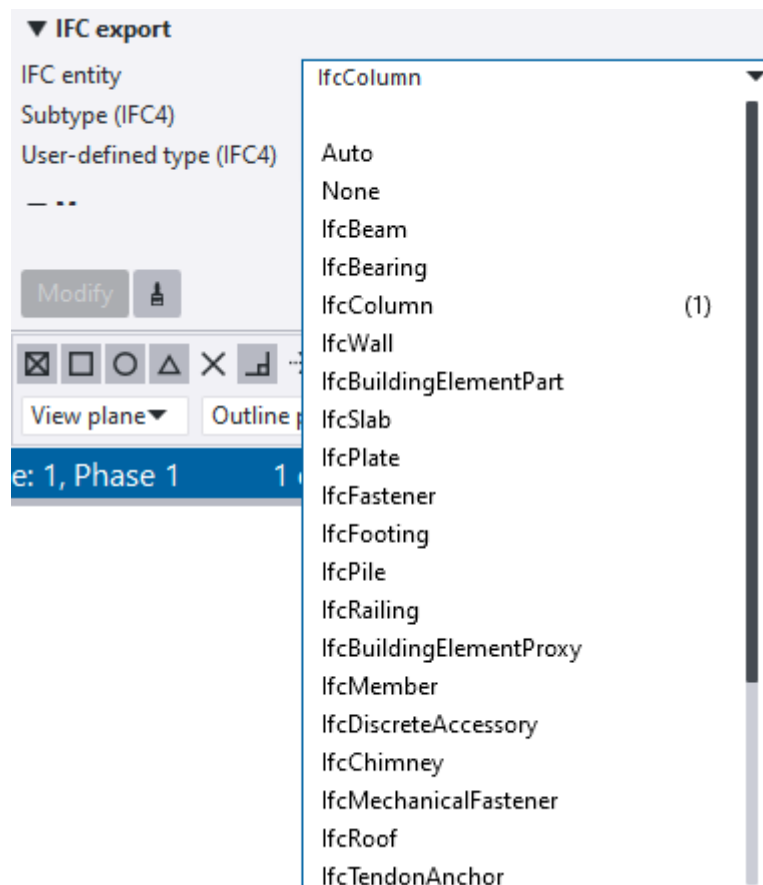
5. Click **Modify** in the user-defined attributes dialog.

Define IFC entities for Tekla Structures model objects

Before you export Tekla Structures model objects to IFC, you need to define the resulting IFC entities for the exported model objects in the object properties.

1. Double-click an object in the model, for example a column, to open part properties.
2. In the **IFC export** section in the property pane, select an option in the **IFC entity** list to define the IFC entity for the exported model object.

The default entity for the object type is selected by default.



3. You can define the IFC entity more precisely by selecting an entity subtype among the predefined subtypes available in the **Subtype (IFC4)** list, or select `USERDEFINED` and then type the desired type in free text in **User-defined type (IFC4)**.

The subtype and user-defined type are only supported in the IFC4 export.

The available subtypes depend on the selected IFC entity.

For example, if you have a native assembly in your Tekla Structures model, you can define that its entity type is `IfcBridgePart`, and select a subtype

among the predefined subtypes available, for example, `PIER`, or select `USERDEFINED` and then type the desired type in free text, for example, `bridge part`.

4. Click **Modify** in the property pane.

Export in IFC2x3 format

1. Select the model objects to export.
If you want to export all model objects, you do not have to select anything.
2. On the **File** menu, click **Export --> IFC**.
3. If there are predefined export settings available, load the predefined export settings from the list at the top and click **Load**.

The predefined export settings files are located in the environment folders.

4. Browse to the **Output file** location and replace the name `outcoord` with the desired file name.

IFC files are by default exported to the `\IFC` folder under the current model folder. The length of the file path is limited to 247 characters. You do not need to enter the file name extension, it will be automatically added according to the selected **File format**.

5. Define the export settings:

Setting	Description
Parameters tab	
File format	The options are IFC , IFC XML , zipped IFC , and zipped IFC XML .
Export type	Select the desired export type. Surface geometry: - If the model is used only for viewing purposes, or as a reference model, Surface geometry is your choice. Surface geometry is ideal when the need is to view the model without any need for re-using or editing: - Reinforcing bars are exported as B-rep (page 204). - Export does not support CSG (page 204) (Constructive Solid Geometry).

Setting	Description
	- Curved elements are exported as B-rep. - Bolts are exported as B-rep. Coordination view 2.0: - The certified Coordination view 2.0 should be your default. - We recommend that you use this export type when the geometry needs to be edited and modified in the receiving application: - Reinforcing bars are exported as extrusions (page 204). - The export uses CSG (Constructive Solid Geometry) for presenting cuts and voids. - Curved elements are exported as extrusions. - Bolts are exported as B-rep. Steel fabrication view: - This export type is designed for the fabrication workflow, and to be provided for manufacturing. Steel fabrication view is recommended for exporting detailed information on steel objects for steel fabrication: - Exports assembly presentation and dedicated property sets. - Bolt holes are exported as voids. - Steel fabrication model view configuration file for property sets and properties (IfcPropertySetConfigurations_AISC.xml) is included in the installation by default. Coordination view 1.0: - This export type is for those who need to export openings as separate objects.

Setting	Description
	- We recommend that you use Coordination view 1.0 instead of Coordination view 2.0 when you need to have voids and openings presented by using opening elements: - Reinforcing bars are exported as extrusions. - Voids and openings are exported as opening elements (ifcOpeningElements). - Curved elements are exported as extrusions. - Bolts are exported as B-rep.
Property sets	The property set default selection changes when you change the Export type. - To use a default property set from your environment, select the property set from the Property sets list. - To modify an existing property set (page 223), select the property set from the list and click Edit. - To define a new property set, select <new> and click Edit.
Export	Select either Selected objects or All objects. If you selected Selected objects, you need to select the objects in the model.
Location by	Model origin exports the model relative to 0,0,0. Work plane exports the model Elevation relative to the current work plane coordinate system. Base point: <name of base point> exports the model relative to the base point using coordinate system values East coordinate, North coordinate, Elevation, Angle to North, Latitude and Longitude from the base point definition. The

Setting	Description
	base point latitude and longitude values have a microsecond accuracy. Note that if the base point has not been defined, it is not displayed in the list.
Advanced tab	
Object types	Select the object types to export. The options are: Assemblies Bolts Welds Pour objects: Select this to export pour objects instead of CIP concrete parts. Note that pour unit export is not supported in IFC2x3. Grid Reinforcing bars Surface treatment and surfaces Spaces If you select Assemblies, you can exclude single part assemblies by selecting Exclude single part assemblies in the Other area. Note the following: • Edge chamfers are omitted from the exported IFC model. This is to enable better interoperability with plant design systems. If the geometry with edge chamfers is needed, you can set the IFC export type to B-rep separately for those objects in the object user-defined attributes dialog on the IFC export tab. • The export does not export what you select if certain object types are selected. For example, if a concrete part is selected and the Reinforcing bars checkbox is selected, all rebars in the concrete part will be exported. It is not possible to select which rebars

Setting	Description
	to export with the part. The workaround is to generate two IFC export files: one with concrete parts only, and one with selected rebars only. To export pour objects, the use the selection switch Select components, Select objects in components, or Select objects in assemblies. Do not use the selection switch Select assemblies, because it tries to export pour units, which are not supported in the IFC2X3 export.
Other	Layer names as part names uses part names, such as COLUMN and BEAM, as layer names for exported objects. If this option is not selected, then layer name will be the object's phase number followed by the phase name. To use a predefined UDA as a layer name, define the UDA for the advanced option XS_IFC_EXPORT_OBJECT_LAYER_FROM_UDA. This option is not available with Steel fabrication view. Export flat wide beams as plates exports flat and wide beams as plates. Select this option if you have modeled plates as beams or columns with flat profiles. For example, some system components use beams or columns instead of plates. Spatial hierarchy from Organizer uses the spatial hierarchy (Building-Site-Section-Floors) created in Organizer in export. Do the following: - Select Spatial hierarchy from Organizer. - Create a project hierarchy in Organizer.

Setting	Description
	c. In Organizer, right-click the project, and select Use for reporting. d. Before the IFC export, synchronize or write the Organizer data in the Tekla Structures model by right-clicking the project in Organizer, and selecting Write to the model for reporting. If you do not select Spatial hierarchy from Organizer, the export uses the IFC export hierarchy defined in the part UDAs. If you have not defined part UDAs, project property UDAs are used. Select Exclude single part assemblies when you export assemblies. Use current view colors exports the objects using the colors defined in object representation, not the class colors. The defined transparency settings are also exported. This option is not available with Steel fabrication view.

6. If you want to save the modified export settings in a new file, give the settings file a new name and click **Save as**. The new settings are saved in the \attributes folder under the model folder.

7. Click **Export**.

The model objects are exported. The export progress is shown in the Tekla Structures progress dialog, and the export status is indicated on the Tekla Structures status bar.

Export in IFC4 format

You can export a Tekla Structures model or a part of the model in the IFC4 format.

1. Select the model objects to export.

If you want to export all model objects, you do not have to select any objects.

2. On the **File** menu, click **Export --> IFC4**.

3. If there are predefined export settings available, load the predefined export settings from the list at the top and click **Load**. The predefined export settings files are located in the environment folders.
4. In the **File name** box, enter the file name without a file name extension. The extension will be automatically added according to the selected **Format**. The length is not limited.
5. Browse for the **Folder** location.
IFC files are by default exported to the \IFC folder under the current model folder.
Both absolute and relative paths can be defined.
6. In **Selection**, select whether you want to export **All objects** or **Selected objects**. If you choose **Selected objects**, you need to select **Spatial hierarchy from Organizer**.
7. Define other export settings:

Setting	Description
Location by	Model origin exports the model relative to 0,0,0. Work plane exports the model relative to the current work plane coordinate system. Base point: <name of base point> exports the model relative to the base point using coordinate system values East coordinate, North coordinate, Elevation, Angle to North, Latitude and Longitude from the base point definition.
Object color	Select whether you want to export objects using object class colors or object group colors. If you select object group colors, the defined transparency settings are also exported.
Layer names as	You can use phases, part names, or template attributes as layer names for exported objects. Select Name or Phase from the list, or type the attribute name in the box. Note that you cannot use user-defined attributes as the layer name.
Format	The options are IFC and IfcZip .

Setting	Description
Export type	Select the desired export type. Reference view (IFC4): • This export type is intended to support the referencing workflow, and exported files can be used as reference files, and viewed in a viewer. • The Reference view (IFC4) is not meant to be used for conversion to native objects. • The overall goal of the Reference view (IFC4) is to provide workflows for various software applications that do not require modifying geometry. Such applications enable viewing, estimating, building, operating, and other downstream analysis. Design transfer view (IFC4): • This export type is intended for the handover workflow, meaning import for further editing. • This requires the conversion of the IFC entities into native objects, and the IFC object conversion (page 207) can be used to convert the IFC entities to Tekla Structures native objects. Typically import and conversion are only needed a couple of times, or even once only. The result may require some rework to accomplish a proper model. • One example is the takeover of the structural engineering model (or part of it) into the basis of the structural detail modeling. Bridge view (IFC4.3): • The main purpose of the Bridge view export is to extend Tekla Structures to bridge constructions.

Setting	Description
	- The bridge IFC files are based on the IFC4.3 schema. IFC4precast view: - This export type supports the fabrication data transfer workflow of precast elements. At this phase it covers the fabrication of precast walls and slabs including all the needed reinforcement and embeds. - This export type is available only in precast roles. For more information about IFC4precast, see IFC4precast.
Base point export	Select which system to use when you have defined a base point for Location by to ensure that the collaboration works with other parties in the project. The options are: IfcMapConversion: Converts model's local coordinate system into the global coordinate system. This option is needed, when the IFC4 format that complies to the IFC4 schema is required. IfcSite coordinate system: Converts coordinates in the IFC model for each object separately. This option can be used to produce an IFC4 file that you can view in most IFC viewers, including Trimble Connect. The same conversion method is also used in the IFC2x3 export.
Property sets	The property set selection changes when you change the Export type. - To use a default property set, select the property set from the Property sets list. - To modify an existing property set (page 223), select the property set from the list and click .

Setting	Description
	To define a new property set, select <new> and click .
Cast-in-place export	Allows you to select more precisely what to include in the cast-in-place export. The options are Pour units or pour objects and CIP cast units or parts .
Export flat wide beams as plates	Select this option if you want to export flat and wide beams as plates. Select this option if you have modeled plates as beams or columns with flat profiles. For example, some system components use beams or columns instead of plates.
Spatial hierarchy from Organizer	Spatial hierarchy from Organizer uses the spatial hierarchy (Building-Site-Section-Floors) created in Organizer in export. Do the following: - Select Spatial hierarchy from Organizer. - Create a project hierarchy in Organizer. - In Organizer, right-click the project, and select Use for reporting. - Before the IFC export, synchronize or write the Organizer data in the Tekla Structures model by right-clicking the project in Organizer, and selecting Write to the model for reporting. Note that the selected objects are only exported when Spatial hierarchy from Organizer has been selected. If you do not select Spatial hierarchy from Organizer, the export uses the IFC export hierarchy defined in the part UDAs. If you have not defined

Setting	Description
	part UDAs, project property UDAs are used. Also note that in bridge models the export always uses the hierarchy defined in project property UDAs.
Object types	Select the object types to export: Assemblies Bolts Grids Reinforcing bars Surface treatment and surfaces Spaces • Edge chamfers are omitted from the exported IFC model. This is to enable better interoperability with plant design systems. If the geometry with edge chamfers is needed, you can set the IFC export type to B-rep separately for those objects in the object user-defined attributes dialog on the IFC export tab. • The export does not export what you select if certain object types are selected. For example, if a concrete part is selected and the Reinforcing bars checkbox is selected, all rebars in the concrete part will be exported. It is not possible to select which rebars to export with the part. The workaround is to generate two IFC export files: one with concrete parts only, and one with selected rebars only.

8. If you want to save the modified export settings in a new file, give the settings file a new name and click **Save as**. The new settings are saved in the \attributes folder under the model folder.

9. Click **Export**.

After a successful export, a message box is displayed. In this message box you can open the folder where the exported IFC model is stored, or view the log

file in a browser. The log file gives detailed information of the export process, exported entities, and the errors occurred during the export.

Limitations in IFC4 export

- The IFC4 export always contains the full assembly. If the part **IFC entity** is set to **None** in the part properties, the part and its bolts are not included in the export.
- The user interface does not provide all the features included in the IFC2x3 export user interface.
- The **Reference view** is intended to be used for design coordination and for referencing workflow.

Check the exported IFC model

We recommend that you test the reference model after creating it.

To check the [exported IFC model \(page 229\)](#), insert the model as reference model to the original Tekla Structures model.

Check the following things:

- Check the IFC model visually. Use different colors for the IFC model and the original model. Use clip planes to check the model thoroughly.
- Compare the number of objects. If there are differences, check the export log.
- Check the modeling of unsuccessfully exported objects. For example, unnecessary cuts may result in unsuccessful export. Consider remodeling the incorrect objects or set **IFC export type** to **Brep** for the objects.

TIP You can also use [Trimble Connector \(page 131\)](#) for viewing and checking the IFC model.

3.3 TrimBIM

TrimBIM (.trb) file is a lightweight file format to store and exchange BIM data between different Trimble applications and other BIM tools.

In Tekla Structures, you can export the entire model or the selected model objects as a .trb file directly from Tekla Structures, and select which IFC property sets are included in the .trb file. The .trb file is always exported locally, and you can then upload the file to a selected Trimble Connect project, leaving the local file to the location where it was originally exported to.

You can use the same IFC property sets for the TrimBIM export as when exporting IFC, .trb, or .tekla file. Use the **Property set definitions** dialog to add and modify the property sets.

Export a TrimBIM file from Tekla Structures

1. In a Tekla Structures model, select the model objects to export.
If you want to export all model objects, you do not need to select any objects.
2. On the **File** menu, click **Export --> TrimBIM**.
You can also start the export from the **Quick Launch**.

Export TrimBIM

standard*

File name: MyModel

Folder: .\TrimBIM\

Location by: Model origin

Selection: All objects

Object color: By object class

Property sets: <new>

▼ Trimble Connect

Project: Project 22

Trimble Connect folder: \

▼ Object types ⓘ

- ☒ Assemblies
- ☒ Bolts
- ☒ Welds
- ☒ Grids
- ☐ Reinforcing bars
- ☒ Surface treatments and surfaces
- ☐ Spaces

Export

Export and upload to Trimble Connect

3. Define the export settings.

Setting	Description
File name	Enter the desired file name, without the file name extension.
Folder	Browse for the folder location where you want to save the file. By default, the .trb files are exported to the \TrimBIM\ folder under the current model folder.
Location by	• Model origin exports the model relative to 0,0,0. • Work plane exports the model Elevation relative to the current work plane coordinate system. • If you have defined a base point, you can use the Base point option. Base point: <name of base point> exports the model relative to the base point using coordinate system values East coordinate, North coordinate, Elevation, Angle to North, Latitude and Longitude from the base point definition. The base point latitude and longitude values have a microsecond accuracy. Note that if the base point has not been defined, it is not displayed in the list.
Selection	Select either All objects or Selected objects . If you selected Selected objects , you need to select the objects in the model.
Object color	Select whether you want to export objects using object class colors or object group colors. If you select object group colors, the defined transparency settings are also exported.
Property sets	• To use a default property set from your environment, select the property set from the Property sets list. • To modify an existing property set (page 223), select the property set from the list and click . • To define a new property set, select <new> and click .
Project	Select the Trimble Connect project where you want to upload the .trb file.

Setting	Description
Trimble Connect folder	Select the folder path in the Trimble Connect project where you want to store the uploaded .trb file.
Object types	Select the object types to export: Assemblies If you select Assemblies, steel parts are exported as assemblies, otherwise steel parts are exported as single objects. Bolts Grids Reinforcing bars Surface treatment and surfaces Spaces

4. To export the .trb file:
 - Click **Export** to export the .trb file to the local folder.
 - Click **Export and upload to Trimble Connect** to export the .trb file to the local folder and to upload it to the selected Trimble Connect project. The local file remains in the original export location.

Create and modify property sets for TrimBIM export

You can use the same IFC property sets for the TrimBIM export as when exporting IFC files. The **Property set definitions** dialog allows you to add and modify the property sets needed in the export. Once you have created the property set settings, you can use them with the export you prefer (IFC, .trb, or .tekla files).

You can create property sets from template attributes and user-defined attributes, define properties for the attributes, and bind the Tekla Structures property sets to IFC entities. You can save the property sets in property set configuration files. The list of configuration files includes predefined files located in your environment folders \common\collaboration\ifc and files stored in the \AdditionalPsets folder under the current model folder.

If the default IFC property sets in your environment work for you, you can use them and you do not need to create any custom property sets. However, if you are not satisfied with the existing property sets, you can modify the property set definitions or create a new property set configuration file.

To modify existing property sets, see [Modify property sets for IFC export \(page 223\)](#).

3.4 DWG and DXF

DWG is the native file format of AutoCAD and the standard file format for Autodesk products. DWG is used for 2D and 3D CAD data that is supported by Tekla Structures.

Drawing eXchange Format (DXF) was developed by Autodesk for enabling data interoperability between AutoCAD and other programs. As the file format does not contain any form of part ID it is not possible to track changes between different physical objects contained within different versions of a file. Clash checking is not possible with a DXF file in Tekla Structures.

The DWG and DXF files imported with the DWG/DXF tool do not show the surfaces of the imported objects, only the construction lines or lines converted to part profiles that can be used to create a model. If you want to show surfaces of the objects, [insert DWG and DXF files as reference models \(page 175\)](#).

In DWG/DXF import, Tekla Structures supports ACAD2023 or earlier.

To determine the AutoCAD version of the DWG file, open the file in a text editor. You will find the version code in the first six bytes:

AC1032 = 2018, 2019, 2020, 2021, 2022, 2023

AC1027 = 2013, 2014, 2015, 2016, 2017

AC1024 = 2010, 2011, 2012

AC1021 = 2007, 2008, 2009

AC1018 = 2004, 2005, 2006

AC1015 = 2002, 2000i, 2000

AC1014 = 14

AC1012 = 13

AC1009 = 12, 11

AC1006 = 10

AC1004 = 9

AC1002 = 2

Click the links below to find out more:

[Import 2D or 3D DWG or DXF files \(page 249\)](#)

[Export in 3D DWG or DXF format \(page 250\)](#)

[Export a drawing in 2D DWG, DXF, or DGN format \(page 253\)](#)

[Export a drawing to a 2D DWG or DXF file \(old export\) \(page 265\)](#)

Link DWG or DXF files in drawings

You can also add links to DWG or DXF files in drawings through the 2D Library or by using the drawing ribbon command DWG/DXF.

Import 2D or 3D DWG or DXF files

In DWG/DXF import, you can convert 2D and 3D objects as parts or reference lines (construction lines).

1. On the **File** menu, click **Import --> DWG/DXF**.
2. Enter the name of the import file.
Click **Browse...** to browse for the file.
3. Enter the offset from X, Y and Z.
4. Enter the scale.
5. Select how to show the imported parts:
 - **Reference lines** displays parts in the model as construction lines.
 - **Parts** displays the full profile of parts in the original model, based on the profile sizes defined in the **Plate profile** and **Beam profile** boxes. You can only use metric profiles with this option.
6. Select **Use 2D import** to import a two-dimensional representation of the original object.
This is useful when have selected the **Reference lines** option. Do not select **Use 2D import** if you want to import the model in 3D.
7. Click **Import**.

Tekla Structures imports the file you specified. If you need to delete the imported parts or reference lines, select the parts or lines and press **Delete**.

Limitations

When importing DWG profiles, note the following:

- The profile must be the only object in the DWG file. The file should not include any titles, blocks or any other graphics.
- The profile must be a closed polyline.
- Generating the polylines from an ADSK 3D model requires a number of steps to clean the profile.
- The profile needs to be scaled up.
- The DWG/DXF files imported with the DWG/DXF tool do not show the surfaces of the imported objects, only the construction lines or lines converted to part profiles that can be used to create a model. If you want

to show surfaces of the objects, [insert DWG and DXF files as reference models \(page 175\)](#).

- The import functionality is not available in all Tekla Structures configurations.

Export in 3D DWG or DXF format

You can export the whole Tekla Structures model or the selected model parts as 3D DWG or DXF. You can use either the older export to export as 3D DWG or DXF, or the newer export to export as 3D DWG.

Export 3D DWG files

- Tekla Structures uses the Open Design Alliance (ODA) toolkit to export 3D DWG format.
- The surface presentation of the parts is exported. Bolt holes are not included in the export.
- You can export objects relative to the model origin, to the base point you define, or to the work plane.
- You can export in layers by name, phase or any template attribute or user-defined attribute.
- Colors can be exported by class or by stored object group representation.
- You can export all objects or selected objects. You can use the **Select objects in assemblies** and **Select objects in components** selection switches for selecting the objects to export. You can export selected parts in an assembly when you use the **Select objects** option and **Select objects in assemblies** and **Select objects in components** when you select the parts. If you do not select a part but an assembly, the highest level of assembly parts will be included in the export.
- Bolt holes are not exported.
- Grids are not exported. For a workaround for exporting the grids, see the support article [Export 3D DWG/DXF grids](#).

Create object group color representations

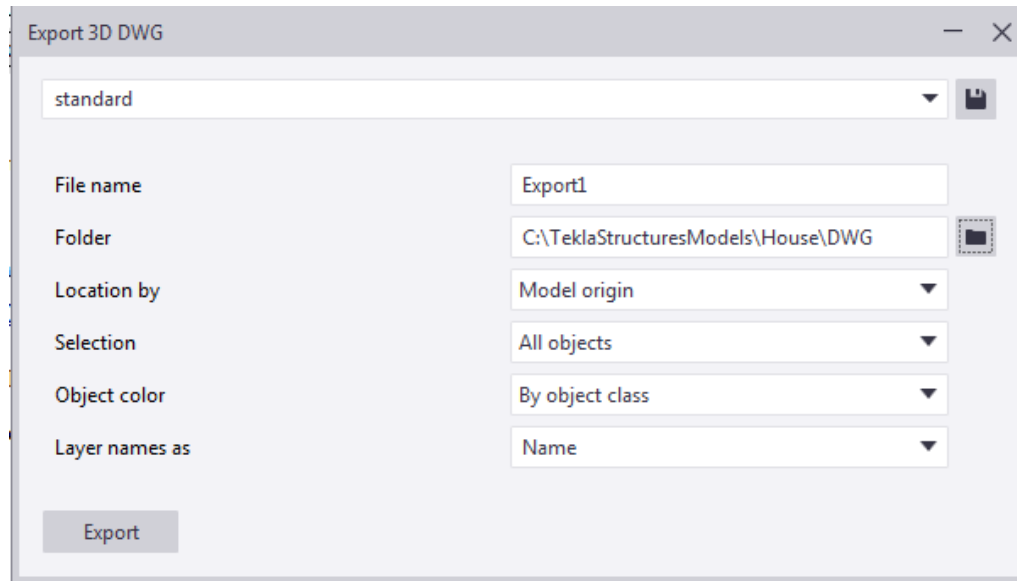
If you want to use object group color representations in the export, you need to create the object groups first, set the colors for the object groups and save the representation settings. Note that the transparency setting is also included in the export.

Create base points

If you want to export objects relative to a base point, you need to create a base point in your model.

1. Open a Tekla Structures model.

2. On the **File** menu, click **Export --> 3D DWG**.



3. In the **File name** box, enter the name of the export file.
4. In the **Folder** box, enter the export folder path, or browse to the folder.
5. In **Location by**, select one of the following:
 - **Model origin** exports the model relative to 0,0,0.
 - **Work plane** exports the model relative to the current work plane coordinate system.
 - **Base point** <name of base point> exports the model relative to the base point using coordinate system values **East coordinate, North coordinate, Elevation, Angle to North, Latitude** and **Longitude** from the base point definition.
6. In the **Selection** list, select **All objects**, or **Selected objects**. If you want to export selected objects, select the objects with the appropriate selection switches:
 - If you activate the **Select parts** and **Select objects in components** selection switches, all the selected parts will be exported.
 - If you activate the assembly or component selection, nothing will be exported.
7. In **Object color**, select whether you want to export objects using object class colors or object group colors.
8. In **Layer names as**, select **Name** or **Phase** from the list, or type the template or user-defined attribute name in the box. You can use phases, part names, or template attributes or user-defined attributes as layer names for exported objects.

9. When you are done, click **Export** to export the objects according to the defined settings.

Tekla Structures creates the <name>.dwg file in the specified folder.

Tekla Structures exports the 3D objects as polyface mesh objects. There is a workaround available in AutoCAD for converting polyface mesh objects to 3D solids. For more information, see the support article [How can I export Tekla Structures 3D objects as 3D solids to AutoCAD 3D DWG format.](#)

Export 3D DWG or DXF files (old export)

You can export the whole model or model parts as 3D DWG or 3D DXF files. By default, Tekla Structures creates a model.dwg file in the current model folder. You can export parts, items and bolts as 3D DWG or DXF.

Limitations

The old 3D DWG and DXF export has the following limitations:

- Bolt holes are not exported.
- Curved beams and polybeams are exported as single, continuous beams.
- The number of segments in the curved beams is as defined for the particular curved beam.
- Reinforcing bars are not exported.
- Grids are not exported.

TIP You can define the color settings for parts and other model objects. This way you can affect the color that the objects have in the exported DWG/DXF files.

1. Open a Tekla Structures model.
2. On the **File** menu, click **Export --> 3D DWG/DXF**.
3. In the **Export 3D DWG/DXF** dialog, accept the default export file name, or enter another one.

To replace an already existing export file, click the ... button and browse for the file.

4. Select whether to export as DWG or DXF.
5. In **Export as**, select the representation for the exported objects:

- **Faces** exports parts as faces.

Exporting 3D DWG or DXF files as **Faces** uses more memory and may take longer, but the end result is better.

- **Lines** exports parts as lines located in the center of the profile cross sections. This option suits well for exporting to analysis software.

- **Center lines** exports parts as part center lines.
- **Reference lines** exports parts as reference lines, drawn between the creation points. This option suits well for exporting to analysis software.

If the model is large, or you have less memory to use, the **Reference lines** option is faster, and the resulting file size is smaller.

6. Select **Part accuracy**:

- The options are **High** and **Normal**. **High** also exports chamfers in profile cross-sections.

7. Select **Bolt accuracy**:

- **High** exports entire bolt assemblies, including washers.
- **Normal** only exports the bolt and nut.
- **No bolts** exports no bolts.

8. Select whether to include **Cuts** in the export.

Yes exports cuts.

9. Select whether to include **Inner contours**

Yes includes the inner contours.

10. In the **Export** list, select what to export:

- **All objects** exports the whole model.
- **Selected objects** exports the parts selected from the model.

To only select parts that you want to include in the export, activate the **Select parts** and **Select objects in components** selection switches. You can also create a selection filter that exports all the parts and objects that you want. Components cannot be imported as such, but you need to select the objects in components to export the included parts.

11. Click **Create**.

Tekla Structures creates the export file in the current model folder. The ID of each part is exported as an attribute and written into the export file for each part.

3.5 Export a drawing in 2D DWG, DXF, or DGN format

You can export Tekla Structures drawings in the 2D DWG, DXF, and DGN v8 format. You can export several drawings at a time.

The drawing export is object based. For example, if you export a rectangular part that is drawn using hidden line types, the result is a rectangular object drawn with a dashed line. In the old line-based DWG export, the result would

be many separate short straight lines. Hatches are also exported as hatch objects in CAD and not separate lines.

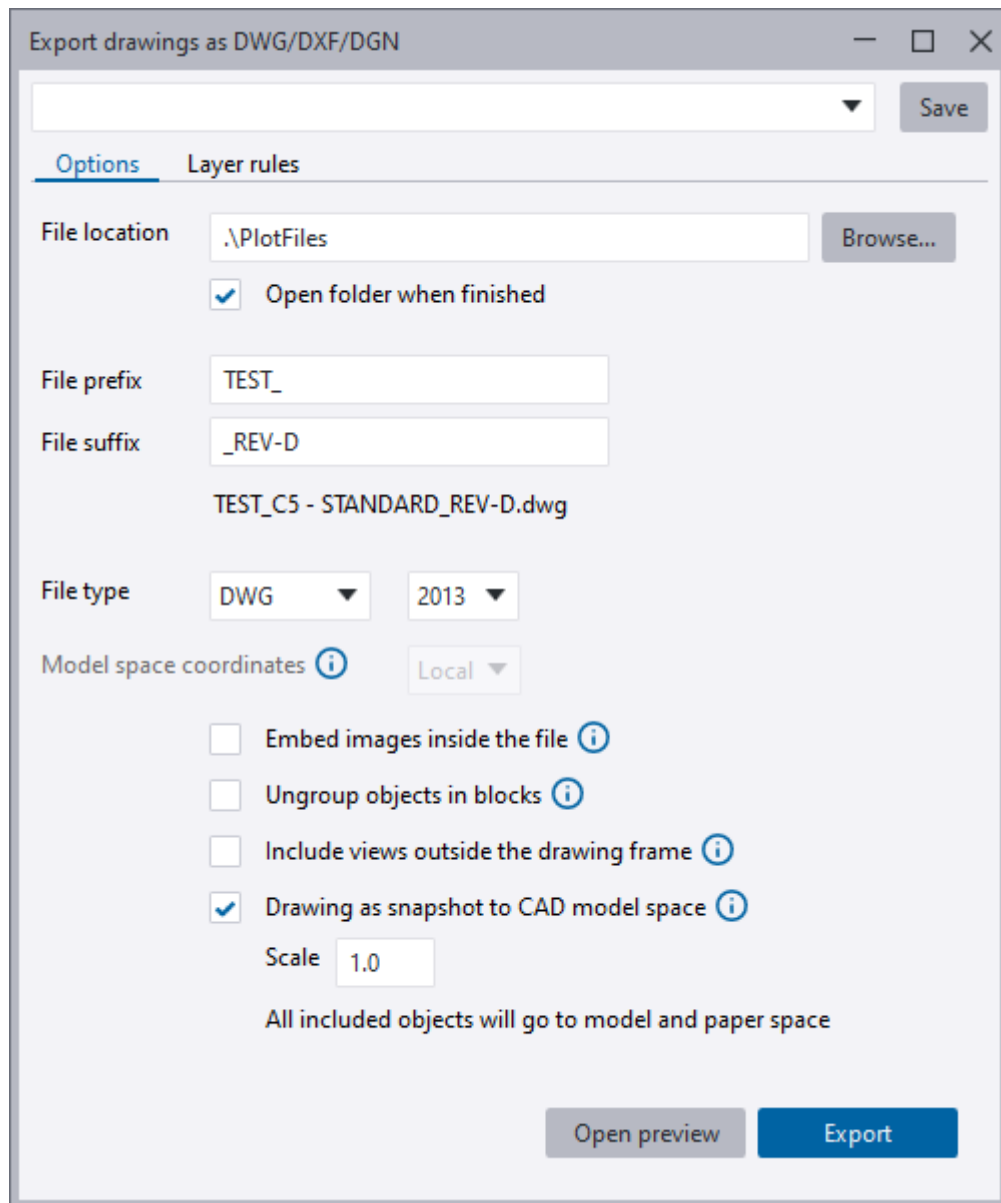
In the drawing DWG/DXF/DGN export you can:

- easily set export layers or levels for different objects, and separate mark frames from mark text and leader lines, for example
- use filters to separate parts from other parts
- use export layers or levels that have been predefined by standard CAD layer/level settings
- use base points and model coordinates
- embed images in the export file so that the images are no longer exported as links

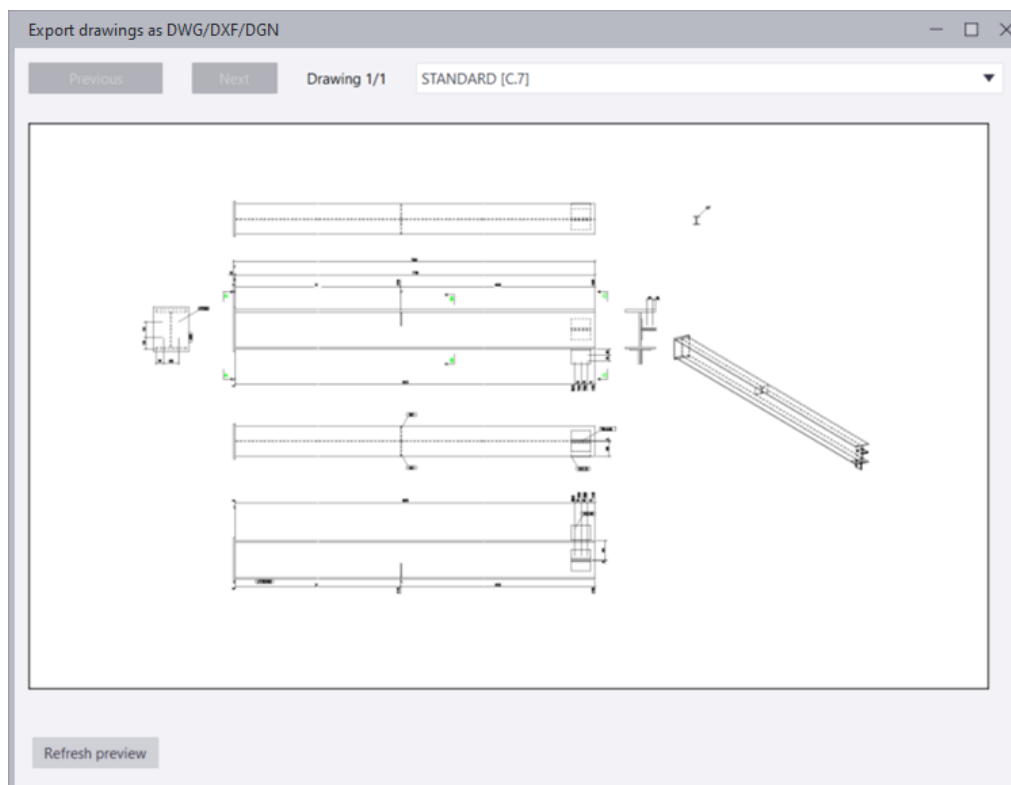
The drawing export does not use font conversion, and the resulting fonts match exactly the fonts that you have defined and see in the Tekla Structures drawing. With the advanced option `XS_DRAWINGS_USE_CAP_HEIGHT_FOR_FONT_HEIGHT` you can control which font height system to use in drawings, CAP font height or em font height.

Define export settings and export DWG, DXF, or DGN files

1. Start the export in any of the following ways:
 - On the **File** menu, click **Export** --> **Drawings**, and select the drawings from the displayed **Document manager** list.
 - Click **Drawings & reports** --> **Document manager**, select the drawings that you want to export from the **Document manager** list, right-click and select **Export**, or click the  **Export** button at the bottom. The **Export** command is not available when you open the **Document manager** in the drawing mode.
 - In an open a drawing, on the **File** menu, click **Export drawings**.



2. Click **Open preview** to show the preview window, where you can also change the displayed drawing if you have selected many drawings for export. To get the preview visible for the first time, click **Refresh preview**. You can refresh the preview again by clicking **Refresh preview**. The preview does not get refreshed automatically, because this could take a long time.



3. In the **Save** list, load previously saved or predefined export settings. If you want to save the modified settings for future use with another name, enter a name for the new settings file and click **Save**.
4. In **File location**, define the location for the exported files.
The default location for the exported files is the current model folder. The default folder can also be controlled by the XS_DRAWING_PLOT_FILE_DIRECTORY advanced option. You can define a relative file location by adding .\ in front of the output folder name. The specified output folder is saved in the settings. Selecting **Open folder when finished** opens the export folder after the export.
5. In the **File type** list, select **DWG, DXF, or DGN (V8)**.
6. For the DWG and DXF exports, select the version to be used in export. There are several versions of AutoCAD or DXF formats available for the DWG or DXF export, and 2010 is the default. You cannot select a specific version for the DGN export.
7. Define other settings on the **Options** tab as necessary:

File prefix File suffix	Enter a specific prefix or suffix to be used in the file name. The preview of the file name will change accordingly. The drawing export supports the following drawing-type-specific advanced options, which you can use to modify the name of the exported file:

	XS_DRAWING_PLOT_FILE_NAME_A XS_DRAWING_PLOT_FILE_NAME_C XS_DRAWING_PLOT_FILE_NAME_G XS_DRAWING_PLOT_FILE_NAME_M XS_DRAWING_PLOT_FILE_NAME_W
Model space coordinates	The coordinate system determines how the drawing views are exported in the CAD coordinate system. Select one of the following options: • Local: Exports the drawing to the null point in the CAD coordinate system. This option uses the left bottom corner of the 1st view frame to set the local coordinates. If the frame is expanded, the local will move. • Model: Matches Tekla Structures null point with CAD null point and rotates the CAD coordinate system accordingly in X and Y coordinates. Z coordinates are not supported. • Base point: <name_of_base_point>: Matches the selected base point with CAD null point, and rotates the CAD coordinate system accordingly. The base points are defined in the Tekla Structures model through File --> Project properties --> Base points. Z coordinates are not supported. NOTE: Base points work only in plan views in general arrangement drawings. If you want to place objects in the model space in the X, Y, Z coordinates so that they fully match the location of the model objects, set the advanced option XS_DWG_EXPORT_3D_MODEL_COORDINATES to TRUE.
Update Tekla Structures linework only	Update the Tekla Structures drawing content and keep other content that is created in a CAD software intact in the same file. Blocks (groups or cells), created by Tekla Structures will be updated. This setting is only shown if you have set the advanced option XS_DWG_EXPORT_UPDATE_TS_LINEWORK_OPTION to TRUE. To use this setting, you need to have the same drawing exported already, and the layer/level setup and the template must be the same as during the

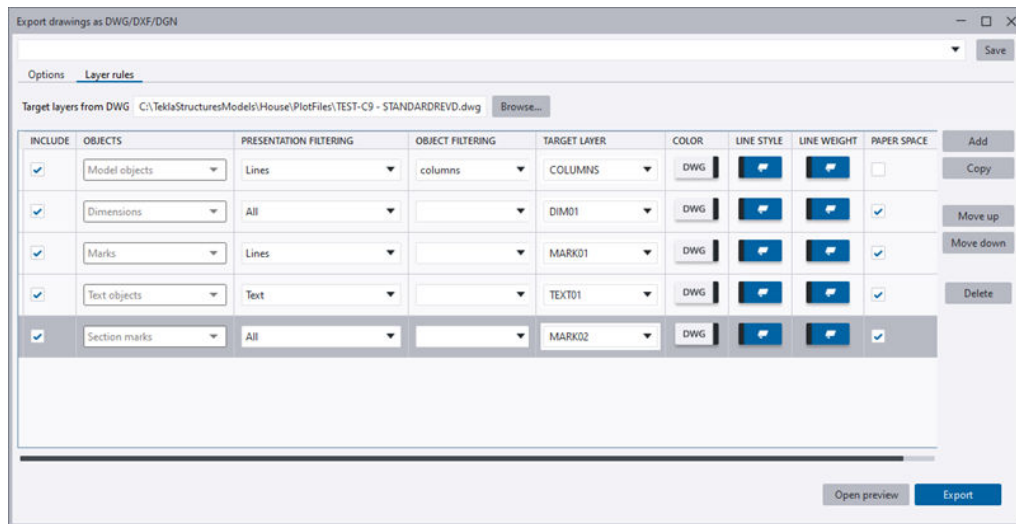
	previous export. All CAD lines that were added previously will stay in the file and only Tekla Structures content will get updated, unless editing was done in a CAD blocks editor. If you edit the content of a block (CAD object), and then select the Update Tekla Structures linework only option, the whole block will be re-written, and the changes made in CAD will not be kept. To keep the changes in CAD, you need to explode a block before editing it. For example, you may want to use this setting if you have added drawing title blocks in the CAD file after the first export of the drawing from Tekla Structures, and want to keep these title blocks as they are, and update only the objects that exported from Tekla Structures.
Embed images inside the file	Embed all images inside the export file. No separate image files are created in the export.
Ungroup objects in blocks (DWG, DXF) Ungroup objects in shared cells (DGN)	Export graphical objects as individual objects instead of blocks or shared cells. For example, a line, hatch and rectangle will be exported as a line object, hatch object and rectangle object, rather than blocks or shared cells. When this option is selected, the option Update Tekla Structures linework only is disabled.
Include views outside the drawing frame	Select whether to include in the export the drawing views that are located outside the drawing area. If you select this checkbox, the views that are outside the drawing area are included in the export. If you do not select this checkbox, the export excludes the drawing views that are outside the drawing area. By default, the checkbox is not selected. The views that are partially inside the drawing area are always exported by default. When the Include views outside the drawing frame checkbox is selected, the export preview is enlarged to show all included views.
Drawing as snapshot to CAD model space	Export the Tekla Structures drawing in scale to model space to a CAD file. When Drawing as snapshot to CAD model space is used, the model, global, and basepoint coordinates, and the paper

	space/coordinate space switch in the layer/level settings will be ignored. If the drawing has linked or copied views, and you have not selected Drawing as snapshot to CAD model space, the drawing views may be placed on top of each other, and the view limits may not be accurate in the resulting file. This is because drawing views are not conceptually the same as paper space viewports in the DWG, DXF or DGN format. If you have shortened views in the drawing, and the objects are placed in 1:1 scale, the ends will be stretched to match the actual size of the part. Select Drawing as snapshot to CAD model space to avoid stretching of the shortened view in a CAD model space. The drawing space in a CAD software will keep the view shortening.
Scale	Define the scale for the exported DWG, DXF, or DGN. This option is only available if you have selected the Drawing as snapshot to CAD model space checkbox. For example, if you have a drawing between the coordinates 0,0 and 800, and you define a scale value 5, the resulting DWG is 5 times bigger, and the DWG is located between the coordinates 0,0 and 4000. In another example, if you have set the drawing view scale in Tekla Structures to 1:50, and wish to export the drawing in 1:1 scale, using 50 as the scale value will produce the desired result. If you have set the advanced option XS_EXPORT_DRAWING_TRY_TO_KEEP_LOCATION to TRUE, Tekla Structures tries to keep the DWG, DXF, or DGN origin in the same position as the drawing view origin. This can only be done in plan views and elevation views. If the drawing has more than one plan view or elevation view, Tekla Structures places the DWG, DXF, or DGN origin in the bottom-left corner of the drawing frame. For more information about defining the export scale, see "Drawing export scale factor for DWG/ DXF".

8. On the **Layer rules** (DWG, DXF) or **Level rules** (DGN) tab, you can define explicitly the layers or levels where different model and drawing objects,

or parts of objects are exported to. For example, you can export outlines to a different layer or level than fills and hatches.

You can also define whether the line color, style, and weight will be used from Tekla Structures settings or from the target layer or level settings specified in a DWG, DXF, or DGN file. If you select Tekla Structures settings, Tekla Structures line color, style, and weight stay exactly as you see them in the Tekla Structures drawing, and there is no functionality to modify them just for the drawing export.



9. To use a template, use the **Target layers from DWG** (DWG, DXF) or **Target levels from DGN** (DGN) list to browse for the template file. If specified, the template is used for layer or level definition. The template should not contain any CAD objects, just layer or level settings, unless it contains objects that are intended to appear on drawings exported using this template. For example, for the DWG export, you could use your standard DWG file with all the predefined layers. The DGN export uses seed files as templates in the export. A seed file is a blank design file with the appropriate settings.

You can enter .\ and then the file name, in which case Tekla Structures searches for the file first in the model, project and firm folders, then in the folder indicated by the advanced option `XS_DRIVER`, then in the system folder, and finally in the user settings folder.

An error message is displayed next to the **Browse...** button until the template is found and loaded.

The target layer or level boxes are briefly colored in yellow when a new template file is loaded. When there are no layers or levels available in the template file, the boxes are colored in red.

10. Add the rules:

- To add a new rule, click the **Add** button on the right, or copy the selected rule by clicking the **Copy** button.

- To move the rules upwards or downwards in the set, click the **Move up** and **Move down** buttons. You can select multiple rules.
- To delete a rule, select it and click **Delete**. You can delete multiple rules at a time.

11. Define the rule contents:

Objects	Select the objects that you want to export. Some objects, like neighbor part marks, are currently under marks and not listed separately. To have them separated in the export, you need to use Object filtering, and create several mark rules for parts and neighbor parts. To include everything else that is missing from the Objects list, add an All object rule at the end of the rules list, because rules are read in the order they are listed. To export pours, you need to enable the pours in the model by setting the advanced option XS_ENABLE_POUR_MANAGEMENT to TRUE.
Presentation filtering	Define which part of the objects should follow the rule. You can also select All. The Presentation filtering options are different for different object types. You cannot add more than one filter per rule. For example, to have mark frames separated from mark text, you need to create two rules for marks, and in the first one, set the Presentation filtering to Text, and in the other one to Frames. See the section "DWG layer rule example" below for an example.

Object filtering	Read the selection filter attribute files that have been defined in the current model. The filter attribute files are only read from the current model folder, not from the firm or project folders.
Target layer (DWG, DXF) Target level (DGN)	If you have no templates, or want to create layers or levels of your own, type a new layer or level name in the Target layer or Target level box, or select a previously used layer or level from the list. After you have added a template, its layers or levels will appear in the Target layer or Target level list. The target layer or level boxes are briefly colored in yellow when a new template file is loaded. When there are no layers or levels available in the template, the boxes are colored in red.
Color Line style Line weight	Define whether the linework is taken from Tekla Structures settings or from the template.
Paper space (DWG, DXF) Coordinate space (DGN)	To draw drawing objects correctly in the paper space (DWG, DXF) or coordinate space (DGN) in the exported file (and not through the view portal), select the Paper space or Coordinate space checkbox. If this checkbox is not selected, there will only be a portal from the model space in the paper space or coordinate space. We recommend that you put drawing annotations, such as marks, dimensions, and texts to the paper space or coordinate space only. That way they will appear correctly, for example, when a part is cut in a Tekla Structures drawing view.
Include	To include a rule in the export, select the Include checkbox next to the rule on the left. If you do not want to

export some objects, just clear the **Include** checkbox.

12. To open the preview to check the result before exporting, click **Open preview**. To update the preview after changes, click **Refresh preview**.
13. Click **Export**.

The drawings are exported on the basis of the defined settings and rules. The rules are read in the order that they are listed. If you have selected **Open folder when finished**, the export folder will open.

The error message **Drawing cannot be read** is displayed if the exported drawing is missing, the drawing is not up to date, or the drawing has some other problems.

When you click the **Export** button, Tekla Structures first checks if the files can be written to before the export starts, and asks you to close the necessary applications. It also checks if the files already exist and asks if you want to overwrite the existing files.

DWG layer rule example

In the example below, three separate mark rules have been created that will be exported on layers 1, 2, and 3. Lines are exported on the layer 1, texts on the layer 2, and frames on the layer 3.

INCLUDE	OBJECTS	PRESENTATION FILTERING	OBJECT FILTERING	TARGET LAYER	COLOR	LINE STYLE	LINE WEIGHT	PAPER SPACE
☒	Marks	Lines	columns	1				☒
☒	Marks	Text	columns	2				☒
☒	Marks	Frames	columns	3				☒

After exporting, you can show the marks in the CAD model in the following three ways depending on the layers displayed in the CAD viewer:

All layers are shown:



Layer 1 containing the lines is hidden:



Layer 2 containing the texts is hidden:

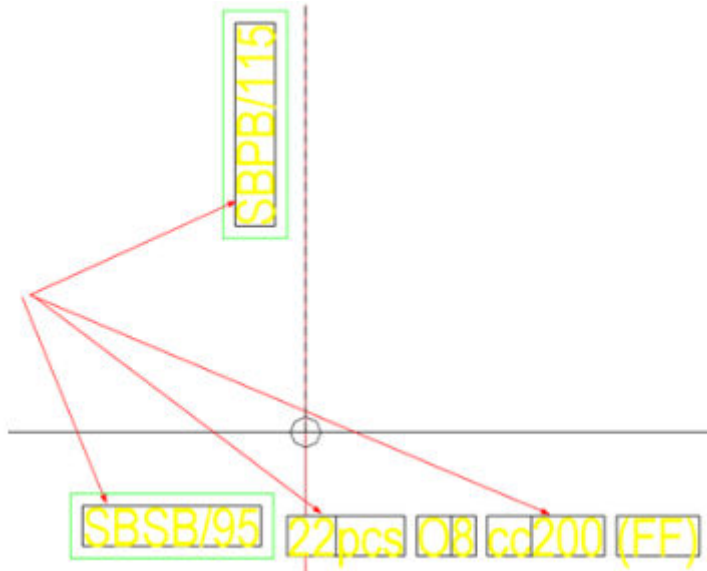


Layer 3 containing the frames is hidden:



Tips

- If you use the **Output file version** 2013 in the export, a wipeout frame will be visible on the layout side in the CAD model due to the limitations in CAD, see below:



To avoid this, either use a DWG file layer template created in AutoCAD, or use the output file version 2010 (default) or earlier.

- Another reason for the visible wipeout frame is that you are using a DWG template where wipeout frames have been set visible. Hide the wipeout frames in the CAD template. For more information, see ["Remove unwanted text frames from DWG exports"](#).

To use old DWG or DXF drawing export

If you want to use the old DWG or DXF drawing export, set the advanced option `XS_USE_OLD_DRAWING_EXPORT` to `TRUE` in an `.ini` file. This advanced option is by default set to `FALSE`. For instructions on using the old export, see [Export a drawing to a 2D DWG or DXF file \(old export\) \(page 265\)](#).

Export a drawing in 2D DWG or DXF format (old export)

You can also export drawings as 2D DWG or DXF using the old DWG/DXF drawing export.

If you want to use the old DWG or DXF drawing export, set the advanced option `XS_USE_OLD_DRAWING_EXPORT` to `TRUE` in an `.ini` file. This advanced option is by default set to `FALSE`. For instructions on using the newer

DWG/DXF drawing export, see [Export a drawing in 2D DWG, DXF, or DGN format \(page 253\)](#).

For an example of setting up the layers and exporting to 2D DWG or DXF, see [Example: Set up layers and export in DWG format \(old export\) \(page 274\)](#)

Export a drawing in 2D DWG or DXF format

1. On the **Drawings & reports** tab, click **Document manager**.
2. Select from the list the drawings that you want to export.
3. Right-click and select **Export**.
4. In the **Export Drawings** dialog, on the **Export file** tab, enter the export file name.

If you are exporting several drawings, leave the file name box empty.

The drawings are exported by default to the `\PlotFiles` folder under the current model folder. If you want to use another folder, enter the full path.

Tekla Structures uses one of the following advanced options to define the names for the export files. The advanced option that is used depends on the drawing type:

`XS_DRAWING_PLOT_FILE_NAME_A`

`XS_DRAWING_PLOT_FILE_NAME_C`

`XS_DRAWING_PLOT_FILE_NAME_G`

`XS_DRAWING_PLOT_FILE_NAME_W`

`XS_DRAWING_PLOT_FILE_NAME_M`.

5. Select the file type: **DXF** or **DWG**.
6. If you want to include a revision mark in the file name, select **Include revision mark to file name**.
7. Set the layer options on the **Layer options** tab:
 - Select the layer rules file.
To add or modify layers, and to assign object groups to different layers, click **Setup...**
 - If you want to use advanced conversion to convert the type, color and weight of lines and layers, select **Use advanced line type and layer conversion**.

- In the **Conversion file** box, enter the name of the file to be used in the conversion.

By default, Tekla Structures uses the `LineTypeMapping.xml` file in the `..\Tekla Structures\<version>\environments\common\inp` folder.

If you need to define your own line type mappings, you can use the file `LineTypeMapping.xml` as a template when you create a conversion file of your own.

- Select **Include empty layers** if you want to include empty layers in the export.
- Select **Object color by layer** to have different colors on different layers.

8. Set the other drawing export options on the **Options** tab:

- Set **Drawing scale** and **Line type scale**.
- If you want to export the drawings so that the DWG/DXF content is grouped by object, select **Export objects as groups**. When you do this, Tekla Structures makes a new group for each object (part, mark, dimension line, etc.).
- Select **Cut lines with text** if you do not want to display continuous lines in exported drawings, for example, to run the line through text or drawing marks.
- Select **Export custom lines as split lines** to ensure that custom line types have the same appearance in the software you are exporting to and when printed. If **Export custom lines as split lines** is selected, custom line types are exported as solid lines that are split to several short lines. If **Export custom lines as split lines** is not selected, custom line types are exported as defined in `TeklaStructures.lin`.
- Select **Use paper space** to export to both model space and paper space. The unscaled contents of the drawing views are exported into model space. The drawing layout is exported into paper space. The layout contains scaled viewports showing appropriate areas of the model space.

When exporting to paper space, ensure that all objects in the view are inside the view frame. Objects that are partially outside the drawing view frame are not exported

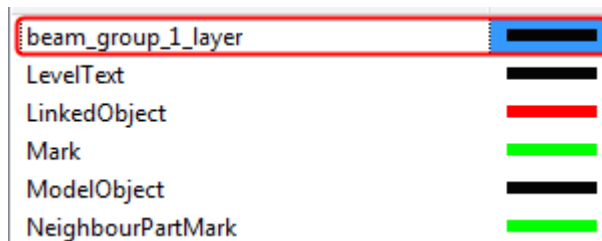
9. Click **Export**.

Create layers in DWG/DXF files for export

You need to define the layers that are included in the exported DWG and DXF files.

NOTE To keep track on the layers that you have, create all the layers that you need for the final DWG/DXF drawings at the same time.

1. On the **File** menu, click **Export --> Drawings**.
2. In the **Export Drawings** dialog, go to the **Layer options** tab and click **Setup** next to the **Layer rules** box.
3. In the **Drawing Export Layers** dialog, click **Modify layers**.
4. To add a layer, click **Add**.
You can add as many layers as you need.
5. Click the row of the new layer in the **Name** column and enter a name for the layer.
6. Click the row of the new layer in the **Color** column and select a color for the new layer.



7. Click **OK**.

Next you can assign objects to the new layer.

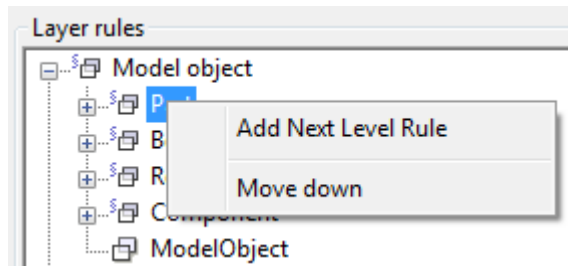
Assign objects to layers in export

You need to define which objects to export to certain layers in the exported DWG/DXF file. You can do this by using a selection filter for identifying the desired objects among all objects, and by creating a rule to export these objects to a certain layer.

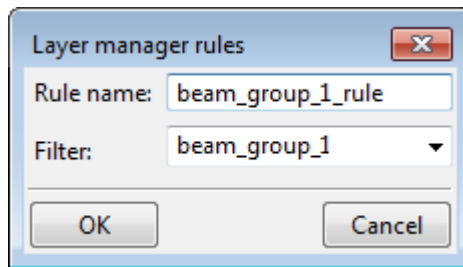
Before creating the rule, first create the selection filter.

1. Create a selection filter.
2. On the **File** menu, click **Export --> Drawings**.
3. In the **Export Drawings** dialog, go to the **Layer options** tab, and click **Setup**.
4. Open an object group by clicking the plus sign next to the group name.
For example, click the plus sign next to **Model Object**.
5. Right-click a rule in the list and select **Add Next Level Rule**.

For example, right-click **Part**.

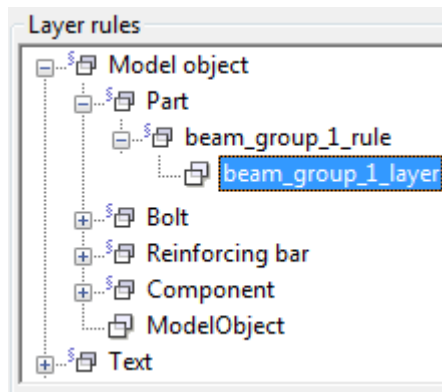


6. Enter a name for the rule and select the selection filter that you created.



7. Click **OK**.
8. Double-click the row under the rule you just created and select the desired layer for it in the **Select Layer** dialog.
9. Click **OK**.

Tekla Structures maps the selected layer to the rule.



10. Save the created layer rule settings for later use by entering a name next to the **Save as** button and clicking **Save as**.

NOTE The order of rules is important. Organize the rules by right-clicking the rule, and selecting **Move up** or **Move down**. The objects are exported to the first matching layer. If there is no matching layer, the objects are exported as **Other object type**.

Example: Create a rule for exporting beam marks to their own layer in drawing export

You can export all kinds of drawing objects to layers of their own.

This example shows how you can do that for beam marks. All kinds of marks can be exported separately to their own layers: bolt marks, part marks, connection marks, neighbor part marks, reinforcement marks and component marks.

First you need to create a selection filter selecting the beams and then you can define the layer rule. Name the beam selection filter `Beams`.

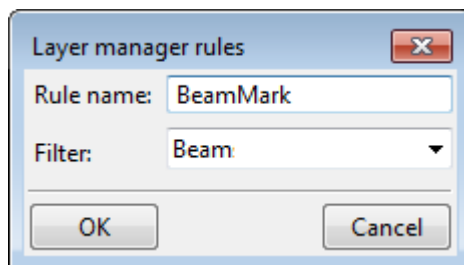
1. On the **File** menu, click **Export --> Drawings**.
2. Go to the **Layer options** tab of the **Export Drawings** dialog and click **Setup** next to the **Layer rules** box.
3. Under **Mark** in the **Drawing Export Layers** dialog, select the layer rule of the mark you want to define to its own layer (part, bolt, connection, neighbor part, or reinforcement mark).

Select **Part mark**.

4. Right-click **Part mark** and select **Add Next Level Rule** from the pop-up menu.

This opens the **Layer manager rules** dialog.

5. Enter a rule name (for example, `BeamMark`) and select a filter that you have created (`Beam`).



6. Click **OK**.

Tekla Structures creates a new rule `BeamMark`. Now you can connect the new rule to a layer you have created for beam marks and use when exporting drawings.

Copying export layer settings to another project

If you want your layer settings to also be available in other projects, you can copy them to a firm or project folder.

1. On the **File** menu, click **Export --> Drawings**.
2. Go to the **Layer options** tab and click **Setup**.
3. Define the required rule and layer settings.

4. Enter a name for the layer rule settings file next to the **Save as** button and click **Save as**.
5. Copy the file <your_layer_rule>.ldb from the \attributes folder under the current model folder to the firm or project folder.

Define customized line type mappings in drawing export

You can use advanced conversion to convert the type, color and weight of lines and layers. This way you will get the line types that you want to use in the target software, for example, AutoCAD.

By default, Tekla Structures uses the file `LineTypeMapping.xml` in the folder `..\Tekla Structures\<version>\environments\common\inp` for the conversion.

If you need to define your own line type mappings, you can use the file `LineTypeMapping.xml` as a template.

NOTE When modifying the line type mappings file, use an editor that is capable of validating XML in order to maintain a valid document structure.

To define your own line type mappings, do one of the following:

To	Do this
Map according to line types only	1. Open the mapping file in an XML editor. 2. Enter only the line type information. For example, all lines in all layers with line type <code>XKITLINE01</code> will be exported to <code>DASHED</code>. 3. Save the mapping file to the model folder.
Map according to line types and layers	1. Open the mapping file in an XML editor. 2. Enter the line type and layer name. Define the layers that the mapping will apply to in the <code>LayerName</code> attribute. If you leave out the attribute <code>LayerName</code>, Tekla Structures uses the line type mapping for any layer. If you include the attribute <code>LayerName</code>, Tekla

To	Do this
	Structures uses the line type mapping for that layer only. For example, all lines on the layer <code>BEAM</code> with line type <code>XKITLINE01</code> will be exported to <code>DASHED</code>. Tekla Structures first searches for these kinds of mappings by default. 3. Define the color of the line in the <code>Color</code> attribute. Enter the color values in AutoCAD Color Index (ACI) codes (numbers from 0 to 255). 4. Define the thickness of the line in the <code>Weight</code> attribute. Enter the values in hundredths of millimeters. 5. Save the mapping file to the model folder.

This is how the file `LineTypeMapping.xml` is composed:

```

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<!DOCTYPE Mapper [
<!ELEMENT Mapper (Mapping*)>
<!--ATTLIST Mapper Version CDATA #REQUIRED-->

<!--ELEMENT Mapping (From, To)-->
<!--ATTLIST Mapping LayerName CDATA #IMPLIED-->

<!--ELEMENT From EMPTY-->
<!--ATTLIST From LineType CDATA #REQUIRED-->

<!--ELEMENT To EMPTY-->
<!--ATTLIST To LineType CDATA #REQUIRED-->
<!--ATTLIST To LayerName CDATA #IMPLIED-->
<!--ATTLIST To Color CDATA #IMPLIED-->
<!--ATTLIST To Weight CDATA #IMPLIED-->
]>
<Mapper version="1.1">
  <Mapping LayerName="Part">
    <From LineType="XKITLINE00"/>
    <To LineType="BYLAYER" Color="4" weight="100"/>
  </Mapping>
  <Mapping LayerName="Part">
    <From LineType="XKITLINE02"/>
    <To LineType="HIDDEN2" LayerName="Part_Hidden" Color="8" weight="100"/>
  </Mapping>
  <Mapping LayerName="Part">
    <From LineType="XKITLINE03"/>
    <To LineType="DASHDOT" LayerName="Part_Refline" Color="12" weight="100"/>
  </Mapping>
  <Mapping>
    <From LineType="XKITLINE00"/>
    <To LineType="Continuous"/>
  </Mapping>
  <Mapping>
    <From LineType="XKITLINE01"/>
    <To LineType="DASHED"/>
  </Mapping>
  <Mapping>
    <From LineType="XKITLINE02"/>
    <To LineType="DASHEDX2"/>
  </Mapping>
  <Mapping>
    <From LineType="XKITLINE03"/>
    <To LineType="DASHDOT"/>
  </Mapping>
  <Mapping>
    <From LineType="XKITLINE04"/>
    <To LineType="DOT2"/>
  </Mapping>
  <Mapping>
    <From LineType="XKITLINE05"/>
    <To LineType="DIVIDE"/>
  </Mapping>
  <Mapping>
    <From LineType="XKITLINE06"/>
    <To LineType="CENTER"/>
  </Mapping>
</Mapper>

```

(1) The first section consists of XML and document type definition. Do not change or remove this section.

(2) The mappings that are available are defined here. You can use these mappings as a template for your own mappings.

Examples:

In the first example, a new Mapping element is added, where XKITLINE00 lines in the Beam layer are converted to BORDER line type, color is converted to 10 and weight to 1.00 mm:

```
<Mapping LayerName="Beam">
  <From LineType="XKITLINE00"/>
  <To LineType="BORDER" Color="10" Weight="100" />
</Mapping>
```

In the second example, a new Mapping element is added, where XKITLINE02 lines in the Part layer are converted to HIDDEN2 line type, the layer name is converted to Part_Hidden, the color is converted to 8 and weight to 1.00 mm.

You can use the LineTypeMapping.xml file for exporting hidden lines to separate layers. The hidden lines must then be defined to their own layers (here Part_Hidden).

```
<Mapping LayerName="Part">
  <From LineType="XKITLINE02"/>
  <To LineType="HIDDEN2" LayerName="Part_Hidden" Color="8" Weight="100"/>
</Mapping>
```

NOTE For the export to succeed, ensure that the layer (here Part_Hidden) exists on the list of available layers in the **Modify Layers** dialog box.

Default line types in drawings

Default line types are available in Tekla Structures drawings. You can map default line types to customized line types, which are defined in TeklaStructures.lin and further exported to DWG/DXF files.

The table below lists the default line types and shows what they look like.

Line type name	Line type appearance
XKITLINE00	————
XKITLINE01	-----
XKITLINE02	- - -
XKITLINE03	----
XKITLINE04	
XKITLINE05	-----
XKITLINE06	-----

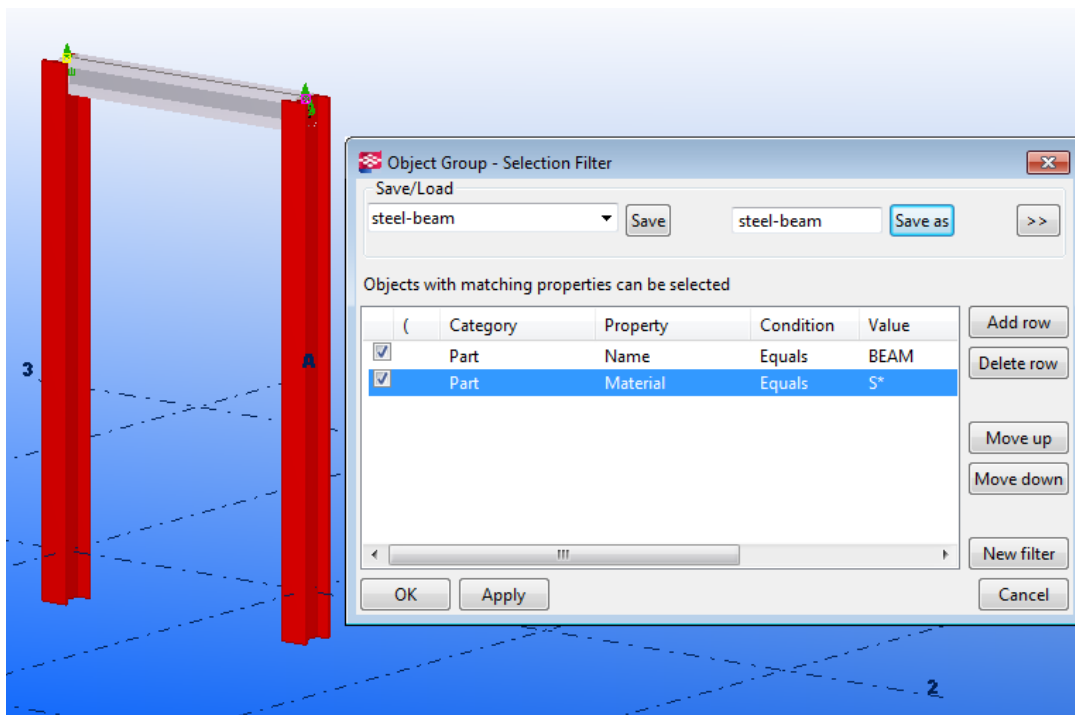
Example: Set up layers and export in DWG format (old export)

This example shows how to define layers and export line types on a certain layer to their own sublayers in the DWG export.

Example: Create a selection filter for DWG export

To create a selection filter:

1. In the model, click the **Selection filter** switch .
2. In the **Object Group - Selection Filter** dialog, click **New filter**.
3. Add new filter rules.
 - a. Create a filter rule that select parts according to the name `BEAM`.
 - b. Create a filter rule that selects parts according to the material `S*` (as in steel).
4. Save the filter as `steel-beam`.



Example: Create layers for DWG export

After creating a selection filter, you can continue by creating layers that you want to have in the exported DWG.

To create the layers you want to have in the exported DWG:

1. On the **File** menu, click **Export --> Drawings**.
2. Go to the **Layer options** tab.
3. Click **Setup** and then click **Modify layers**.

- Click **Add** to add a new layer.

Create separate layers for solid lines (`steel-beam-layer`) and hidden lines (`steel-beam-layer-H`) within steel beams.

- Set the color for the layers.

Set the solid lines to red and hidden lines to blue.

<code>steel-beam-layer-H</code>	
<code>steel-beam-layer</code>	

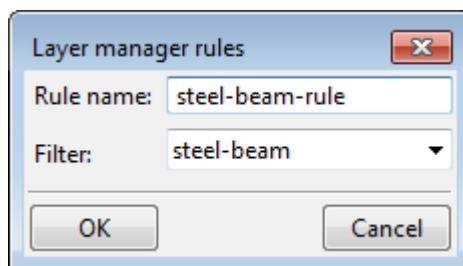
- Click **OK** to accept the changes.

Example: Create a rule for drawing DWG export and assign a layer to the rule

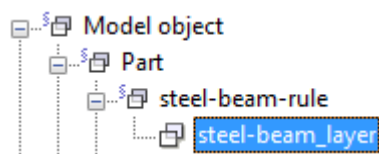
After creating layers, you can continue by creating a rule to export an object group into a layer, and assign the layer to the created rule.

To create a rule to export an object group into a layer, and assign the layer to the created rule:

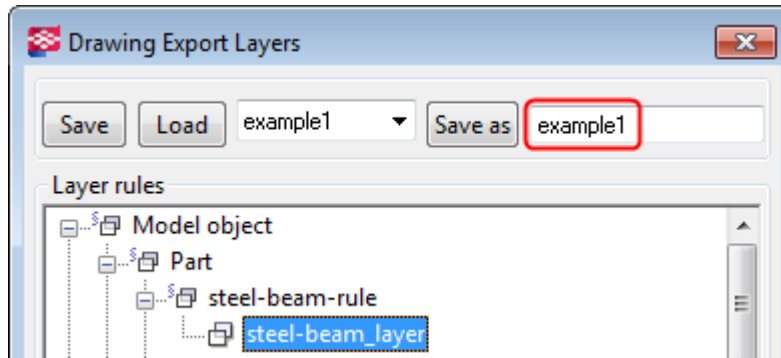
- Right-click a model object part rule and select **Add Next Level Rule**.
- Enter a name for the rule (`steel-beam-rule`) and select the selection filter you created for steel beams (`steel-beam`).



- Click **OK**.
- To assign a layer to a rule, double-click the row under the `steel-beam-rule` and select a layer, in this case `steel-beam-layer`.
- Click **OK**.



- Save the layer rule settings with the name `example1` using **Save as**.



7. Close the dialog by clicking **OK**.

Example: Define a custom line type for DWG export

After creating a rule, you can continue by defining a custom line type for continuous lines in the exported DWG. In this example, you will add some line type definitions.

To define a custom line type:

1. Open the `TeklaStructures.lin` file in a text editor (`..\ProgramData\Trimble\Tekla Structures\<version>\environments\common\inp`).
2. Add the following line type definition in the file:

```
*HIDDEN,Hidden _____
A, 1.5875, -0.79375
*HIDDEN2,Hidden (.5x) - - - - -
A, 0.79375, -0.396875
*HIDDENX2,Hidden (2x) _____
A, 3.175, -1.5875

*PHANTOM,Phantom _____
A, 7.9375, -1.5875, 1.5875, -1.5875, 1.5875, -1.5875
*PHANTOM2,Phantom (.5x)
A, 3.96875, -0.79375, 0.79375, -0.79375, 0.79375, -0.79375
*PHANTOMX2,Phantom (2x) _____
A, 15.875, -3.175, 3.175, -3.175, 3.175, -3.175

*CONTINUOUS, Continuous _____
A, 1|
```

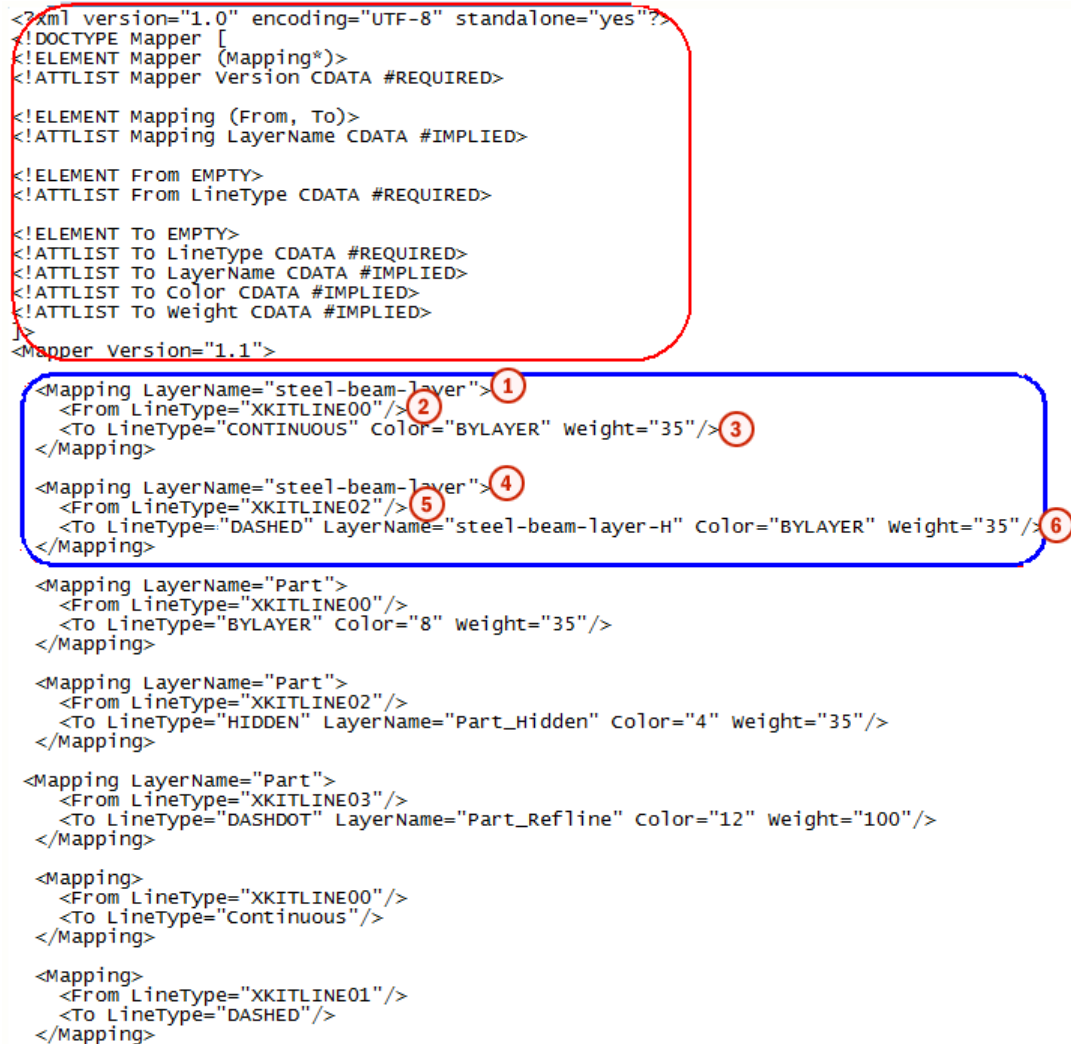
3. Save the file. Ensure that the file name extension does not change.

Example: Define line types and weights for layers in DWG export

After defining a custom line type, you can continue by modifying the `LineTypeMapping.xml` file and defining the line types and weights.

To define the line types and weights:

1. Open the `LineTypeMapping.xml` file (`..\ProgramData\Trimble\Tekla Structures\<version>\environments\common\inp`) in a text editor.
2. Add the line type mappings for the layers as shown inside the lower blue frame in the image below. Do not touch the lines inside the upper red frame.
3. Save the file. Ensure that the file name extension does not change.



```

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<!DOCTYPE Mapper [
<!ELEMENT Mapper (Mapping*)>
<!ATTLIST Mapper Version CDATA #REQUIRED>

<!ELEMENT Mapping (From, To)>
<!ATTLIST Mapping LayerName CDATA #IMPLIED>

<!ELEMENT From EMPTY>
<!ATTLIST From Linetype CDATA #REQUIRED>

<!ELEMENT To EMPTY>
<!ATTLIST To Linetype CDATA #REQUIRED>
<!ATTLIST To LayerName CDATA #IMPLIED>
<!ATTLIST To Color CDATA #IMPLIED>
<!ATTLIST To Weight CDATA #IMPLIED>
]>
<Mapper Version="1.1">

  <Mapping LayerName="steel-beam-layer">1
    <From Linetype="XKITLINE00">2
      <To Linetype="CONTINUOUS" Color="BYLAYER" weight="35"/>3
    </Mapping>

    <Mapping LayerName="steel-beam-layer">4
      <From Linetype="XKITLINE02">5
        <To Linetype="DASHED" LayerName="steel-beam-layer-H" Color="BYLAYER" weight="35"/>6
      </Mapping>

    <Mapping LayerName="Part">
      <From Linetype="XKITLINE00"/>
      <To Linetype="BYLAYER" Color="8" weight="35"/>
    </Mapping>

    <Mapping LayerName="Part">
      <From Linetype="XKITLINE02"/>
      <To Linetype="HIDDEN" LayerName="Part_Hidden" Color="4" weight="35"/>
    </Mapping>

    <Mapping LayerName="Part">
      <From Linetype="XKITLINE03"/>
      <To Linetype="DASHDOT" LayerName="Part_Refline" Color="12" weight="100"/>
    </Mapping>

    <Mapping>
      <From Linetype="XKITLINE00"/>
      <To Linetype="CONTINUOUS"/>
    </Mapping>

    <Mapping>
      <From Linetype="XKITLINE01"/>
      <To Linetype="DASHED"/>
    </Mapping>
  </Mapper>

```

1. The lines are on the `steel-beam-layer` layer.
2. The lines are drawn with `XKITLINE00` (solid lines).
3. The lines are exported to `CONTINUOUS` lines in DWG. The line color in DWG was already defined in the layer properties (red). The line weight in DWG is 35.
4. The lines are on the `steel-beam-layer` layer.
5. The lines are drawn with `XKITLINE02` (hidden lines).

6. The lines are exported to `DASHED` lines into a separate layer called `steel-beam-layer-H` in DWG. The line color in DWG was already defined in the layer properties (blue). The line weight in DWG is 35.

Example: Export the drawing to DWG

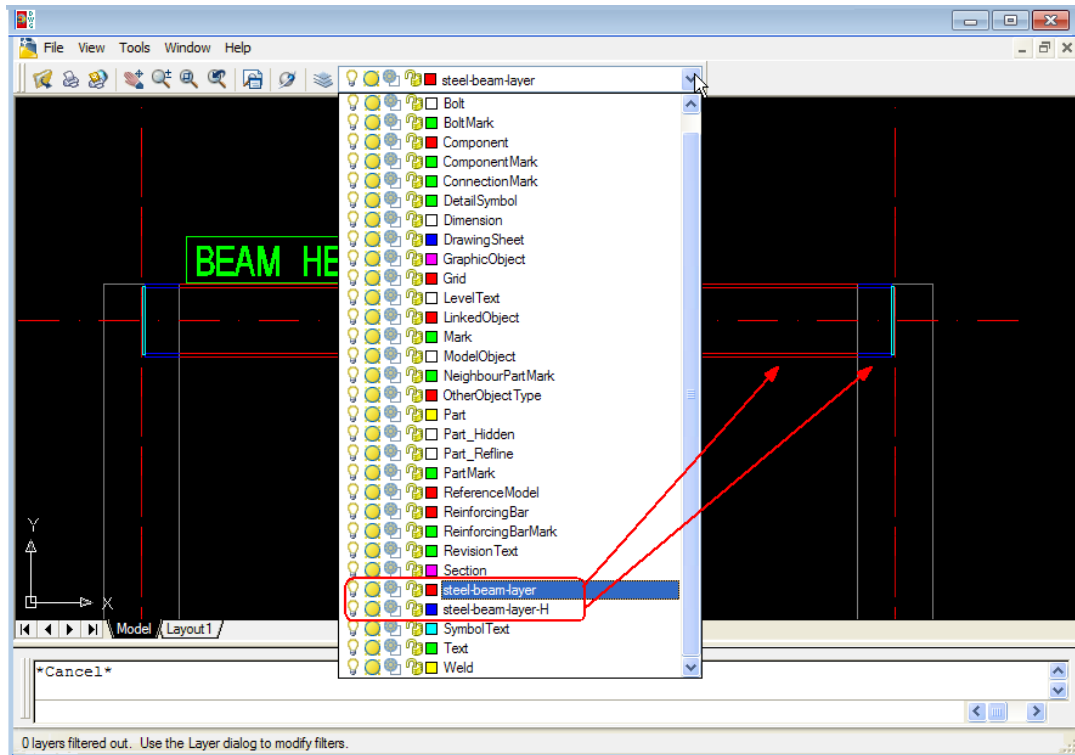
After you have defined all the layer settings, you can continue by exporting the drawing. Before exporting the drawing to DWG, ensure that all the drawing properties are as you wish.

To export the drawing:

1. Open the drawing that you want to export.
2. On the **File** menu, click **Export drawings**.
3. Enter a name for the export file.
4. Set the **Type** to **DWG**.
5. Go to the **Layer options** tab page and load the layer rule settings that you saved earlier with the name `example1`.
6. Select the following checkboxes: **Use advanced line type and layer conversion**, **Include empty layers** and **Object color by layer**.
7. Browse for the `LineTypeMapping.xml` file.
8. Go to the **Options** tab, set the scale for the export and select the **Export objects as groups** checkbox and, if you want to, **Cut lines with text** and **Export custom lines as split lines**.
9. Click **Export**.

Open the exported DWG with an applicable DWG viewer software. You can see that the solid lines of the steel beam are on one layer and the hidden lines are

on another layer. You can also see that columns do not match with the layer rules you defined, so they are handled according to other rules.

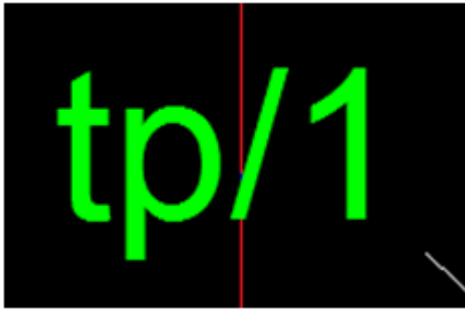


See below for examples on how the selecting and not selecting **Cut lines with text** affects the result.

In the following example, **Cut lines with text** is selected.



In the following example, **Cut lines with text** is not selected.



3.6 DGN

The DGN format has been used especially for data transfer between plant design programs. It was developed by MicroStation. It is similar to DWG in that it is only a graphical data format. It contains unique part IDs in the given model. It is possible to check for clashes between the Tekla Structures model and a DGN reference model.

This format has the following limitations:

- GUID is not supported.
- DGN reference model import does not support change management or UDAs.
- 3D DGN export supports parts only.

See also

[Reference models and compatible formats \(page 173\)](#)

[Insert DGN files \(page 281\)](#)

[Insert a reference model \(page 175\)](#)

[Export in 3D DGN format \(page 283\)](#)

Insert DGN files

You can insert DGN files as reference models to Tekla Structures.

You can view DGN reference model objects on different reference model layers according to the level settings in the DGN file. You can use DGN models for clash checking. Tekla Structures reference model insert supports V7 and V8 DGN formats.

A DGN file may contain one or more DGN models. A DGN model can be one of the following three types: a design model, an extrusion model or a sheet model. Design models are most useful in Tekla Structures as they contain appropriate structural data.

If there are many model types available in a DGN file, Tekla Structures selects the inserted model type in the following order:

1. Active model is inserted if it is a design model.
2. Default model is inserted if it is a design model.
3. If DGN file contains design models, the first one is inserted.
4. If there are no design models in the DGN file, the first model is inserted, regardless of the model type.

DGN reference model insert does not support UDAs or change management.

To insert a DGN file, open the Tekla Structures model where you want to insert the DGN reference model, and click the **Reference models** button in the side

pane .

To complete the insertion, follow the instructions in [Insert a reference model \(page 175\)](#).

DGN objects supported in reference models

Tekla Structures can display the following DGN objects in reference models:

Object	Type no.	Description
Cell	2	A collection of grouped entities with a common insertion point/ origin, scale and orientation in 2D/3D space.
Line	3	
Line string	4	A series of interconnected lines.
Shape	6	Like a line string, but closed (first point = last point).
Text node	7	A multi-line paragraph/block of text.
Curve	11	A parametric spline curve.
Complex chain	12	A chained collection of other entities (lines, line strings, arcs, curves or b-spline curves).
Complex shape	14	Like a complex chain, but closed (first point = last point).
Ellipse	15	
Arc	16	
Text	17	Supports TrueType fonts and text styles (bold, underline, italic, etc).
3D surface	18	Like a 3D solid, but not capped on the ends.

Object	Type no.	Description
3D solid	19	The solid created by projecting or rotating from a boundary entity (line, line string, curve, arc or ellipse).
Cone	23	Actually a truncated cone described by two parallel circles; if the radius of both circles is the same, a cylinder is produced.
B-spline surface	24	See description of b-spline curves, which also applies here; additional data is provided by surface boundary entities (type 25).
B-spline curve	27	Can be rational/non-rational, uniform/non-uniform, open/closed; entity type 27 supplies header data and additional data is provided by pole entities (type 21), knot entities (type 26) and weight factor entities (type 28).
Shared cell definition	34	Similar to a DWG block definition; basically defines a set of grouped entities.
Shared cell instance	35	Similar to a DWG block instance; given a particular cell 'definition', numerous cell 'instances' can be created at differing locations, scales and orientations.
Multiline	36	A set of parallel lines, which can be jointed (with or without visible seams at the joints), and have various types of end caps (rounded, square, etc).
Mesh	105	Supports indexed face loops, quad list, quad grid, triangle grid and triangle list meshes.
Smart solid	-	Smart solids (solids created from embedded Parasolid/ACIS data) can be imported into Tekla Structures as wireframe outlines.

Export in 3D DGN format

You can export selected parts or the whole model in the 3D DGN format. You can use either the older v7.0 export or the newer v8.0 export.

Export in 3D DGN v8 format

- Tekla Structures uses the Open Design Alliance (ODA) toolkit to export 3D DGN v8 format.
- The surface presentation of the parts is exported. Bolt holes are not included in the export.
- You can export objects relative to the model origin, to the base point you define, or relative to the work plane.
- You can export in layers by name, phase or any template attribute or user-defined attribute.
- Colors can be exported by class or by stored object group representation.
- You can export all objects or selected objects. You can use the **Select objects in assemblies** and **Select objects in components** selection switches for selecting the objects to export. You can export selected parts in an assembly when you use the **Select objects** option and **Select objects in assemblies** and **Select objects in components** when you select the parts. If you do not select a part but an assembly, the highest level of assembly parts will be included in the export.

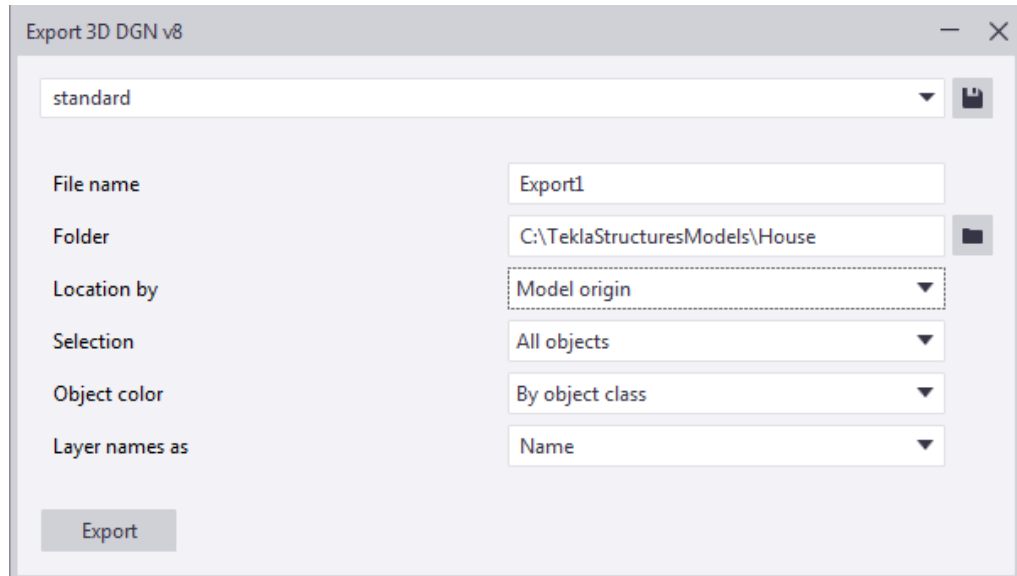
Create object group color representations

If you want to use object group color representations in the export, you need to create the object groups first, set the colors for the object groups and save the representation settings. Note that the transparency setting is not included in the export.

Create base points

If you want to export objects relative to a base point, you need to create a base point in your model.

1. Open a Tekla Structures model.
2. On the **File** menu, click **Export --> 3D DGN v8**.



3. In the **File name** box, enter the name of the export file.
4. In the **Folder** box, enter the export folder path, or browse to the folder.
5. In **Location by**, select one of the following:
 - **Model origin** exports the model relative to 0,0,0.
 - **Work plane** exports the model relative to the current work plane coordinate system.
 - **Base point** <name of base point> exports the model relative to the base point using coordinate system values **East coordinate**, **North coordinate**, **Elevation**, **Angle to North**, **Latitude** and **Longitude** from the base point definition.
6. In the **Selection** list, select **All objects**, or **Selected objects**. If you want to export selected objects, select the objects with the appropriate selection switches:
 - If you activate the **Select parts** and **Select objects in components** selection switches, all the selected parts will be exported.
 - If you activate the assembly or component selection, nothing will be exported.
7. In **Object color**, select whether you want to export objects using object class colors or object group colors.
8. In **Layer names as**, select **Name** or **Phase** from the list, or type the template or user-defined attribute name in the box. You can use phases, part names, or template attributes or user-defined attributes as layer names for exported objects.
9. When you are done, click **Export** to export the objects according to the defined settings.

Tekla Structures creates the <name>.dgn file in the specified folder.

Export in 3D DGN v7 format

- The 3D DGN v7 export supports parts only.
- In the 3D DGN v7 export, you can only use the model origin in the export. Changing the work plane has no effect to the export.
- You can use the following advanced options to control DGN exports:

XS_EXPORT_DGN_COORDINATE_SCALE

XS_EXPORT_DGN_INCLUDE_CUTS

1. Open a Tekla Structures model.
2. On the **File** menu, click **Export --> 3D DGN** .
The **3D DGN Export** dialog opens.
3. In the **Output file** box, enter the name of the export file.
If you want to replace an already existing file, click the ... button and browse for the file.
4. In the **Export** list, select **All objects**, or **Selected objects** and select the parts to export.
It might be a good idea to filter out minor secondary parts, for example, curved parts from railings, if you do not need them in the exported DGN model. This decreases the export file size.
5. Click **Create**.
Tekla Structures creates the <name>.dgn file in the current model folder.

Control tubular parts in 3D DGN export

If you have tubular parts in your model, and you want to reduce the size of the DGN files, or affect the complex display in rendered views, you can use the following advanced options:

XS_CHORD_TOLERANCE_FOR_SMALL_TUBE_SEGMENTS

XS_CHORD_TOLERANCE_FOR_TUBE_SEGMENTS

3.7 LandXML

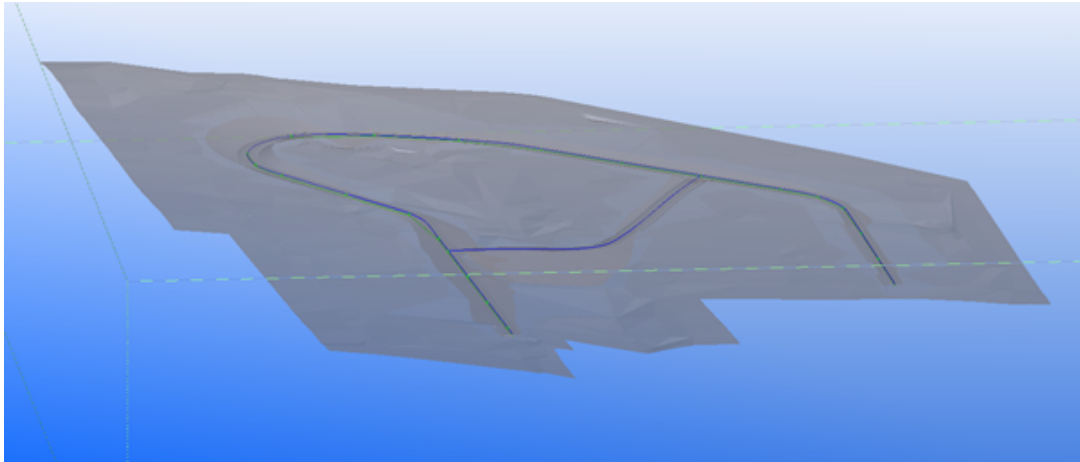
You can insert LandXML reference models to Tekla Structures. The supported contents of LandXML files are terrain models, line alignments of roads and railways, and rain water systems.

You can export files in .xml format from applications like Bentley InRoads, Autodesk Civil, and Trimble Business Center, and insert the .xml files in Tekla Structures as reference models. The LandXML format extends the capabilities

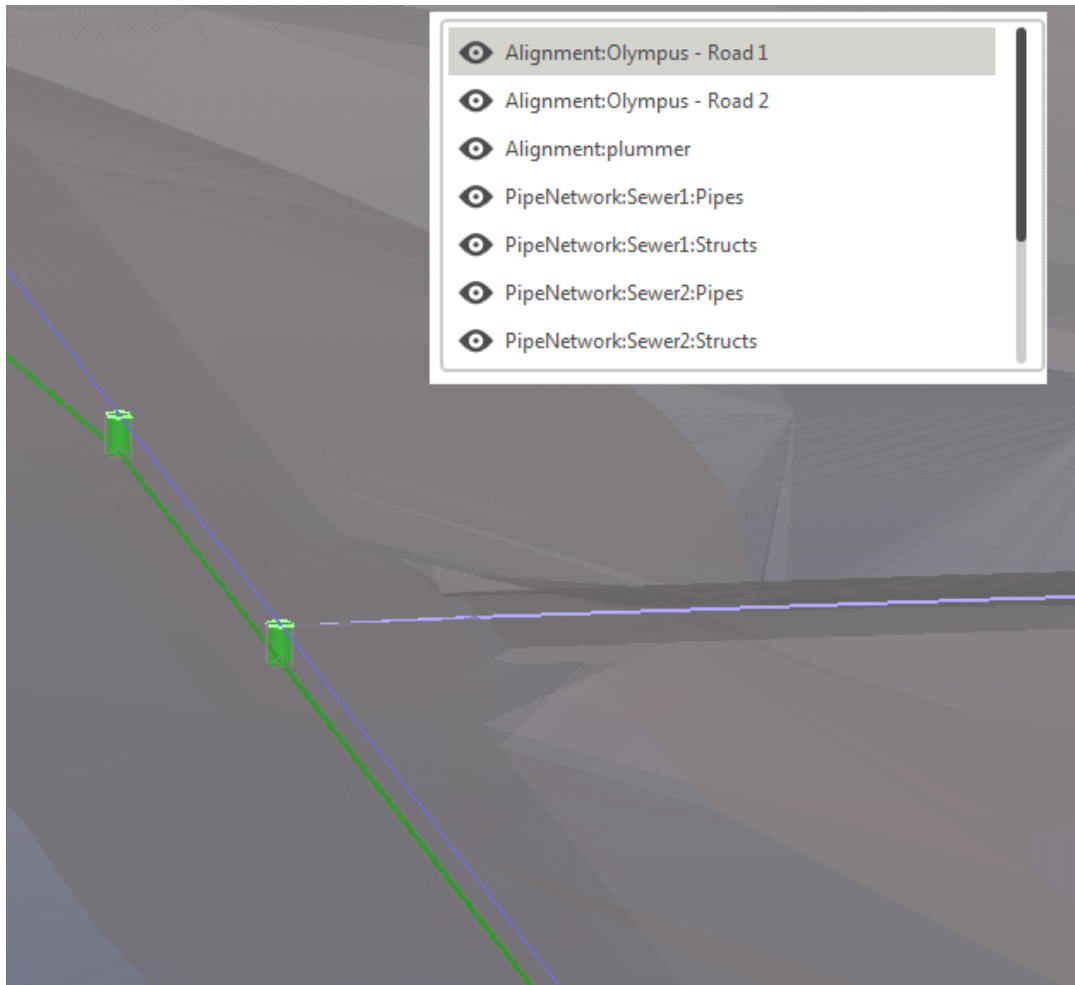
of Tekla Structures to show merged models, including the infra models. Tekla Structures supports LandXML 1.2 schema and single-precision floating-point format.

A typical example of a building structure where LandXML can be used is the surface of the bedrock to be utilized when pile lengths are to be considered. LandXML can also be used when estimating the need of excavation. The LandXML format is important also for bridge and for civil structures design tasks.

An example of an imported LandXML reference model:



An example of layers in a LandXML reference model:



Limitations

The LandXML feature does not support all the possible data in the format. It supports the subset of the primitives defined in LandXML 1.2 schema, such as alignments, terrain models and pipe networks.

- Surfaces are not shown correctly in drawings.
- Triangle type of surfaces are only supported.
- There is no warning if the LandXML file contains unsupported data.

See also

[Insert a reference model \(page 175\)](#)

3.8 PDF

You can insert a PDF file as a reference model in your Tekla Structures model. During the import, Tekla Structures converts the PDF into the DXF format.

You can only insert PDFs created with vector-based software, such as a CAD system. Raster PDFs or scanned PDFs will not work. Also, the insert PDF tool only places a reference model on the X/Y plane as a plan view. To place an elevation view of the PDF, you need to use work planes to temporarily change the X/Y plane to be parallel to the vertical grid lines.

To be able to import a raster PDF file to Tekla Structures, you need a 3rd party software to convert the raster PDF to DWG or DXF format. For more information about the differences between raster and vector PDFs and software to use for converting from raster, see [Cannot import a PDF into Tekla Structures model](#).

Insert a PDF file in a Tekla Structures model

1. To be able to select the PDF reference model in the model to work with it, activate the **Select reference models** selection switch. To be able to work with other objects as well, also activate the **Select all** and **Select components** selection switches.
2. On the **File** menu, click **Import --> Insert PDF** .
The **Insert PDF Reference Model** dialog opens.
3. Click **Browse...**
4. Browse for the PDF reference model file and click **Open**.
5. Set the scale for the PDF reference model. You can also adjust the scale after you have inserted the PDF in the **Reference models** side pane.
6. Enter the number of the page that you want to insert.
7. Click **OK**.
8. Pick a point anywhere in the model to place the PDF reference model.

The best practice is to use the model origin or the lower left corner of your grid system that correlates to your PDF.

Tekla Structures converts the PDF file into the DXF format and inserts the DXF file. The conversion creates a DXF file for every inserted PDF page. Tekla Structures saves the DXF files to the same folder where the PDF is.

When you have inserted the PDF reference model, you can double-click it in the Tekla Structures model and modify its details in the **Reference models** side pane. For example, you can change the title, or adjust the scale or rotation. If the original PDF has layers, you can show and hide the desired layers.

NOTE The PDF file might be subject to minor scaling adjustments during the printing process to make it fit a standard page size. That means that it may not be 100% exact in all directions once scaled to full size.

What to consider when inserting a PDF file produced from a CAD file in a Tekla Structures model

The following article explains how accurately produced CAD drawing files are critical in order for printed PDFs to be used in 3D modeling platforms as overlay references: [PDF inaccuracies from CAD files](#).

Insert a PDF in a Tekla Structures drawing

There is no direct option to insert a PDF file in a Tekla Structures drawing. However, the PDF files that you insert in the model are automatically converted to the DXF format during the import, and saved in the same folder with the same name as the PDF file. You can use this as a workaround for inserting PDFs in drawings:

1. First, insert the PDF in the Tekla Structures model following the instructions above.
2. Open the desired drawing and, on the **Drawing** ribbon tab, select **DWG/DXF**.
3. In the **DWG/DXF** property pane, browse to the folder where you have the DXF file converted from the PDF file and select the DXF file.
4. Adjust other properties if necessary.
5. Pick points in the drawing to place the frame where the linked DXF file will be added.

Related information

See also

[PDF Import Error: Failure during PDF File conversion \(11\)](#)

[Cannot import PDF into a Tekla Structures model](#)

[Changing the color of a PDF reference file](#)

[Text in imported PDF looks distorted](#)

3.9 3D PDF

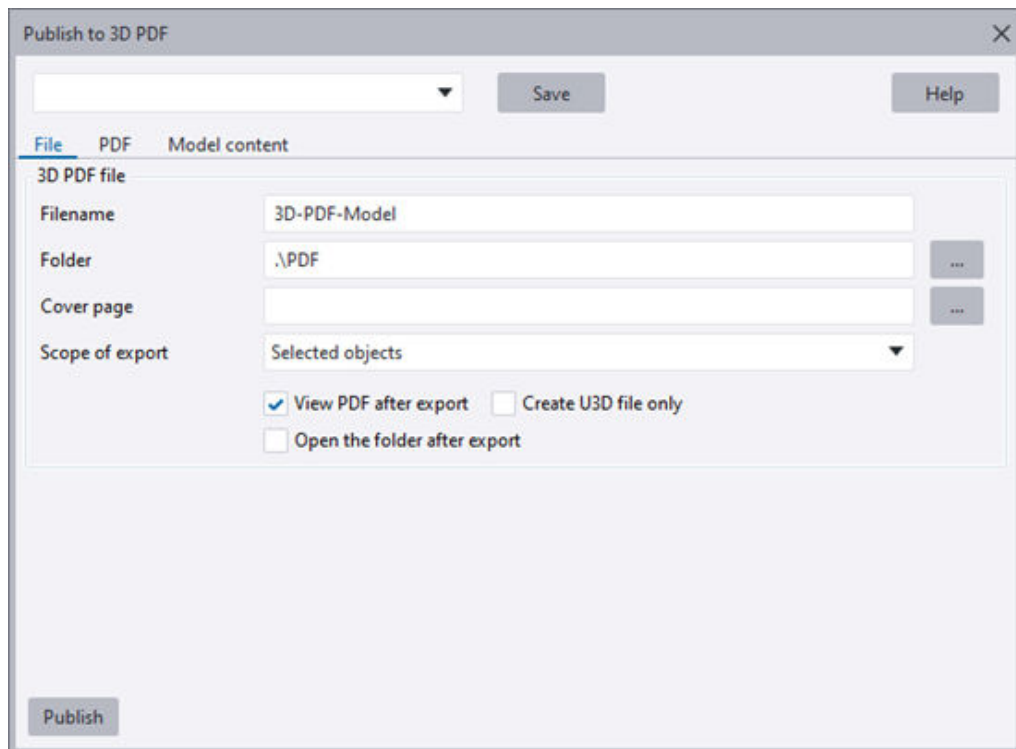
You can export the current model or the selected model objects as a 3D PDF file. The 3D PDF allows you to easily communicate your work to others: all the receiver needs is a PDF reader that supports 3D PDFs.

When you open the resulting 3D PDF file in a PDF reader, the 3D PDF looks exactly like the original 3D design. You can explore the model using the tools available in the PDF reader.

NOTE We recommend that you use Adobe Acrobat Reader, as all PDF readers do not support the 3D PDF format.

Export a model or selected model objects as 3D PDF

1. In modeling mode, click **File --> Export --> 3D PDF**.



2. Enter the desired filename and browse to the folder where you want to save the file. By default, the 3D PDF file is exported to the \PDF folder under the current model folder.
3. Check the other options on the **File**, **PDF**, and **Model content** tabs, and adjust the options to suit your needs. For more information about the settings, see section "3D PDF export settings" below.
4. If you want to export some objects only, select the objects in the model, and select **Selected objects** as the **Scope of export**. To export the whole model, select **All objects**.
5. When you are ready, click **Publish**. The 3D PDF file is exported to the export folder you defined. A message is displayed when the model has been converted.

3D PDF export settings

Setting	Description
File tab	
Cover page	Browse for a suitable PDF cover page.

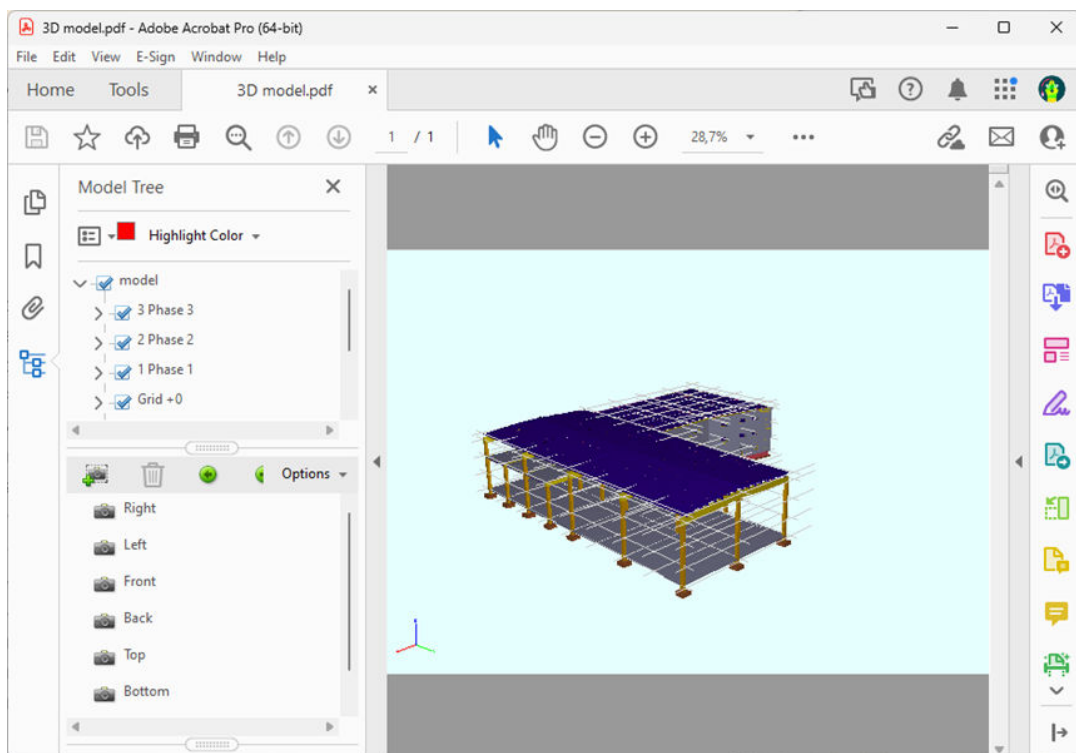
Setting	Description																										
View PDF after export	Open the 3D PDF in a PDF reader after the export.																										
Open the folder after export	Open the 3D PDF export folder after the export.																										
Create U3D file only	Export as a U3D file. The Universal 3D (U3D) format is a compressed file format standard for 3D computer graphics data.																										
PDF tab																											
Additional property sets	Select the IFC property set configuration file to include in the export. The properties defined in the property sets are shown in the model tree together with the standard part properties. The property sets can be defined in the IFC Property set definitions dialog. To show the additional properties in the PDF model tree, you need to select the Include part attributes option.																										
Include fasteners	Include fasteners in the export.																										
Include reinforcement	Include reinforcement in the export.																										
Include welds	Include welds in the export.																										
Include grids	Include grids in the export																										
Include part attributes	Include part properties in the export. When you select this option, and select a part in the model tree or in the PDF, the part properties will be displayed in the model tree. <table> <thead> <tr> <th>Property</th><th>Value</th></tr> </thead> <tbody> <tr> <td>Application.FullName</td><td>Tekla Structures</td></tr> <tr> <td>Application.Identifier</td><td>Multi material modeling</td></tr> <tr> <td>Application.Version</td><td>Work</td></tr> <tr> <td>GUID</td><td>3JRjTKpy5E_fVZtXo8roIU</td></tr> <tr> <td>Organization.Name</td><td>Trimble Solutions Corporation</td></tr> <tr> <td>OwnerHistory.ChangeAction</td><td>NoChange</td></tr> <tr> <td>OwnerHistory.CreationDate</td><td>Wed Jun 2 10:00:00 2021</td></tr> <tr> <td>OwnerHistory.State</td><td>Undefined</td></tr> <tr> <td>Person.FamilyName</td><td>Undefined</td></tr> <tr> <td>Person.Id</td><td></td></tr> <tr> <td>Product.Description</td><td>HEA600</td></tr> <tr> <td>Product.Name</td><td>COLUMN</td></tr> </tbody> </table>	Property	Value	Application.FullName	Tekla Structures	Application.Identifier	Multi material modeling	Application.Version	Work	GUID	3JRjTKpy5E_fVZtXo8roIU	Organization.Name	Trimble Solutions Corporation	OwnerHistory.ChangeAction	NoChange	OwnerHistory.CreationDate	Wed Jun 2 10:00:00 2021	OwnerHistory.State	Undefined	Person.FamilyName	Undefined	Person.Id		Product.Description	HEA600	Product.Name	COLUMN
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Person.Id																											
Product.Description	HEA600																										
Product.Name	COLUMN																										

Setting	Description																																																														
	When you have selected this option, the additional properties are shown in the model tree as well if you have selected a property set configuration file in Additional property sets. <table> <tr> <th>Property</th><th>Value</th></tr> <tr> <td>Application.FullName</td><td>Tekla Structures</td></tr> <tr> <td>Application.Identifier</td><td>Multi material modeling</td></tr> <tr> <td>Application.Version</td><td>Work</td></tr> <tr> <td>GUID</td><td>3JRjTKpy5E_fVZtXo8roLU</td></tr> <tr> <td>Organization.Name</td><td>Trimble Solutions Corporatic</td></tr> <tr> <td>OwnerHistory.ChangeAction</td><td>NoChange</td></tr> <tr> <td>OwnerHistory.CreationDate</td><td>Wed Jun 2 10:00:00 2021</td></tr> <tr> <td>OwnerHistory.State</td><td>Undefined</td></tr> <tr> <td>Person.FamilyName</td><td>Undefined</td></tr> <tr> <td>Person.Id</td><td></td></tr> <tr> <td>Product.Description</td><td>HEA600</td></tr> <tr> <td>Product.Name</td><td>COLUMN</td></tr> <tr> <td>Property.AssemblyActualEn...</td><td>Sun Jan 28 02:00:00 2024</td></tr> <tr> <td>Property.AssemblyActualSta...</td><td>Sun Jan 7 02:00:00 2024</td></tr> <tr> <td>Property.AssemblyErectionC...</td><td>DONE</td></tr> <tr> <td>Property.AssemblyErectionC...</td><td>002</td></tr> <tr> <td>Property.AssemblyErectionC...</td><td>CLEARN</td></tr> <tr> <td>Property.AssemblyErectionS...</td><td>80%</td></tr> <tr> <td>Property.AssemblyPlannedE...</td><td>Sun Oct 29 03:00:00 2023</td></tr> <tr> <td>Property.AssemblyPlannedS...</td><td>Sun Oct 1 03:00:00 2023</td></tr> <tr> <td>Property.COG_X</td><td>24000.000000 mm</td></tr> <tr> <td>Property.COG_Y</td><td>0.000000 mm</td></tr> <tr> <td>Property.COG_Z</td><td>3610.000000 mm</td></tr> <tr> <td>Property.END_X</td><td>24000.000000 mm</td></tr> <tr> <td>Property.END_Y</td><td>0.000000 mm</td></tr> <tr> <td>Property.END_Z</td><td>7200.000000 mm</td></tr> <tr> <td>Property.Name</td><td>HEA600</td></tr> <tr> <td>Property.START_X</td><td>24000.000000 mm</td></tr> <tr> <td>Property.START_Y</td><td>0.000000 mm</td></tr> <tr> <td>Property.START_Z</td><td>0.000000 mm</td></tr> </table>	Property	Value	Application.FullName	Tekla Structures	Application.Identifier	Multi material modeling	Application.Version	Work	GUID	3JRjTKpy5E_fVZtXo8roLU	Organization.Name	Trimble Solutions Corporatic	OwnerHistory.ChangeAction	NoChange	OwnerHistory.CreationDate	Wed Jun 2 10:00:00 2021	OwnerHistory.State	Undefined	Person.FamilyName	Undefined	Person.Id		Product.Description	HEA600	Product.Name	COLUMN	Property.AssemblyActualEn...	Sun Jan 28 02:00:00 2024	Property.AssemblyActualSta...	Sun Jan 7 02:00:00 2024	Property.AssemblyErectionC...	DONE	Property.AssemblyErectionC...	002	Property.AssemblyErectionC...	CLEARN	Property.AssemblyErectionS...	80%	Property.AssemblyPlannedE...	Sun Oct 29 03:00:00 2023	Property.AssemblyPlannedS...	Sun Oct 1 03:00:00 2023	Property.COG_X	24000.000000 mm	Property.COG_Y	0.000000 mm	Property.COG_Z	3610.000000 mm	Property.END_X	24000.000000 mm	Property.END_Y	0.000000 mm	Property.END_Z	7200.000000 mm	Property.Name	HEA600	Property.START_X	24000.000000 mm	Property.START_Y	0.000000 mm	Property.START_Z	0.000000 mm
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Property.START_Y	0.000000 mm																																																														
Property.START_Z	0.000000 mm																																																														
Export as assemblies	Automatically select the corresponding assembly of the objects for the export.																																																														
Use current view colors	Use the colors in the model view in the exported 3D PDF.																																																														
Tree view	Select how to show the model content in the model tree: by model phases (Per phase) or by model objects (Per part name).																																																														
Solid accuracy	Show the solids with normal or high accuracy.																																																														

Setting	Description
Model content tab	
Page size	Select the desired page size.
Page orientation	Select the desired page orientation (Landscape or Portrait)
Background	Define the background color.
Light definition	Select the desired extra light effects. The options are: Artwork None White Day Night Hard Primary Red Cube CAD Headlamp
Rendering mode	Select the desired rendering mode. The options are: Solid Solid wireframe Transparent Transparent wireframe Bounding box Transparent bounding box Transparent bounding box outline Wireframe Shaded wireframe Hidden wireframe Vertices Shaded vertices Illustration

Setting	Description
	Solid outline Shaded illustration
Title	Enter a title for the PDF. The title is shown in the PDF properties.
Subject	Enter a subject for the PDF. The subject is shown in the PDF properties.
Author	Enter the author of the PDF. The author is shown in the PDF properties.

Below is an example of a 3D PDF in Adobe Acrobat Pro. The model content is listed in the model tree by phases.



3.10 SketchUp

You can export Tekla Structures models as .skp files to be used in Trimble SketchUp.

Trimble SketchUp is a modeling software used in architecture, construction, engineering, and landscape architecture, for example. [3D Warehouse](#) contains

lots of SketchUp models that you can import as reference models to Tekla Structures.

You can insert Sketchup files as reference models to Tekla Structures. For more information about inserting reference models, see [Insert a reference model \(page 175\)](#).

Tekla Structures supports SketchUp version 2021 and earlier in export and reference model insert.

Export a model to SketchUp

1. Select the model objects to export.
If you want to export all objects, you do not have to select anything. We recommend exporting large models in smaller portions.
2. On the **File** menu, click **Export --> SketchUp**.
3. On the **Parameters** tab, browse to the desired **Output file** location and enter the file name. By default, the file is exported to the model folder.
4. In **Version**, select the desired SketchUp version.
5. On the **Advanced** tab, select the objects that you want to export. You can export:

Parts

Reinforcing bars

Surface treatment

Pour objects

Bolts

Welds

6. Click **Create selected**.

If have not selected any model objects, and want to export everything, click **Create all**.

The export file is created in the specified folder.

3.11 Point clouds

Point clouds are groups of measured points on the surfaces of objects created with 3D laser scanners, such as Trimble X9 3D Laser Scanning System. In construction, the point clouds are mainly used in renovation projects to define the building or structure that is to be renovated. They can also be used to get the exact position of existing machinery, pipework, or landscape that need to be taken into consideration on the site. You can also use them to check execution by importing them as build points into a model to be compared to the design.

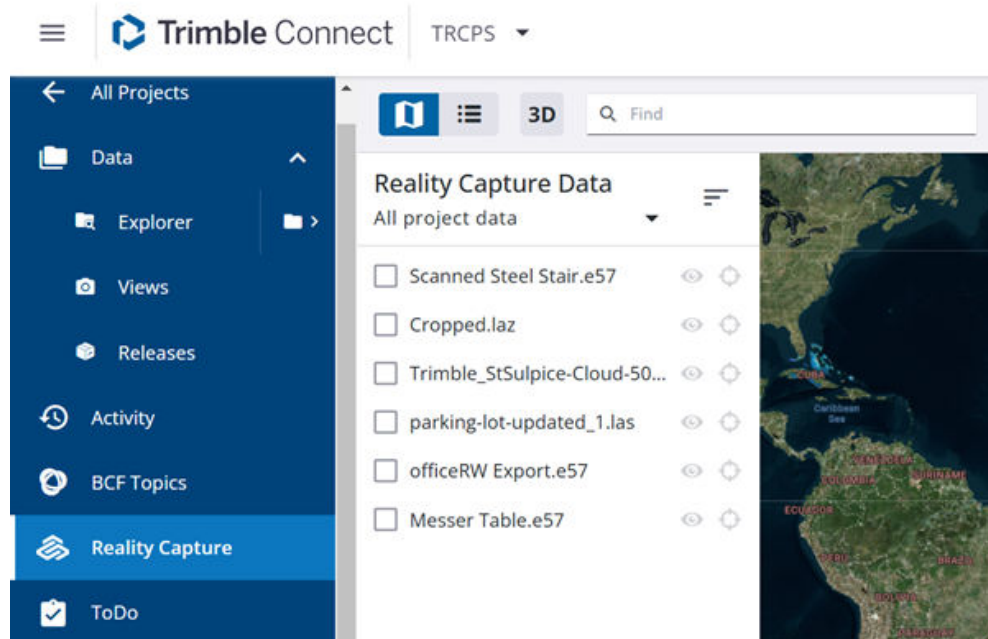
About point clouds in Tekla Structures

- You can attach a point cloud locally, from the internet, or using the Trimble Reality Capture platform service.
- **Local point clouds:**
 - The original, attached point cloud file is processed and cache files are created in the potree format. The point cloud conversion occurs as a background process, and you can continue working with Tekla Structures meanwhile.
 - Point cloud data is stored in the folder defined by the advanced option `XS_POINT_CLOUD_CACHE_FOLDER`. By default, the folder is `%LocalAppData%\Trimble\Tekla Structures\PointClouds`, for example, `C:\Users\<user>\AppData\Local\Trimble\Tekla Structures\PointClouds`. The `XS_POINT_CLOUD_CACHE_FOLDER` advanced option is user specific, and it is located in the **File locations** category in the **Advanced options** dialog.
 - If the point cloud file is in the potree format already, then the original file is used without any conversion or copying to the `..\PointClouds` folder.
 - If you have a point cloud on a local computer, you work with a model in a network folder, and you attach the point cloud from the local computer, no one else can see it, because it is on the local computer. Point clouds are always personal data.
 - If the same point cloud is used in several models, it will not be converted again or duplicated when you attach it. If point clouds are identical, the existing converted file is used, otherwise the file is converted.
 - It may be useful to use a network drive for the potree file in a project. The file will not be copied to the local computer.
- **Point clouds from internet:**
 - When you use point clouds through the internet, the point cloud web streaming cache is a common cache with Trimble Connect for Windows. You can define the cache folder using the advanced option `XS_POINT_CLOUDS_WEB_CACHE` in the **File locations** category in the **Advanced options** dialog. By default, the folder is `%LocalAppData%\Trimble\Trimble Connect\Import`, for example, `C:\Users\<user>\AppData\Local\Trimble\Trimble Connect\Import`.
 - The cache usage improves the performance of the web streamed point clouds.
- **Point clouds from Trimble Reality Capture platform service:**
 - When you attach and show point clouds stored in Trimble Reality Capture platform service, you do not need to store large point clouds

files locally on your computer but you can attach point clouds hosted in an existing Trimble Connect project.

- Point clouds from Trimble Reality Capture are not converted to the potree format by Tekla Structures. The Trimble Reality Capture platform service in Trimble Connect does the conversion if needed when point cloud is uploaded there.
- Point clouds from the Trimble Reality Capture platform service use the same web streaming cache as the point clouds from the internet.
- Trimble Reality Capture platform service license is required for the point cloud provider (surveyor or other scanner owner) to store and share the scan data: Streaming point clouds from Trimble Reality Capture platform service does not require a separate license. The license is required for the point cloud provider to store and share the scan data in the Trimble Reality Capture platform service. Trimble Connect users can use the Trimble Reality Capture platform service by just toggling the button in the Trimble Connect user interface to access it. Users will get 10 gigabytes as free storage so it is easy to trial and if they need more storage beyond that they can purchase a license.
- To learn more about the service, see [Trimble Reality Capture](#).

Point clouds in Trimble Connect:



- When you attach a point cloud to a Tekla Structures model, you can place it either by the model origin or a defined base point.
- In Tekla Structures, point clouds have colors if the original file format supports colors.
- Point clouds can be seen in both the OpenGL model view and in the DX model view. The DX model view with perspective projection may give better

visual results. Performance with a bigger amount of data and/or larger number of views is better with Open GL than DX rendering.

Compatible file formats

ASCII (.asc, .xyz)

E57 (.e57)

LAS (.las)

LAZ (.laz)

SDB (.sdb)

PTS (.pts)

PTX (.ptx)

Potree (.js, .json)

Trimble scan format (.tzf)

Trimble TDX format (.tdx)

Limitations

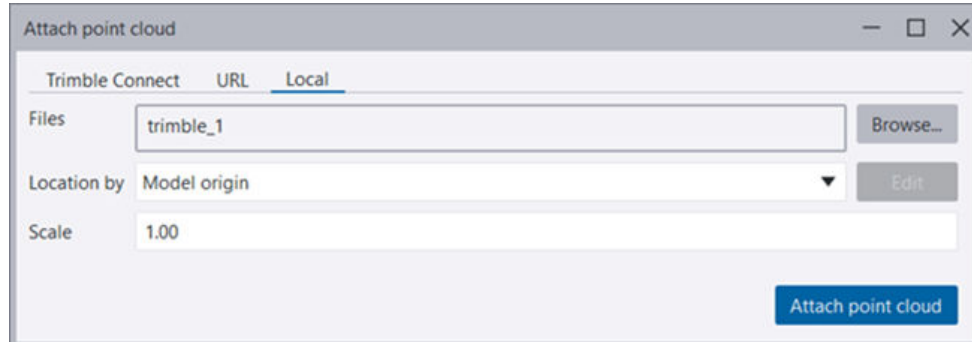
- Some basic Tekla Structures model handling functionalities are not available, such as select, undo, move, rotate, copy, and context menu on right-click.
- Point clouds are not autosaved.
- You cannot delete a point cloud from the point clouds list using the keyboard button **Delete**.
- Point clouds are not visible in drawings.
- Local point clouds are not shared in Tekla Model Sharing or in multi-user mode.
- For the file formats ASCII, PTS: On each text line, the first three fields must be: x y z. For colored point data, the last three fields must be: r g b

Attach a point cloud to the model

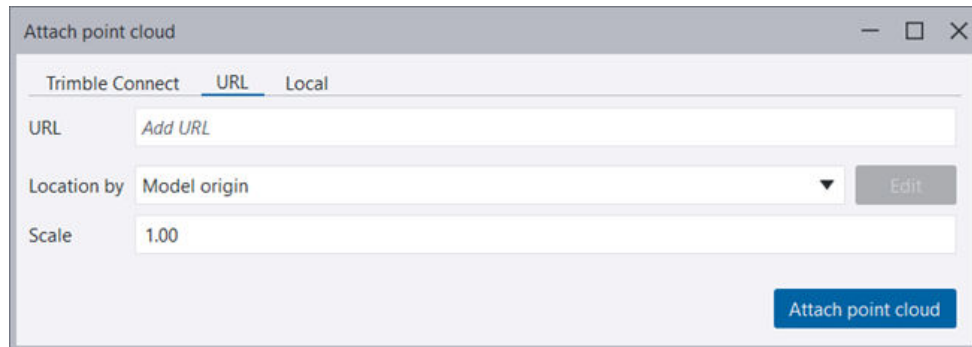
1. Click the **Point clouds** button  in the side pane.
2. To place the point cloud inside the work area, select the **Show inside work area only** checkbox.
3. Click **Attach**.
4. Do one of the following depending on if you are attaching the point cloud locally, from the internet, or using the Trimble Reality Capture platform service:

- **Attach a point cloud locally:** In the **Attach point cloud** dialog, on the **Local** tab, browse for the point cloud file.

You can also drag point clouds from Windows Explorer, and insert several point clouds at a time.



- **Attach a point cloud from the internet:** In the **Attach point cloud** dialog, on the **URL** tab, enter the URL address of the point cloud.



When you are using a point cloud from the internet, you need to create the HTTP directory structure potree that you can create with [Point Cloud Manager](#).

Select the source for conversion

You're about to start converting the project.

Source

Oi

Points : 332240

Files : 1

Created : 23.1.2018 13.56.34

Created by : User

Modified : 23.1.2018 13.56.34

Modified by : User

Coordinate system :

Reset source coordinate system to

▼

▼ Conversion settings

XYZ format ⓘ

Intensity ☐

RGB ☒

Output to

Database file ☐

Directory structure ☒

Output format

BINARY ▼

Output quality

DEFAULT ▼

Output coordinate system

▼

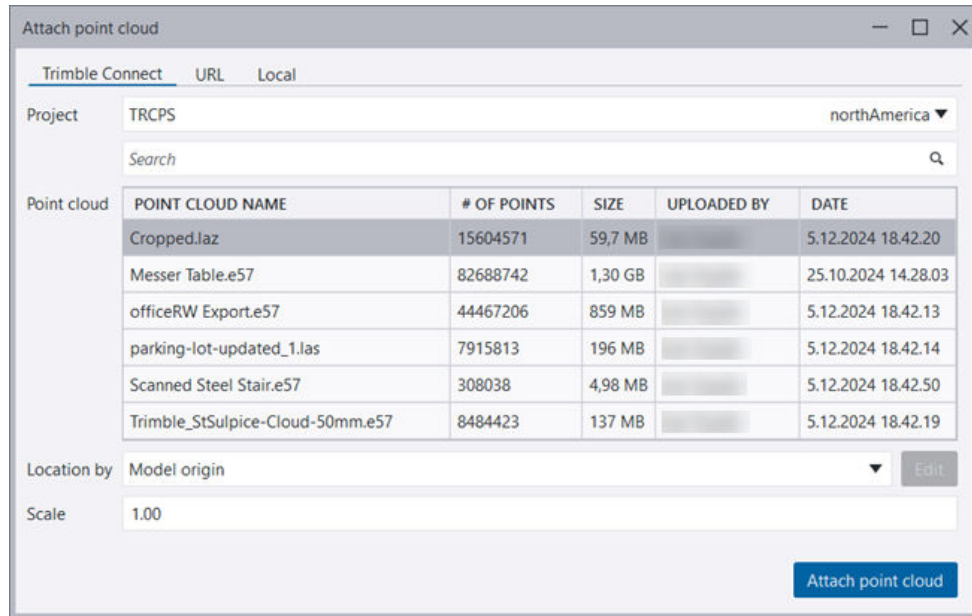
Start

- Attach a point cloud using Trimble Reality Capture:** In the **Attach point cloud** dialog, on the **Trimble Connect** tab, select a Trimble Connect project. A loading spinner  is displayed while the point clouds for the selected project are being loaded. Select a point cloud hosted in the Trimble Connect project.

You can browse to any Trimble Connect project that has point clouds in the service without needing to do anything specific in the Tekla Structures model.

You can also search for a point cloud.

Once the point cloud is attached, it will no longer be available for attaching again in the **Attach point cloud** dialog.



To learn more about the service, see [Trimble Reality Capture](#).

5. In **Location by**, select one of the following:
 - **Model origin:** Place the point cloud in the model origin.
 - A base point: Place the point cloud in the real world coordinates.
You can edit the selected base point. To do this, click the **Edit** button.
 - **Auto-created base point:** Select this option to get the point cloud near the model origin. Select this option if you do not know the coordinate system of the point cloud. An automatic base point with point cloud bounding box min x, min y, and min z coordinates will be created in Tekla Structures origin.
6. Change the point cloud scale, if needed.
7. Click **Attach point cloud**.
8. To show the point cloud in the model, select the model view where you want to show it, and click the eye button  next to the point cloud in the list.

When you select a model view, the view gets a yellow frame.

When the point cloud is set visible in the model view, you can see the min x, min y, and min z coordinates of the point cloud bounding box on the status bar.

To hide the point cloud, click the eye button .

When you are modeling, you can snap to points for modeling and measuring distances. You can use clip planes and clip boxes in point clouds to show exactly what you want, for example, clip off the roof and some of the floors

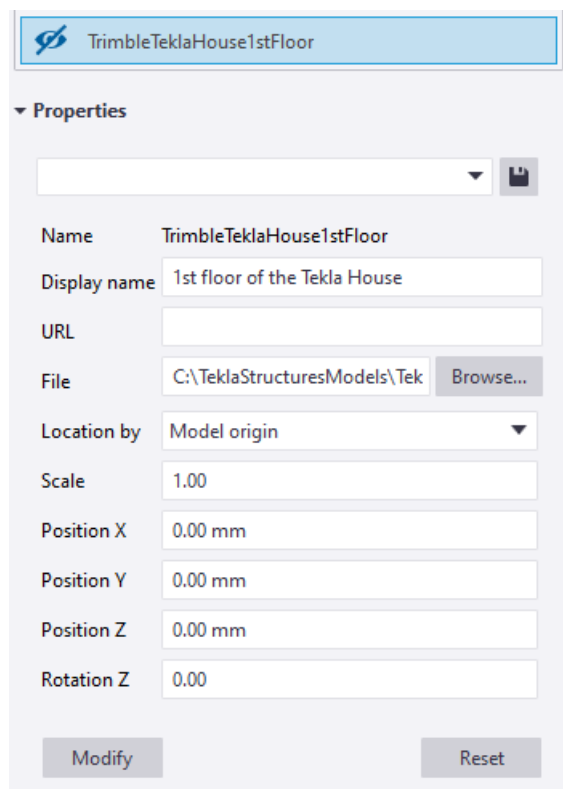
so that you can see the bottom floor of the building, and everything there that needs your attention in the planning phase. You can also use the [Clipper tool](#) in Tekla Warehouse for handling several clip planes at a time, and split the model to smaller pieces for visualization and modeling.

Modify point cloud properties and visualization settings

You can modify the point cloud properties and visualization settings when you have attached a point cloud, and DirectX rendering is active.

The point cloud **Visualization settings** are view specific and settings are enabled for one view only, the name of which can be seen at the top of the **Point clouds** side pane (if you have not selected multiple views). The **Properties** settings are enabled only if the point cloud is selected from the list.

1. When you have attached the point cloud, select it from the point clouds list in the side pane, otherwise you cannot modify its properties.



The screenshot shows the 'Properties' panel for a point cloud. At the top, there is a header bar with a blue icon and the text 'TrimbleTeklaHouse1stFloor'. Below this, the 'Properties' section is expanded. It contains a dropdown menu with a folder icon, followed by several input fields: 'Name' (TrimbleTeklaHouse1stFloor), 'Display name' (1st floor of the Tekla House), 'URL' (empty), 'File' (C:\TeklaStructures\Models\Tek with a 'Browse...' button), 'Location by' (Model origin), 'Scale' (1.00), 'Position X' (0.00 mm), 'Position Y' (0.00 mm), 'Position Z' (0.00 mm), and 'Rotation Z' (0.00). At the bottom, there are 'Modify' and 'Reset' buttons.

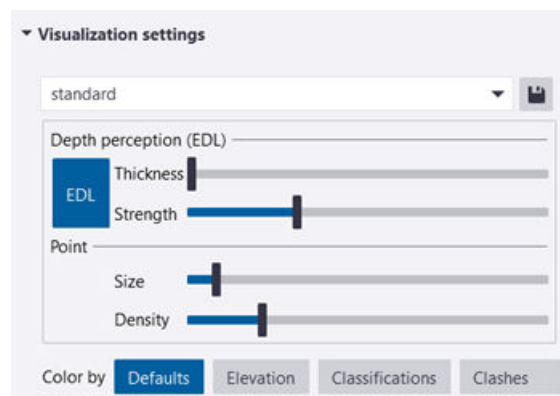
2. In **Display name**, define the desired display name for the point cloud. In addition to the display name, the point cloud has the actual point cloud file name, which you cannot change.
3. **URL** shows the point cloud URL address for point clouds from the internet or from the Trimble Reality Capture platform service. You can change the URL if necessary.

4. **File** shows the folder path of the point cloud file. You can change the path if necessary.
5. Adjust the point cloud location, scale and rotation.

Use the **Reset** button to return the values that we saved for the point cloud the last time.

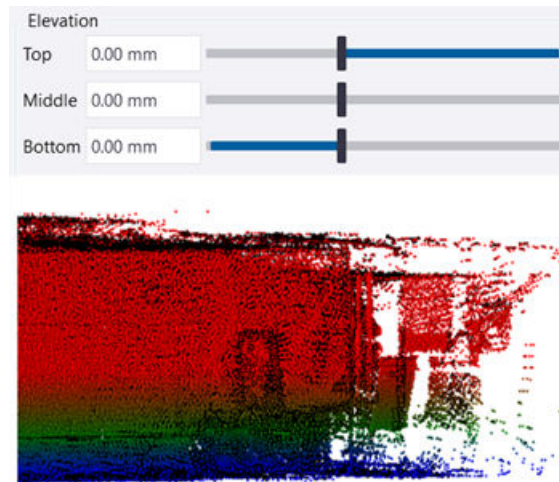
If you need to move a point cloud once it has been attached, you first need to create a new base point or update the existing base point, remove the point cloud, and then re-attach the point cloud.

6. Click **Modify**.
7. In **Visualization settings - Depth perception (EDL)**, use the EDL (Eye-dome lighting) effect to improve the depth perception of the point cloud. Drag the sliders to increase or decrease the outline thickness and strength of the point cloud. You can deactivate the EDL effect by clicking the **EDL** button.

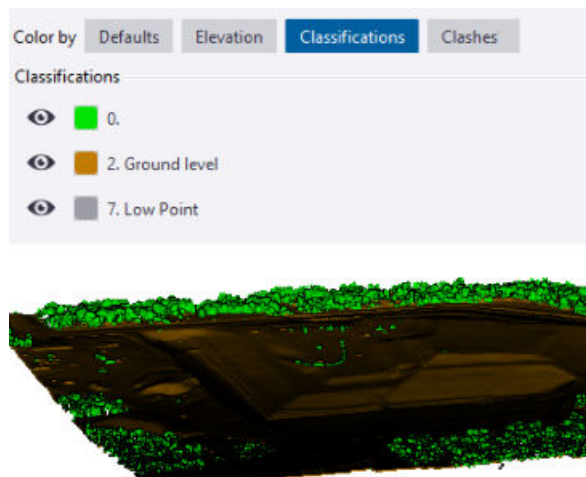


8. In **Visualization settings - Point**, adjust the size and density of the points by dragging the sliders.
9. In **Visualization settings - Elevation**, change the point cloud colors. Normally, the default color values are in use. The visualization settings are view specific and therefore you can use different settings in different views.

- You can color the point cloud by elevation by dragging the sliders.

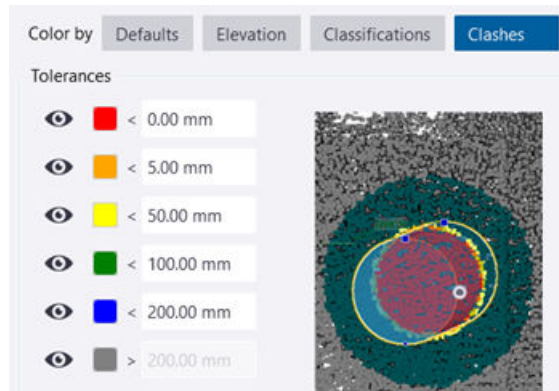


- If the point cloud contains classifications, you can change the color of the classification category points or hide them in **Visualization settings - Classifications**.

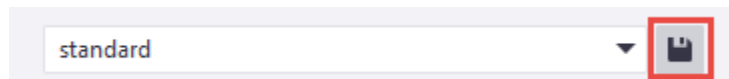


- In **Visualization settings - Clashes**, check clashes and deviations by using different colors for different tolerances. You can detect points that are inside or within a distance from the selected parts and selected reference model objects based on the settings you define. Clash check between point clouds and pour objects is also supported.

Note that rendered objects coloring may cause confusing results. It is recommended to use **Ctrl+1** and **Shift+1** visibility modes to get unambiguous results.



10. Save the properties and visualization settings for future needs.



Detach a point cloud from a model

- To detach a point cloud, click  **Detach** next to the point cloud name in the **Point clouds** list. Then reopen the model or save the model.

Note that you cannot detach the point cloud by pressing **Delete** on the keyboard.

The local point clouds are cached to the default location or to the location specified by the user. When a local point cloud is no longer used in any Tekla Structures model, it is cleaned from cache.

Set the default maximum point count in a view

You can use the advanced option `XS_SET_MAX_POINT_CLOUD_POINT_COUNT` to set the default maximum value for the points in a view. The default value is 10 000 000 (10 million). Restart Tekla Structures if you change the value.

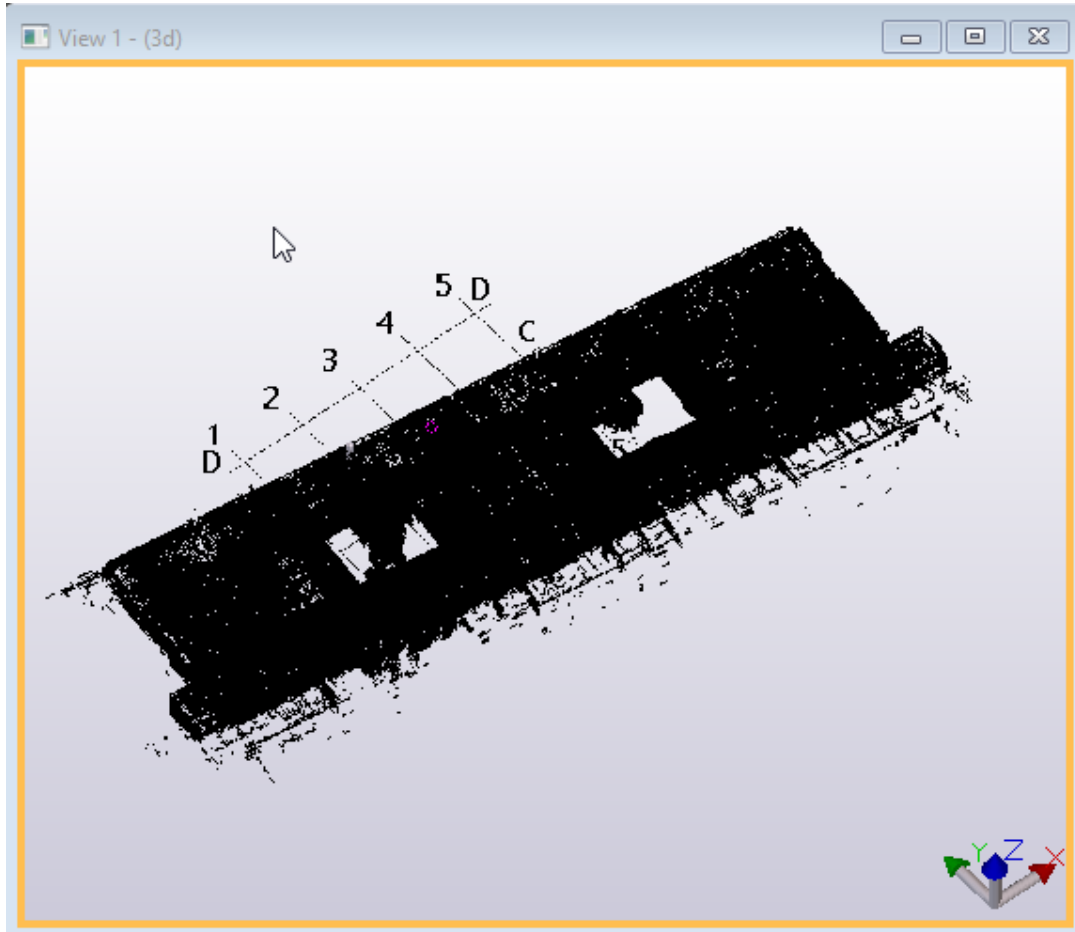
Clip point clouds and reference models only

To only clip point clouds and reference models with clipping tools, in the model, go to **View** --> **Clipping** and select the **Clip only reference objects** checkbox. Native Tekla Structures objects are not clipped. By default, this checkbox is not selected.

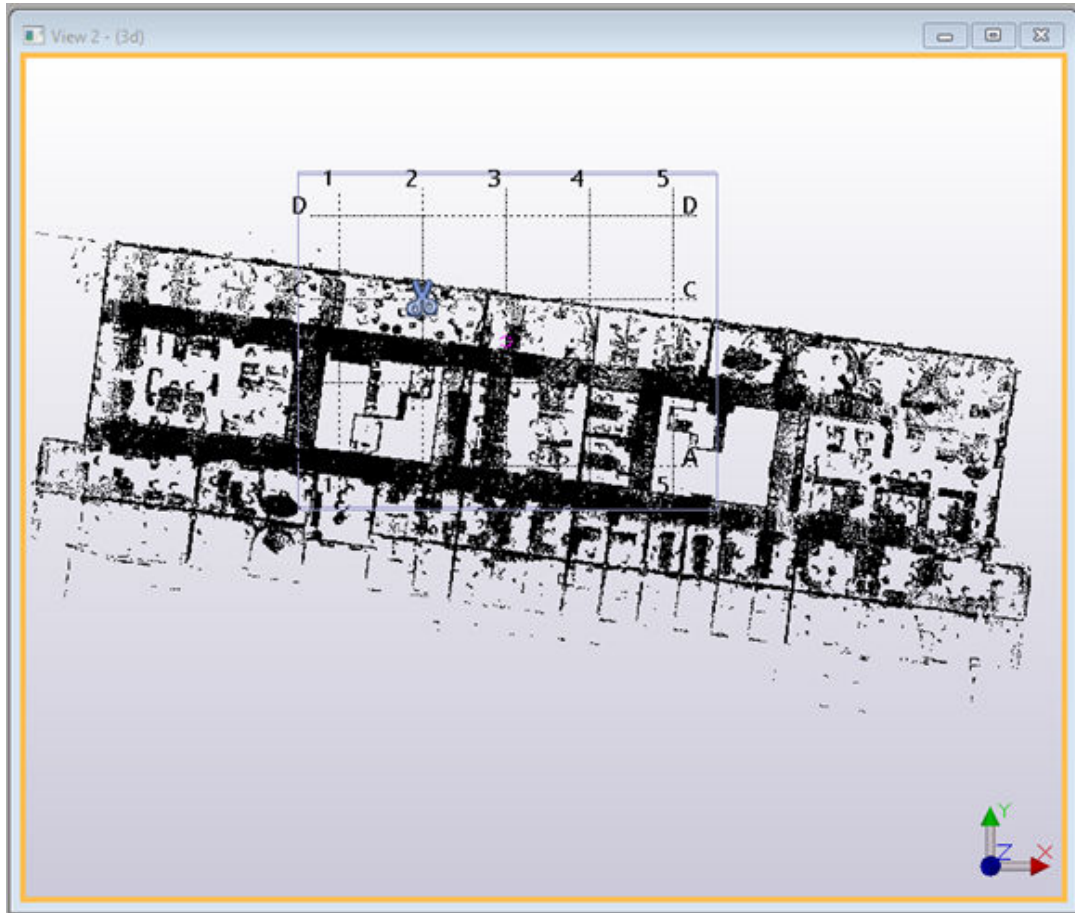
Redraw the model views after changing the value.

Point cloud example

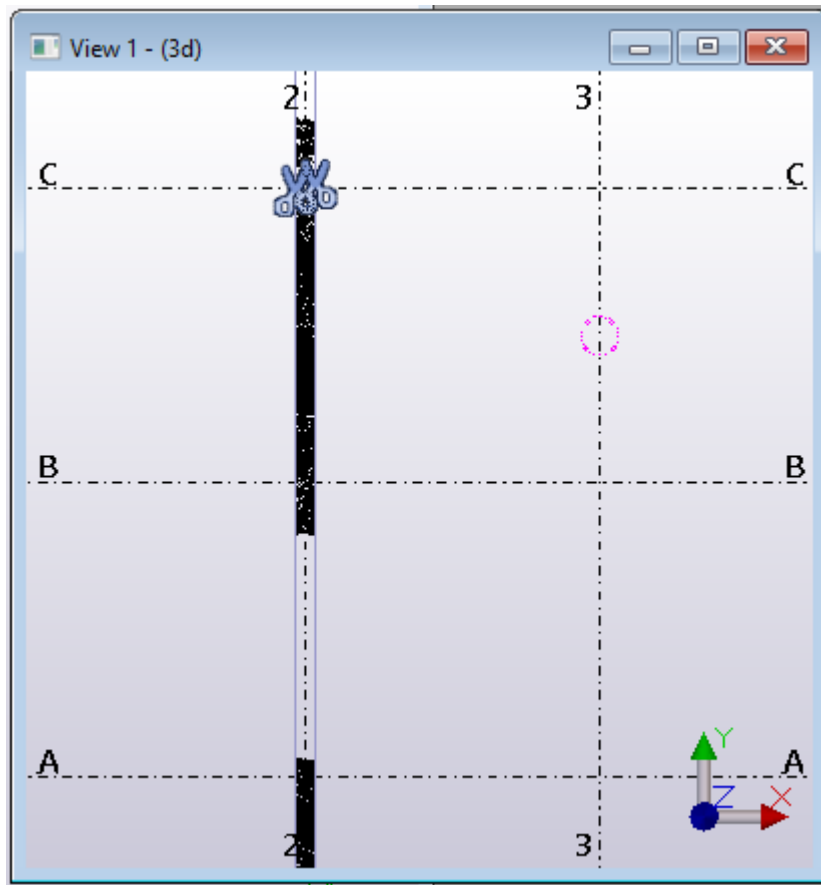
In the first image below, a point cloud has been attached to a model in a plan view. Remember to select a model view and click the eye button , otherwise the point cloud will not be shown.



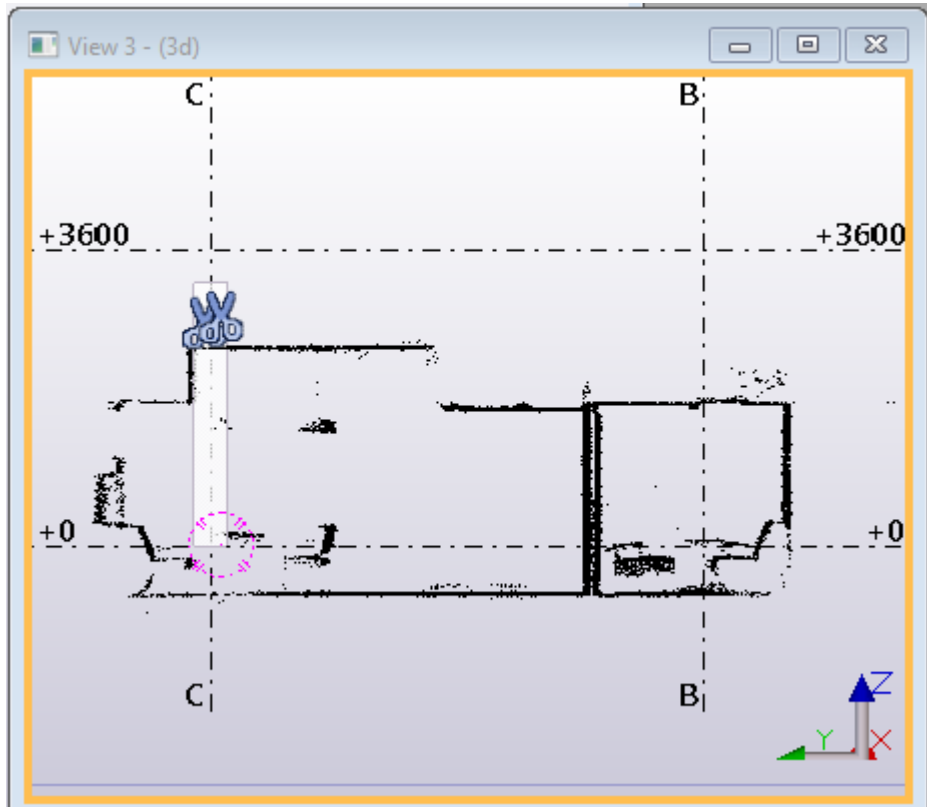
In the next image, the clip plane tool has been used to cut off floors and other structures:



In the next image, a section has been cut to be used in a section view:



The last image shows the section view:



Share local point clouds with other users using potree file

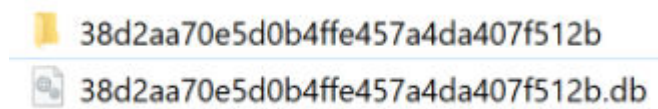
Point clouds are normally so large in file size that it is not sensible to share the point cloud as a part of the model data. Point cloud is not structural domain data but project data that is not a part of the model, and therefore it is not dependent on the model save. However, there is need for multiple persons to use the same point cloud model efficiently. You can use the potree file for sharing the point cloud. The best practices in sharing the point cloud potree file among model users are explained below. You first need to create the potree file and copy the potree file to a shared location, and then other users can attach it to their Tekla Structures model.

Create a potree file

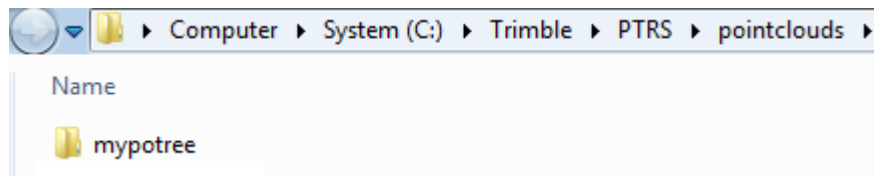
Option 1: With Tekla Structures

1. Create a potree file by attaching a point cloud model to a Tekla Structures model.

The potree file is created in the folder defined by the advanced option `XS_POINT_CLOUD_CACHE_FOLDER`. The potree file is named as `<potree_name>.db`, and it has a folder with the same name. For example:



2. Copy both the <potree_name>.db file and the related folder to a shared location. You can rename the model if you want, in which case you also need to rename the folder.



NOTE Do not replace existing potree data, especially if it is used by other users.

Option 2: With Point cloud manager

For detailed instructions for creating a potree file with **Point cloud manager**, see section "Create a potree file with Point cloud manager" in "Hosting your own potree point cloud data".

Attach a potree from a shared location

1. Open Tekla Structures and the **Point clouds** pane from the side pane.
2. Browse to the point cloud folder (mypotree in the example above) and select the point cloud .js file. Then follow the instructions above for attaching the point cloud.

3.12 Layout manager

Use **Layout manager** to import and export layout data between Tekla Structures and a field layout device, such as Trimble® LM80, and between Tekla Structures and Trimble Connect. **Layout manager** enables you to use accurate model data on the construction site.

When you want to import and export layout data, we recommend that you first set up groups in **Layout manager**, then model the [layout points \(page 316\)](#), [layout lines \(page 318\)](#), and [layout arcs \(page 319\)](#), and organize them in the groups. The points, lines, and arcs are used in a layout device on the construction site to position parts correctly.

Once you have defined and organized the layout data, you can export the data from **Layout manager** in different export formats: point file (.txt), CSV file (.csv), job file (.cnx), and Trimble FieldLink file (.tfl) and (.tflx).

You can check and measure the positions of the exported layout points (design points) on the site using a field layout device. The layout device helps you

to position the parts correctly on the site, because then the points along the part boundaries can be placed to the correct locations. To place the part boundaries correctly, measure the as-built positions of the parts on the site and create measured points along the part boundaries.

When you have measured the as-built positions and created measured points, you can import the points to Tekla Structures. You can first preview the points in **Layout manager**. Finally, you can view the measured points in the model.

To import and export directly with a handheld mobile device, such as Trimble® LM80, you need to connect your computer to the device. Your computer needs to have software that enables it to communicate with a mobile device. For information on how to connect your computer to Trimble layout devices, see the Trimble website.

See also

[Set up groups in Layout manager \(page 312\)](#)

[Export layout data from Layout manager \(page 321\)](#)

[Import layout data to Layout manager \(page 324\)](#)

[Example: Base point use in Layout manager \(page 329\)](#)

Set up groups in Layout manager

You can create groups in **Layout manager** to organize layout points, layout lines, and layout arcs suitably.

Base points in Layout manager

You can use base points in **Layout manager** when defining the location of layout points. You can use the base points that have already been defined in the model, and you can define new base points in **File --> Project properties --> Base points**. **Layout manager** uses the **Location in the**

model coordinates that you define for base points, and the **East coordinate**, **North coordinate**, and **Elevation** coordinates.

The 'Base point' dialog box contains the following fields and controls:

- Name:** Old Trimble Building (with a dropdown arrow, a plus button, a lock button, and a delete button).
- Description:** Old Trimble Building in Espoo, Finland
- Coordinate system:** ETRS-GK25
- East coordinate (E):** 25489283613.00 mm
- North coordinate (N):** 6674830501.00 mm
- Elevation:** 3557.00 mm
- Latitude:** 60.186171
- Longitude:** 24.806864
- Location in the model:**
 - X: 6000.00 mm
 - Y: 6000.00 mm
 - Z: 0.00 mm
- Angle to North:** 26.408
- Buttons:** Modify, Project base point (checkbox), Close, Zoom to, Pick (two buttons).

When you add, modify, or delete base points in **File --> Project properties --> Base points**, check that the base point data is up to date in **Layout manager**.

- The base points that you add are shown in the **Group local coordinate system** list for the groups in **Layout manager**.
- If you delete a base point that is linked to a group in **Layout manager**, Tekla Structures recreates that base point so that it can still be used in **Layout manager**.
- If you modify a base point that is used in **Layout manager**, Tekla Structures shows a message about the base point use in **Layout manager**. You can either use the modified coordinates in **Layout manager**, or you can select not to use them. If you select not to use them, the coordinates of the base point will then be different in Tekla Structures and in **Layout manager**.

When you open an existing model in a Tekla Structures version where **Layout manager** uses the base point functionality, **Layout manager** creates base points based on the group local coordinate systems that are not in the model

origin [(0,0,0) & no rotation]. The created base points are added to the groups in **Layout manager** and shown in the **Group local coordinate system** list. The base points are also shown in the list of base points in **File --> Project properties --> Base points**. The description text in the **Base point** dialog shows that the base point has been created by **Layout manager**.

Define a default coordinate system for groups

You can define a default base point to set the default coordinate system for all new groups that you create in **Layout manager**. You can use the groups in **Layout manager** to organize layout points, layout lines, and layout arcs.

1. On the **Manage** tab, click **Layout manager**.
2. In **Layout manager**, select **Layout Manager Object Group** to show the available **Group local coordinate system for new groups** list.
3. Select from the list the base point that you want to use, the model origin, or the current work plane.

The base points that have been defined in the model are available in the list. If you have added new base points to the model since you opened **Layout manager**, check that the new base points are available in the list.

You can change the group default coordinate system at any time by selecting another option from the list. Note that the default coordinate system only applies to new groups. The existing groups are not changed.

Define numbering settings for groups

You can define that all groups in **Layout manager** have the same numbering settings. When you change the settings, the changed settings are used in all groups that you create after the change. The settings in the existing groups are not changed.

1. On the **Manage** tab, click **Layout manager**.



2. Click the **Settings** button.
3. In the **Settings** dialog, click **Group**.
4. Define the numbering settings.

- a. Enter a prefix in the **Prefix** box.

You can also leave the prefix empty to create the layout point, layout line, and layout arc names without a prefix.

- b. In the **Start number** box, enter a start number.
- c. In the **Number max length** box, enter the maximum length for the number.

- d. In the **Delimiter** box, enter a delimiter, either a hyphen or an empty space, to separate the prefix and the number.
 - e. From the **Fill leading space** list, select whether the leading space in front of the number is filled with zeroes, for example, `PFX 00001` or `PFX 1`.
5. Click **Save**.

NOTE You can modify the numbering settings of an individual group if you do not want to use the default settings. Right-click the group, select **Auto naming**, and change the settings in the dialog. To restore the default settings, click **Reset**.

Create a group in Layout manager

1. On the **Manage** tab, click **Layout manager**.

2. Click the **New group**  button.

You may want to set up several groups so that you can organize the layout points, lines, and arcs into groups as they are modeled.

3. Enter a name for the group in the **New group name** dialog and click **Create**.

A group name can have 79 characters.

4. Enter a description for the group, if needed.
5. Select the **Group local coordinate system**.

The coordinates are immediately applied when selected.

If you do not want to use the default base point, you can select some other suitable base point, the model origin, or the current work plane.

6. Check the numbering settings of the group.

The groups that you create use the default numbering settings defined in the **Layout manager Settings**. If you want to change the numbering settings, right-click the group and select **Auto naming**. Then change the settings in the **Auto naming** dialog.

Layout manager may show an **Unassigned** group in the tree structure. The **Unassigned** group shows layout points and layout lines that have inadequate group information. Such points and lines have usually been created in an earlier **Layout manager** version.

View the contents of groups in Layout manager and in the model

You can do any of the following:

To	Do this
View location coordinates of points	When you have selected a coordinate system for the group and added layout points to the group, you can view the location coordinates of the points in Layout manager. Select a point in the group to show the coordinates of the point. • Location in the model shows the point location compared to the model origin. • Location in the group shows the point location compared to the group local coordinate system. • East, North, Elevation shows the coordinates that represent the corresponding X, Y and Z coordinates.
Highlight the layout points, lines and arcs in the model	You can highlight the contents of a group in the model. Select a group in Layout manager and click the Auto highlight button. Click in the model background to remove the highlighting. If you want to highlight the contents of all groups in the model, select Layout Manager Object Group in Layout manager and then click the Auto highlight button.
Set units for Layout manager	Use the XS_IMPERIAL advanced option to control which units are used in Layout manager. Set the advanced option to TRUE to display imperial units, otherwise metric units are used. You can modify the distance accuracy settings of units in the Layout manager Settings , under the General section.

Create a layout point

Use the **Layout point** tool to create layout points. The layout points that you create in the model are design points that you can export to use in a layout device, such as Trimble® LM80.

Before you start:

- Ensure that the **Select components**  selection switch is activated.

1. On the **Manage** tab, click **Layout manager**.

2. Click the **Layout point**  button to start creating layout points.

Tekla Structures opens the **Layout point** dialog and the **Applications & components** catalog in the side pane.

3. In the **Layout point** dialog, define the layout point properties on the **Parameters** tab:

a. Enter a name and a description for the layout point.

You can use the following special characters in layout point names: _
~ % ! @ # & . = + - and space.

Note that the maximum length of the name is 16 characters if you export layout data to .cnx, .tfl, and .tflx file formats. When exporting to a text file (.txt) or a CSV file (.csv), there is no limitation in the number of characters in the name. The maximum length of the description is 24 characters.

If you do not enter a name, **Layout manager** adds a number as the name.

b. Enter the diameter of the layout point in the **Size** box.

Layout manager uses the `XS_IMPERIAL` advanced option to determine the units. Set `XS_IMPERIAL` to `TRUE` to use imperial units.

c. Select whether the layout point is a reference point.

A reference point is a mapping point to another coordinate system, such as a geo-spatial coordinate system or a municipal monument.

d. Select a class for the layout point.

e. Select a shape for the layout point.

f. Enter a name for the part that the **Layout point** tool creates in the model.

g. Select a group from the **Group Name** list or create a new group by entering a name.

These groups are the groups that are listed in **Layout manager**.

h. Click **Apply**.

Note that the **Is Stakeout Point** and **Is Field Point** properties are not available for the points that you are defining in the model. For imported points, **Is Stakeout Point** shows whether the point is a measured point as staked in the Trimble® LM80 device if it deviates from the corresponding layout point created in the model. **Is Field Point** shows whether a point

is a field point that has been measured on the construction site and imported to Tekla Structures.

4. Select a location for the layout point in the model.

The layout point is created when you select the location, and it is added to the group that you selected in the **Layout point** dialog. To close the dialog, click **OK**.

TIP You can also add a layout point to a group in **Layout manager**. Select the point in the model, then right-click the desired group in **Layout manager** and select **Add selected**.

TIP To zoom to a layout point in the model, right-click the point in **Layout manager** and select **Zoom selected**.

In **Layout manager**, you can highlight a layout point that you have selected in the model. First select a point in the model, then in **Layout manager**, click **Highlight** --> **Highlight selected model point**. Select **Redraw** to remove the highlighting.

See also

[Set up groups in Layout manager \(page 312\)](#)

Create a layout line

Use the **Layout line** tool to create layout lines. Layout lines are created between layout points.

Before you start:

- [Create layout points \(page 316\)](#) in your model.
- Ensure that the **Select components**  selection switch is activated.

1. On the **Manage** tab, click **Layout manager**.

2. Click the **Layout line**  button.

Tekla Structures opens the **Layout line** dialog and the **Applications & components** catalog in the side pane.

3. In the **Layout line** dialog, define the properties of the layout line:
 - a. Enter a name and a description for the layout line.

If you do not enter a name, **Layout manager** adds a number as the name.

- b. Enter the diameter of the layout line in the **Size** box.
Layout manager uses the `XS_IMPERIAL` advanced option to determine the units. Set `XS_IMPERIAL` to `TRUE` to use imperial units.
- c. Select a class for the layout line.
- d. Enter a name for the part that the **Layout line** tool creates in the model.
- e. Select a group from the **Group Name** list or create a new group by entering a name.

These groups are the groups that are listed in **Layout manager**.

- f. Click **Apply**.

Note that the **Is Field Line** property is not available for the lines that you are defining in the model. This property shows if a line is a field line that has been measured on the construction site and imported to Tekla Structures.

4. Select the first layout point.
5. Select the second layout point.

The start point and the end point cannot be in the same location.

The layout line is created, and it is added to the group that you selected in the **Layout line** dialog. To close the dialog, click **OK**.

TIP You can also add a layout line to a group in **Layout manager**. Select the line in the model, then right-click the group and select **Add selected**.

TIP To zoom to a layout line in the model, right-click the line in **Layout manager** and select **Zoom selected**.

You can highlight a layout line that you have selected in the model in **Layout manager**. First select a line in the model, then in **Layout manager**, click **Highlight** --> **Highlight selected model point**. Select **Redraw** to remove the highlighting.

See also

[Set up groups in Layout manager \(page 312\)](#)

[Create a layout point \(page 316\)](#)

Create a layout arc

Use the **Layout arc** tool to create layout arcs. Layout arcs are created between layout points.

Before you start:

- [Create layout points \(page 316\)](#) in your model.
 - Ensure that the **Select components**  selection switch is activated.
1. On the **Manage** tab, click **Layout manager**.
 2. Click the **Layout arc**  button.

Tekla Structures opens the **Layout arc** dialog and the **Applications & components** catalog in the side pane.
 3. In the **Layout arc** dialog, define the layout arc properties on the **Parameters** tab:
 - a. Enter a name and a description for the layout arc.

If you do not enter a name, **Layout manager** adds a number as the name.
 - b. Enter the diameter of the layout arc in the **Size** box.

Layout manager uses the `XS_IMPERIAL` advanced option to determine the units. Set `XS_IMPERIAL` to `TRUE` to use imperial units.
 - c. Select a class for the layout arc.
 - d. Enter a name for the part that the **Layout arc** tool creates in the model.
 - e. Select a group from the **Group Name** list or create a new group by entering a name.

These groups are the groups that are listed in **Layout manager**.
 - f. In **Is circle**, select how the arc is shown in the model. To show the arc as a complete circle, select **Yes**. This property is exported to and imported from `.tflx` files.
 4. Select the start layout point for the arc in the model.
 5. Select the end layout point for the arc in the model.
 6. Select a layout point on the arc.

The layout arc is created when you select the point on the arc, and it is added to the group that you selected in the **Layout arc** dialog. To close the **Layout arc** dialog, click **OK**.

TIP To zoom to a layout arc in the model, right-click the arc in **Layout manager** and select **Zoom selected**.

You can highlight a layout arc that you have selected in the model in **Layout manager**. First select the arc in the model, then in **Layout**

manager, click **Highlight** --> **Highlight selected model point**. Select **Redraw** to remove the highlighting.

Export layout data from Layout manager

You can use **Layout manager** to export layout data from your model.

You can first export the layout data from **Layout manager** to a file and move the file later to a layout device, such as Trimble® LM80. You can also export layout data from **Layout manager** to Trimble Connect. Alternatively, you can export a file directly to a layout device. You can do this if you connect the layout device to your computer using a USB, or with a Bluetooth connection.

Export layout data

1. On the **Manage** tab, click **Layout manager**.

2. If needed, check from the **Settings**  that the default export settings are as intended, and modify the settings if needed.
3. Select the [group \(page 312\)](#) that you want to export.

The points in the group are exported according to the group local coordinate system. The local coordinates of the points are shown in the export dialog.

4. In **Layout manager**, click **Export** .
5. Select the file type for the export.
 - **Export point file (.txt)** to export [layout points \(page 316\)](#).
 - **Export CSV file (.csv)** to export layout points.
 - **Export job file (.cnx)** to export all layout data in the model to Trimble® LM80.
 - **Export Field Link file (.tfl)** to export all layout data in the model to Trimble FieldLink.
 - **Export Field Link file (.tflx)** to export all layout data in the model to Trimble FieldLink (from version 6.3 onward).
 - **Export Trimble Connect (.tflx)** to export all layout data in the model to Trimble Connect.

Note that in addition to Trimble devices, other layout devices can also read in the .txt, .csv, and .cnx file types.

NOTE The layout points that you create in the model are design points that you can export to use in a layout device.

The maximum length of the layout point name is 16 characters if you export layout data to `.cnx`, `.tfl`, and `.tflx` formats. When exporting to a text file (`.txt`) or a CSV file (`.csv`), there is no limitation in the number of characters in the name. The maximum length of the description is 24 characters.

6. Select the destination folder or project.
If a suitable folder or project does not exist, create one to export the layout data.
7. Select the file to export.
When exporting to Trimble Connect enter a name for the export file without the file extension.
8. Select the coordinate system for the export from the **Export local coordinate system** list.
 - The **Export local coordinate system** list shows the base point of the group. You can change the coordinates by selecting another option from the list.
9. If needed, select a drawing in **Map file (.dxf)** when exporting a job file (`.cnx`) or a Trimble FieldLink file (`.tfl`). You can attach a layout drawing when exporting these file types.

You can use a layout drawing with the layout point data in a layout device. To ensure that the drawing is exported correctly, you need to define the drawing scale.
10. Click **Export** to export.

Define default export settings

You can define the default export settings for export files: point file (`.txt`), CSV file (`.csv`), and Trimble LM80 job file (`.cnx`). The units depend on the settings in **File menu --> Settings --> Options --> Units and decimals**.

1. On the **Manage** tab, click **Layout manager**.
2. Click **Settings** .
3. Click **Point File** to define the export settings for point files (`.txt`):
 - a. Select the unit.
 - b. Select the delimiter.

- c. Define the order of column headers in point files. Select a header in the list and click the **Move up** or **Move down** button.
4. Click **CSV File** to define the export settings for CSV files (.csv):
 - a. Select the unit.
 - b. Define the order of column headers in point files. Select a header in the list and click the **Move up** or **Move down** button.
5. Click **Trimble LM80** to define the default **Length unit** for Trimble® LM80 job files (.cnx).

You can select to export as meters, feet-inches, or survey feet.

6. Click **Save**.

Define the drawing scale

You can include a drawing when exporting all layout data in a job file or a field link file from **Layout manager** by adding the drawing to the **Map file (.dxf)** box in the export dialog. The drawing is exported in the .dxf or .dwg format. To ensure that the drawing is exported correctly, you need to define the drawing scale.

1. Create a general arrangement (GA) drawing of your model.
We recommend that you make the drawing as simple as possible, only include parts and grids to show the drawing correctly in a layout device. You might want to create a drawing layout especially intended to be used in **Layout manager** export.
2. Open the drawing that you are going to use as a drawing layout.
3. Double-click the drawing view frame to open **View Properties**.
4. Copy the drawing scale.
5. Close the drawing.
6. On the **Manage** tab in the model view, click **Layout manager**.
7. Click the **Drawing scale calculator**  button.
8. Enter the drawing scale in the **Scale Denominator (e.g. 48, 128)** box.
9. Click **Calculate**.
The drawing scale is shown in the **Scale** box.
10. Copy the drawing scale from the **Scale** box and close the **Drawing scale calculator** dialog.
11. On the **File** menu, click **Export --> Drawings**.
Tekla Structures opens the **Document manager** dialog and the **Export drawings as DWG/DXF** dialog.

12. In the **Document manager** dialog, select the drawing that you want to export.
13. In the **Export drawings as DWG/DXF**, do the following:
 - a. In **File location**, select the export folder.
 - b. Select the **Drawing as snapshot to CAD model space** checkbox.
The **Scale** box is shown.
 - c. Enter the drawing scale in the **Scale** box.
14. Click **Export**.

Import layout data to Layout manager

You can use **Layout manager** to import layout data to your model to verify the as-built conditions.

You can copy the file that contains the layout data from a layout device, such as Trimble® LM80, to your computer and import the file later to **Layout manager**. You can also import the layout data from Trimble Connect to **Layout manager**. Alternatively, you can import a file directly to **Layout manager**. You can do this if you connect the layout device to your computer using a USB, or with a Bluetooth connection.

Import layout data

1. On the **Manage** tab, click **Layout manager**.
2. If needed, check from the **Settings**  that the default import settings are as intended, and modify the settings if needed.
3. In **Layout manager**, click **Import** .
4. Select the file type for the import.
 - **Import point file (.txt)** to import [layout points \(page 316\)](#).
Point files (.txt) are always imported to the **Design Points** tab, regardless of whether they have been measured on the site.
 - **Import CSV file (.csv)** to import layout points.
CSV files (.csv) are always imported to the **Design Points** tab, regardless of whether they have been measured on the site.
 - **Import job file (.cnx)** to import all layout data in a Trimble® LM80 job file.
Job files (.cnx) are imported to the **Measured Points** tab.

- **Import Field Link file (.tfl)** or **Import Field Link file (.tflx)** to import all layout data in a Trimble FieldLink file. The .tflx files are used for Trimble FieldLink from version 6.3 onwards.
- **Import Trimble Connect (.tflx)** to import all layout data from Trimble Connect in a Trimble FieldLink file.

Design points imported from Trimble FieldLink files (.tflx) are shown in the **Layout manager** dialog using different colors and symbols, depending on the visual classification type of the point. The imported points are shown in the model by the class color that most closely matches the color of the symbol.

Trimble FieldLink color	Tekla Structures color	Description
		Control point
		Tolerance status - low
		Tolerance status - in tolerance
		Tolerance status - high
		Design point
		April tag
		Plane level in tolerance
		Plane level high tolerance
		Plane level low tolerance
		Stake in tolerance
		Stake out tolerance

5. Select the file to import.

If a point file does not contain column headers, **Layout manager** opens the **Text File Import - Column Headers Mapping** dialog where you can define the columns.

6. Select the [group \(page 312\)](#) to which the layout data is imported.
For `.txt` and `.csv` files, the group that you select in the list is used only for points that do not have a group specified in the imported file. If needed, click the **New** button to create a new group.
Job files (`.cnx`) and Trimble FieldLink files (`.tfl`, `.tflx`) may contain layout point groups. If there are groups in these files, the groups are shown in the list of groups that you can select in the **Group** list.
7. If you are importing to a new group, select the group coordinate system in **Group local coordinate system**.
By default, new groups use the coordinate system selected in **Group local coordinate system for new groups**.
8. Click **Import**.
The imported points are created in the model and displayed in the **Layout manager** dialog in the group that you selected in the import dialog box.

NOTE Design points are layout points that have been created in the Tekla Structures model. Measured points are layout points that have been measured on the construction site.

Define point file columns

You can import layout points to your model in a point file that lists the layout point names and the point coordinates. If the point file does not have a header, or if **Layout manager** does not recognize the header, the **Text File Import - Column Headers Mapping** dialog is displayed when you select the import file.

Example of a point file without a header:

```
Layout point 6, 0, 13.12336, , 0
Layout point 5, 0, 6.56168, , 0
Layout point 4, 4.92126, 0, , 0
Layout point 3, 9.84252, 6.56168, , 0
Layout point 2, 4.92126, 13.12336, , 0
Layout point 1, 9.84252, 13.12336, , 0
Layout point, 9.84252, 0, , 0
```

In the **Text File Import - Column Headers Mapping** dialog, the content of the point file is shown at the bottom and the column headings are shown at the top.

1. Check that the point file content is shown under the correct column headings:
 - **Name Column** shows the layout point name.
 - **X Column** shows the x coordinates.
 - **Y Column** shows the y coordinates.

- **Z Column** shows the z coordinates.
- **Group column** shows the group where the points are imported.

Text File Import - Column Headers Mapping

Name Column: Column 1

X Column: Column 2

Y Column: Column 3

Z Column: Column 4

Group Column: Column 5

Description Column:

Unit: Meter

Process first line: Yes

COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4	COLUMN 5
Layout point 6	0	13.12336		0
Layout point 5	0	6.56168		0
Layout point 4	4.92126	0		0
Layout point 3	9.84252	6.56168		0
Layout point 2	4.92126	13.12336		0
Layout point 1	9.84252	3.12336		0
Layout point	9.84252	0		0

Cancel OK

2. If needed, change the columns at the top of the dialog by selecting the correct column from the list.
3. Select a measuring unit.
4. Select in the **Process first line** setting whether the first line in the point file is a header row.
 - **Yes** means that the first line has layout point data and that it is not a header line.
 - **No** means that the first line is a header line.

5. Click **OK**.

Measured points in Layout manager

Measured points are points that are measured on the construction site using a layout device and imported to Tekla Structures. You can view the properties of measured points in **Layout manager** or in the **Layout point** tool dialog. In addition to the general point properties, such as name, diameter, and shape, the measured points have measured point properties that cannot be modified in Tekla Structures.

To view the measured point properties, select the point in **Layout manager** or double-click the point in the model.

The measured point properties are as follows:

Property	Description
Is Stakeout Point	You can label a measured point as staked in the Trimble® LM80 device if it deviates from the corresponding layout point created in the model. The property is shown in the Layout point tool dialog.
Is Field Point	A field point has been measured on the construction site and imported to Tekla Structures. Is Field Line is the corresponding property for layout lines. The property is shown in the Layout point tool dialog.
HR	Height of rod is the height of the prism on the pole. It is used to determine instrument height, and therefore the actual elevation of the measured point.
HA	Horizontal angle is the angle that was measured from the back sight, or 0 angle.
VA	Vertical angle is the difference in angle measurement from the horizontal position of the instrument scope.
SD	Slope distance is the actual distance regardless of elevation change. Horizontal angle is the distance along a horizontal plane.

Property	Description
PPM	Parts per million is a factor used to determine measurements that take into account the air conditions and how they affect the ability of light to travel through the air. This property is important in the measurement calculation and accuracy.
Benchmark offset	Benchmark offset is a measurement that defines a benchmark that elevation measurements are calculated from.

Example: Base point use in Layout manager

This example shows different model views that contain a layout point, control point, and civil origin in the model. The civil origin is the datum point, or the fundamental benchmark point of the national land survey network.

1. Create a control point in **File --> Project properties --> Base points**.

Base point

Name

Control point 1

+

Description

Coordinate system

East coordinate (E)

50000000.00 mm

North coordinate (N)

2000000.00 mm

Elevation

10000.00 mm

Latitude

0.00

Longitude

0.00

Location in the model

X

0.00 mm

Y

-10000.00 mm

Z

-1000.00 mm

Angle to North

45.00

Zoom to

Pick

Pick

Modify

☐ Project base point

Close

2. [Create a layout point \(page 316\)](#) by using the **Layout point** tool, and add the layout point to the model.

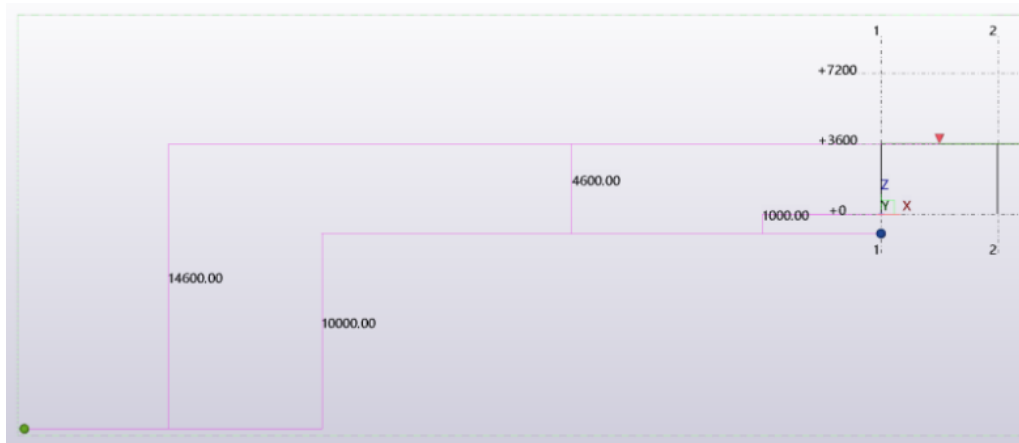
The image below shows the point locations in a 3D model view.



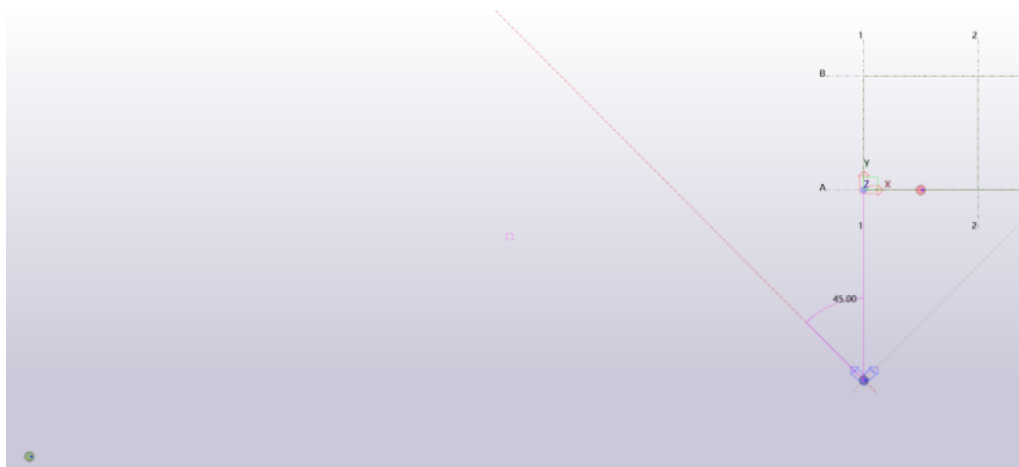
- The green point in the bottom-left corner is the civil origin.
Note that the **East coordinate** and **North coordinate** are not in scale here.
 - The blue point is the control point, that is, the base point that you created.
 - The red cone is the layout point, in the image framed with a yellow square.
 - The green box is the model origin at the grid intersection A-1.
3. In **Layout manager**, add the layout point to a [group \(page 312\)](#). Select the base point that you created, *Control point 1*, to be used as the **Group local coordinate system** of the group.
 4. Check the coordinates of the layout point.
 - **Location in the model:** the distance to the model origin.
 - **Location in the group:** the distance to the base point selected for the layout point group.
 - **East, North, Elevation:** the distance to the civil origin.

The images below show different views and measurements of the points in the model.

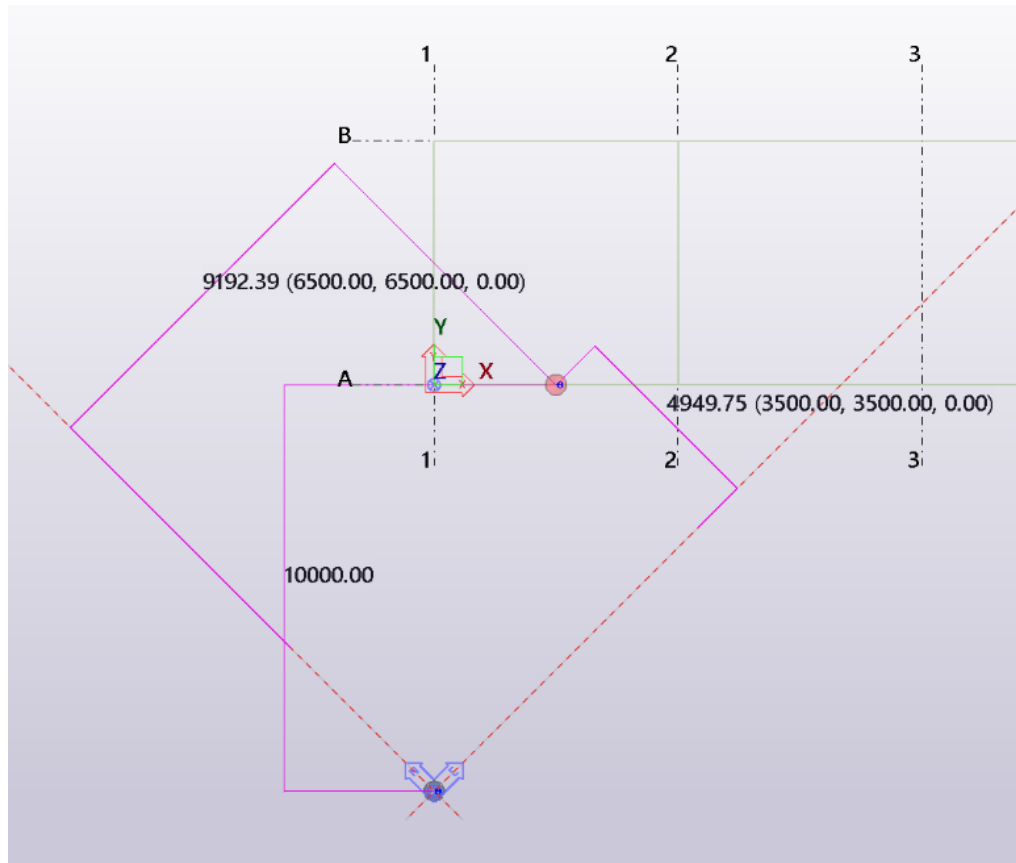
Elevation view



Plan view



Plan view zoomed



5. [Export the layout point \(page 321\).](#)

The X, Y and Z coordinates in the export dialog are the **East, North, Elevation** (X, Y, Z) coordinates that you can view in **Layout manager** point properties. These coordinates are exported.

3.13 Analysis and design systems

Analysis and design systems are used to design and analyze the frame or components within a structure. These applications calculate the loading, stresses and strains on the elements. They also calculate the moments, shears and deflections on objects under various loading conditions.

These types of applications make use of various forms of analysis from the traditional first order static, second order p-delta, geometric non-linear or buckling analysis. They can also make use of various forms of dynamic analysis from modal extraction to time history and response spectrum analysis along

with the sizing of steel, concrete and timber elements to the relevant national and international design codes.

Some examples of these systems are Tekla Structural Designer, ETABS, STAAD.Pro, SAP2000, Robot, ISM, S-Frame, MIDAS, Dlubal, SCIA, Powerframe, GTStrudl, Strusoft, and AxisVM.

See also

[Analysis and design direct links \(page 333\)](#)

[Tekla Structural Designer \(page 333\)](#)

[STAAD.Pro \(page 355\)](#)

[SAP2000 \(page 355\)](#)

[Robot \(page 354\)](#)

[ISM \(page 355\)](#)

[S-Frame \(page 356\)](#)

[FEM \(page 357\)](#)

Analysis and design direct links

When you have a direct link to an analysis and design application, and you export the analysis model from Tekla Structures using that particular analysis application, the model is opened in the application. Tekla Structures and the analysis and design application need to be installed on the same computer.

The analysis and design direct links are created either using the Tekla Open API or the older COM link (Common Object Model transfer technology). A number of direct links are available including AxisVM, Diamonds, Dlubal, ETABS, GTStrudl, ModeSt, MIDAS, NISA, Powerframe, ISM, Robot, SAP2000, SCIA, S-Frame, STAAD.Pro, STRUDS, and Strusoft.

Many of the direct links are available for downloading in [Tekla Warehouse](#). For the applications that are not available in Tekla Warehouse, the links can be downloaded from the vendor web sites or by contacting the vendor.

Tekla Structural Designer

Tekla Structural Designer is a software that allows you to design reinforced concrete buildings and steel buildings. It works with real physical objects such as beams, columns and slabs. The information transferred is the physical information such as geometry, section sizes and grade as well as attributed

data. In Tekla Structures, you can import from and export to Tekla Structural Designer.

Tekla Structural Designer is a code-based modeling tool, which enables structural engineers to establish a code compliance design of the structure, and perform calculations and schema design, for example. All the design/code data is held within Tekla Structural Designer at all times.

Tekla Structural Designer will analyze and design structures to a range of International codes of practice.

The initial model can be started in either Tekla Structures or Tekla Structural Designer, depending on the project needs. You can import and export many times, and make use of the effective change management functionality.

The integration process allows you to pass models between Tekla Structural Designer and Tekla Structures, allowing the updates in the model at both ends. As the model is integrated between software applications, the changes are updated, and modifications performed since the last integration operation are maintained within the model.

For the full integration process, including importing reinforcement, you need to have compatible versions of Tekla Structures and Tekla Structural Designer installed on the same computer and access to the original Tekla Structures Designer file (.tsmd). Otherwise Tekla Structural Designer and Tekla Structures accept and produce files in the .cxl neutral file format. The .cxl file format is an XML based neutral file format that allows applications to link Tekla Structural Designer.

Tekla Structures supports files created in Tekla Structural Designer 2016 or later.

This section only contains instructions regarding [import \(page 336\)](#) and [re-import \(page 339\)](#) from Tekla Structural Designer, and [export \(page 340\)](#) to Tekla Structural Designer. For more information about Tekla Structural Designer and the integration between Tekla Structural Designer and Tekla Structures, see [Guidance notes for Integration between Tekla Structural Designer and Tekla Structures](#). This page contains a link to "Integration with Tekla Structures" guide in .pdf format.

Also take a look at other related information in [Tekla User Assistance for Tekla Structural Designer](#):

[Getting started with Tekla Structural Designer](#)

[First steps with Tekla Structural Designer](#)

[Product guides](#)

[Videos](#)

Example workflow of integration between Tekla Structures and Tekla Structural Designer

Integration between Tekla Structures and Tekla Structural Designer has been developed to ensure that the initial model can be started in either tool without any detriment to the design process. This added flexibility enables companies to align their software solutions closely to their own workflows. (i.e. The initial model can be created in Tekla Structural Designer by the engineer or in Tekla Structures by the technician.)

It is recommended that Tekla Structures model is used as the "master model" for geometrical changes as this model also is linked to the BIM documentation. Alterations made to the model geometry are best handled by altering the Tekla Structures model and transferring the changes through to Tekla Structural Designer for redesign.

A typical workflow and the decision making process through the different stages of a project could be as follows:

Initial scheme stage

- The initial model may be started in Tekla Structures or Tekla Structural Designer without any detriment to the process.
- A number of factors may determine which software is used for starting the modeling process, such as availability of staff, or deliverable requirements.
- Unless there are external drivers, Tekla Structures may prove to be the best starting point for the model as it can provide most of the deliverable items at the initial stage.
- The model does not need to cover the complete building, it might be a typical bay or floor, for example.
- The generated structure can be designed in Tekla Structural Designer for initial section sizing at the initial stage and synchronized back to Tekla Structures for initial drawings or material list creation.
- Simple drawings can be created at this stage, this can be done in Tekla Structures or Tekla Structural Designer.
- Initial material lists for cost estimates can be generated at this stage.

Detailed design stage

- It is not always appropriate to carry models forward from the **Initial scheme stage** to the **Detailed design stage** as changes to the overall scheme may have been made, which will not be reflected in the initial scheme model. It is sometimes better to begin the model again.
- Models can be started in Tekla Structures or Tekla Structural Designer to suit the user. The models can then be transferred to the other modeling system.
- Importantly, the two models can be worked on at the same time, with synchronization of the two models taking place to suit the workflow.

- Tekla Structural Designer can be used for a full gravity and lateral design of the structure.
- Within Tekla Structures, drawings can be generated to a tender stage level and general arrangements submitted to building control for approval.

Construction stage

- Using the model from the **Detailed design stage**, much of the **Construction stage** process will take place in Tekla Structures so that the integration with other disciplines can be accounted for.
- The design is not revisited unless the client drives the requirement for change.
- If a re-design of the structure is required, the same synchronization of Tekla Structures or Tekla Structural Designer models can be carried out to suit the user.
- The model will be completed within Tekla Structures and fully detailed drawings for parts can be created along with construction level arrangement drawings of the structure.
- Detail integration checks with other disciplines (e.g. mechanical and electrical engineers) can be carried out at this stage.

Import from Tekla Structural Designer

Import from Tekla Structural Designer creates Tekla Structures parts, such as beams, columns, slabs, and shear walls based on the contents of the imported Tekla Structural Designer file (.tsmd) or neutral file (.cxl). To import rebars, you need to have compatible versions of Tekla Structures and Tekla Structural Designer installed on the same computer and access to the original Tekla Structures Designer file (.tsmd).

1. Open the Tekla Structures model to which you want to import.
2. On the **File** menu, click **Import --> Tekla Structural Designer**.
3. In the **Tekla Structural Designer Import** dialog, enter the path of the import .cxl file or the original .tsmd file in the **Import file** box, or click the ... button next to the box to browse for the file.

Once you have selected a valid file, the import settings and the **Import** button will be enabled.

4. If updating the positions of objects is not required, select the **Only consider profile and material changes** checkbox.
5. Select among the following grid options:
 - **Import grids from import file:** The grid lines from the import file will be imported into the Tekla Structures model. A grid line pattern will be created, and all the imported grid lines will be attached as individual grid planes to this pattern.

- **Delete existing Tekla Structures grids:** Import will remove all grid lines/planes from the current Tekla Structures model.
6. If you want to remove slab and wall openings in the Tekla Structures model that were previously imported from Tekla Structural Designer, select the **Remove previously imported openings** checkbox.
 7. Open the **Location** section and define to which location you want to import the model. Do one of the following:
 - In the **X**, **Y**, and **Z** boxes, enter offsets for the imported model from the global origin of the Tekla Structures model.
 - Click **Pick** and then pick a location for the import model datum point in the Tekla Structures model.

You can also define a rotation.
 8. In the **Rebars** section, define whether the reinforcing bars are imported, and how they are imported. Note that the **Rebars** section will become available only when you have selected a `.tsmd` file as the import file.

Option	Description
Import rebars	Enable or disable rebar import.
Delete old rebars	Delete any reinforcement previously imported using Tekla Structural Designer import.
Create rebars as	Native bars: Create the rebars as standard Tekla Structures bars. Rebar sets are created for loose bars in cast-in-place concrete pad footings, strip footings, beams, columns, and walls. Meshes are not transferred. Reference bars: Create the rebars as a reference model that will be saved in the model folder.
Creation options	Simplify bars: The rebars will be imported without any hooks or curtailments, and longitudinal bars in beams will be cut off before they enter the columns at the end points. Once per design group: Rebars in parts belonging to the same design group (for example, beam, column, or pad footing) will be added only to one part in the group.
Import rebars for	Select the objects for which you want to import rebars: Beams, Columns, Walls, Slabs, or Foundations.

9. To read the import file and display all the proposed profile, material grade, and rebar grade conversions to be used, open the **Conversions** section and click the preview buttons.

The import uses an internal conversion list containing the standard profiles and grades. If the profile or grade of any object cannot be converted using the internal conversion, the Tekla Structures name will be replaced with the text --- NO MATCH --- in the **Conversions** tables.

10. If the text --- NO MATCH --- is displayed, you can convert the profiles, materials, and rebar grades manually in the following way:
 - a. Create a profile, material, and/or rebar grade conversion file in a text editor using the file name extension `.cnv`.

The conversion files can also be used to override the standard conversion.

- b. In the text file, enter the `.cxl/.tsmd` profile, material, or rebar grade name, for profiles the `#` symbol and the profile code, then the equal sign (=), and the corresponding Tekla Structures name.

You may need help from your local Tekla support with this.

In the rebar grade conversion file, list the size mappings for the grade on the rows underneath the grade name in the same way, indented by a tab.

```
Gr. 60=A615-60
    TsdSize1=TsSize1
    #3=#14
    #6=#18
    TSDgrade=TSGrade
    [...]
```

- c. In the **Profile conversion file**, **Material conversion file**, and/or **Rebar conversion file** boxes, specify the conversion files that you want to use for mapping profiles and grades.

The **Rebar conversion file** box is only available if you have a compatible version of Tekla Structural Designer installed and a `.tsmd` import file selected.

If the conversion files are not used, the members with profiles or materials that cannot be converted will still be created but they will use the import file profile or material, which may be invalid in Tekla Structures. In this case, the members may be drawn as lines in the model, but can then be edited manually in Tekla Structures.

11. Click **Import**.

If you are importing a `.tsmd` file, Tekla Structural Designer starts and opens the model, so that it can be imported into Tekla Structures.

If none of the objects in the import file have previously been imported into the current model, Tekla Structures imports the contents of the selected import file and creates all the required objects in the Tekla Structures model. If the Tekla Structures model is empty, the project properties from the import file will be written into the model's project properties. If the model contains objects, the `.cxl/.tsmd` model data will be ignored leaving existing project properties intact.

NOTE You can find more information on exporting models and objects from Tekla Structural Designer in the [Tekla Structural Designer product guides](#).

Limitations

- For the best results, ensure that `XS_ENABLE_POUR_MANAGEMENT` in **Advanced options** --> **Concrete detailing** is set to `TRUE`.
- Clashes are not resolved.
- Laps cannot be modeled.
- Mapping of sizes and grades only works for standard settings with UK and USA models.

See also

[Re-import from Tekla Structural Designer \(page 339\)](#)

Re-import from Tekla Structural Designer

When you import from Tekla Structural Designer, you can control which changes will be made in the Tekla Structures model. If none of the objects in the import file have been previously imported in Tekla Structures, the import will complete after Tekla Structures has created the required objects. If objects already exist, then the new objects will be listed as new, but if no objects exist, then the import will just take place.

1. Follow the steps in [Import from Tekla Structural Designer \(page 336\)](#). In addition, do the following in the **Tekla Structural Designer Import** dialog:
 - a. If updating the positions of objects is not required, select the **Only consider profile and material changes** checkbox.
This will only update the object profiles and materials, and ignore other changes.
 - b. Select the **Show model comparison tool** checkbox at the bottom of the dialog.
This will display the **Model Comparison Tool** dialog after you have clicked **Import**.

2. In **Model Comparison Tool**, go to an appropriate tab: **Added**, **Updated**, **Deleted**, or **Unchanged**.
3. To display the properties of an object, select the object from the list on the left.

If the selected object has been updated or deleted, or has not been changed, the object is also highlighted in the model.
4. To append the Tekla Structures object ID to the object name in the comparison tool list, select the **Display part IDs** checkbox.
5. To import objects that do not exist in the Tekla Structures model:
 - a. On the **Added** tab, ensure that the checkbox after the object name is selected for each object (or object type) that you want to import.
 - b. At the bottom of the **Model Comparison Tool** dialog, select the **Add new objects** checkbox.

If you clear this checkbox, the objects that did not previously exist in the Tekla Structures model but that are in the import file are excluded from the import.
6. To update the properties of the previously imported objects, go to the **Updated** tab and do the following:
 - a. Ensure that the check box after the object name is selected for each object (or object type) that you want to update.
 - b. To reduce the amount of information displayed about the objects that have been updated, select the **Only display changed fields** checkbox.

Only the values that have been changed are displayed instead of all the object properties.
 - c. For each object to update, select the object from the list on the left, and then in the list of properties, select the **Apply updates** checkbox for each object property whose value you want to update.
7. To delete objects that currently exist in the Tekla Structures model but that are not in the import file:
 - a. On the **Deleted** tab, ensure that the checkbox after the object name is selected for each object (or object type) that you want to delete.
 - b. At the bottom of the **Model Comparison Tool** dialog, select the **Delete current objects** checkbox.

If you clear this checkbox, no objects will be deleted.
8. Click **Accept changes** to use the current settings and complete the import.

Export to Tekla Structural Designer

Export to Tekla Structural Designer allows you to export the entire Tekla Structures model or a selected subset of the model. The exported `.cxl` file can be uploaded to Tekla Structural Designer to update the model, or to create a new Tekla Structural Designer model based on the Tekla Structures model.

If you have compatible versions of Tekla Structures and Tekla Structural Designer installed on your computer, also the corresponding Tekla Structural Designer model (`.tsmd` file) can be created or updated during the export, and it then automatically opens in Tekla Structural Designer.

NOTE To export to Tekla Structural Designer using a Tekla Structures analysis model, see Export an analysis model to Tekla Structural Designer.

1. Open the Tekla Structures model from which you want to export.
2. On the **File** menu, click **Export --> Tekla Structural Designer**.
3. In the **Export to Tekla Structural Designer** dialog, either enter the path of the export file in the **Export file** box or click the **...** button at the end to browse to a folder and enter a name for the file.

If you have a compatible version of Tekla Structural Designer installed, the `.tsmd` file type is automatically selected.

Once you have selected a valid file, the **Export** button and the **Conversions** section will be enabled.

4. In the **Grids** list, specify which of the Tekla Structures grids you want to export: **All**, **Selected**, or **None**.
With **Selected**, select the grids in the model.
5. In the **Model objects** list, specify which objects you want to export.
To only export certain objects, select **Selected**, and then select the objects in the model.
The use of selection and view filters is recommended to ensure that only the structural part of the model or objects requiring design are exported.
6. To process the model and display all the proposed profile and material grade conversions to be used, open the **Conversions** section and click the preview buttons.
The export uses an internal conversion list containing the standard profiles and grades. If the profile or material of any object cannot be converted using the internal conversion, the export name will be replaced with the text `--- NO MATCH ---` in the **Conversions** tables.
7. If the text `--- NO MATCH ---` is displayed, you can convert the profiles and materials in the following way:

- a. Create a profile and/or material conversion file in a text editor using the file name extension `.cnv`.

The conversion files can also be used to override the standard conversion.

- b. In the text file, enter the `.cxl/.tsmd` profile or material name, for profiles the # symbol and the profile code, then the equal sign (=), and the corresponding Tekla Structures name.

You may need help from your local Tekla support with this.

- c. In the **Export to Tekla Structural Designer** dialog, in the **Profile conversion file** and **Material conversion file** boxes, specify the conversion files that you want to use for mapping profiles and material grades.

If the conversion files are not used, the objects with profiles or materials that cannot be converted will still be created but they will use the export file profile or material that may be invalid.

8. Click **Export**.

The **Process log** section will show you the result of the export.

A `.cxl` file is created in the folder you specified using the file name you specified. Also with the `.tsmd` export file type, a `.cxl` file is created first and a timestamp is added after the file name.

9. If you have a compatible version of Tekla Structural Designer installed and `.tsmd` selected as the export file type, Tekla Structural Designer starts and the **BIM Integration : Structural BIM Import** wizard appears. Do the following:

- a. Review and modify the settings in the wizard as needed, and then click **Next** in each step.

For example, you can set the building code, and select whether this is a first-time transfer from Tekla Structures to Tekla Structural Designer, or an update to an existing model.

For more information about the options, see 'Import a project from a Structural BIM Import file' in the [Tekla Structural Designer product guides](#).

- b. When you are happy with the settings, click **Finish** in the final step of the wizard.

A Tekla Structural Designer model file (.t.smd) is created in the folder you specified using the file name you specified.

Next you can start working with the model in Tekla Structural Designer.

To import a .cxl file to Tekla Structural Designer on another computer, for example, see 'Import a project from a Structural BIM Import file' in the [Tekla Structural Designer product guides](#).

Tekla Tedds Integrator

Tekla Tedds Integrator allows you to link Tekla Tedds calculation documents to your Tekla Structures model. You can link existing documents or create new documents, which you or other Tekla Structures users can then easily modify or review during the BIM workflow. The integration reduces the amount of manual work that the detailer or engineer has to undertake in Tekla Structures.

NOTE The Tekla Tedds Integrator ribbon tab is shown only if it has been set visible in your environment or role by your administrator. For more information, see "Enable the user interface for Tekla Tedds Integrator" later in this article.

For example, using Tekla Tedds Integrator you can check that a simple steel connection in a Tekla Structures model is compliant with Eurocode design. You can quickly modify the design using the Tekla Tedds calculations until all the code-compliant design checks are satisfied. Then you can return the modified design to the Tekla Structures model and automatically update the geometry and configuration of the steel connection to reflect the modified design.

When using Eurocode design, Tekla Tedds Integrator includes built-in automatic data transfer for simple steel connections, structural concrete, and precast concrete elements. For other structural design codes, you can manually select the calculation to use, in which case no data is transferred. You can also add your own integration links, see the [Tekla Tedds Integrator Reference Guide](#) for details on how this can be achieved.

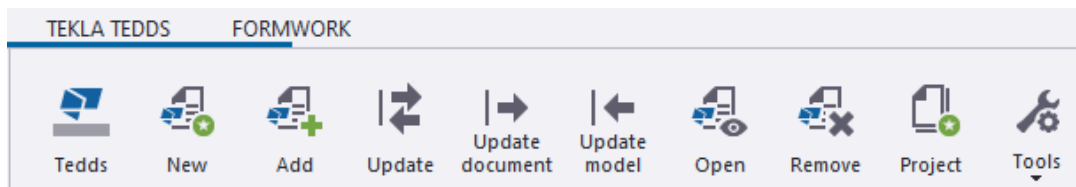
Tekla Tedds Integrator supports different levels of design integration. The linking method that is used depends on the structural element selected in the Tekla Structures model.

- **Data linking:** If the integrator is able to identify the structural element you selected in the Tekla Structures model, the appropriate Tekla Tedds calculation will be automatically selected and any appropriate design information available from the model object, such as geometry and material, will be automatically transferred to the Tekla Tedds calculation. When the design is completed, the Tekla Structures model object will be updated as appropriate and the documentation will be linked to the model object. For a list of Tekla Structures object types supporting the data linking method, see the [Tekla Tedds Integrator User's Guide](#).

- **Document linking:** If the integrator is unable to identify the structural element you selected in the Tekla Structures model, you will be asked to choose which Tekla Tedds calculation to use to create your design documentation. When the design is completed, the documentation will then be linked to the model object.

Tekla Tedds ribbon tab in Tekla Structures

The Tekla Tedds ribbon tab in Tekla Structures provides commands for integrating Tekla Structures model objects and Tekla Tedds calculations:



Tekla Tedds application

Tekla Tedds is an easy to use application that engineers can rely on for accurate calculations. With Tekla Tedds, engineers can streamline engineering design, avoid errors, and present output professionally. Tekla Tedds includes a built-in library of structural engineering calculations, which can be used to produce high quality calculation documentation for a wide variety of structural building elements. The calculations are compliant with a range of regional design codes. For more information about Tekla Tedds, see [Tekla User Assistance for Tekla Tedds](#).

To use Tekla Tedds Integrator, you need to have the Tekla Tedds application installed on your computer. You do not need to start the Tekla Tedds application to use the integrator commands, the commands will launch Tekla Tedds automatically when it is needed. For more information about the Tekla Tedds installation, see [Tekla Tedds installation and licensing workflow](#).

Tekla Tedds needs to be [purchased separately](#), it is not included in the Tekla Structures license.

To launch the Tekla Tedds application to do some manual work with Tekla Tedds:

- On the Tekla Tedds ribbon in Tekla Structures, click  **Tedds**.

Create a new document for a model object

You can create a new Tekla Tedds calculation document for the selected Tekla Structures object.

1. Select an object in the Tekla Structures model.
2. On the **Tekla Tedds** ribbon tab, click  **New**.

Depending on the selected structural element, either the data linking method or the document linking method is used:

Data linking method

If the structural identity of the object can be determined, the data linking method will be used, and the appropriate calculation will start automatically. Geometric information related to the section shape, governing dimensions, member length and material will be automatically populated.

Some information is not transferred from Tekla Structures to the Tekla Tedds calculation, such as loads and bending moments (where applicable), slenderness information, or the national annex to be used. Where values are not transferred from Tekla Structures, the default values applicable for the Tekla Tedds calculation will be populated.

- a. To complete the design once the Tekla Tedds calculation has been completed, click the **Finish** button.

This creates a new Tekla Tedds calculation document (.ted) and links it to the selected model object.

- b. In the displayed dialog, save the documented results of the calculation.

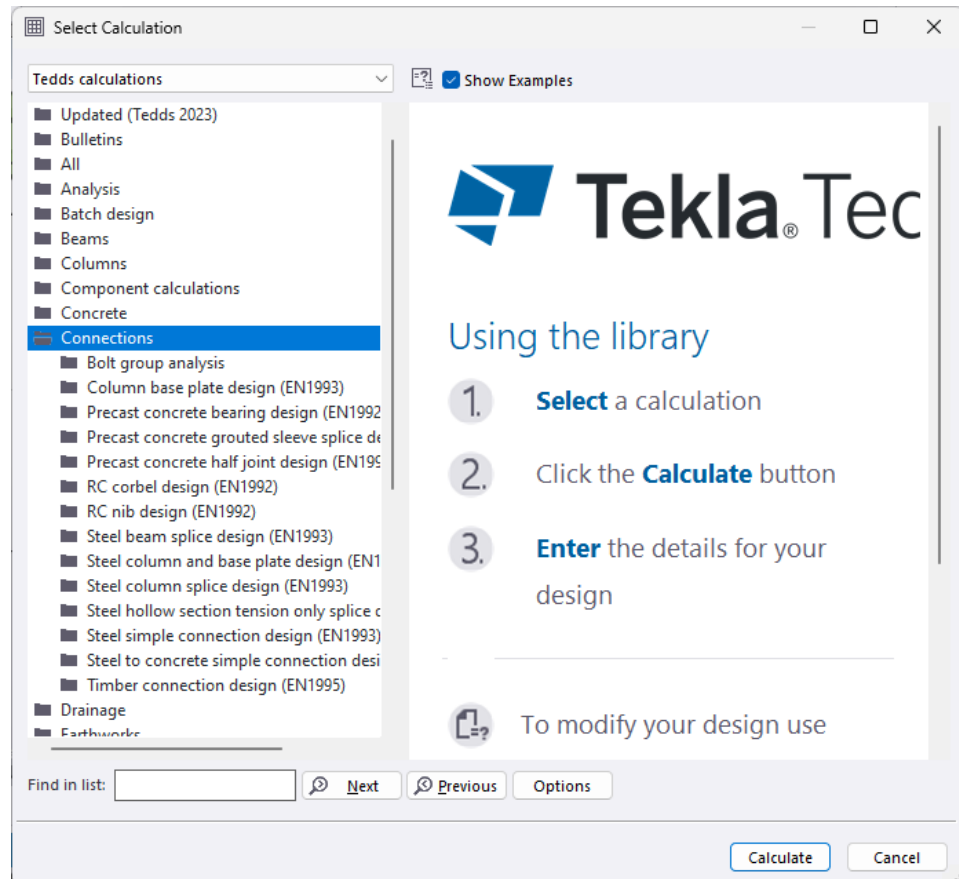
We recommend that you save the document in a subfolder under the Tekla Structures model folder, which will ensure that the documents

are transferred with the model, for example, when using Tekla Model Sharing.

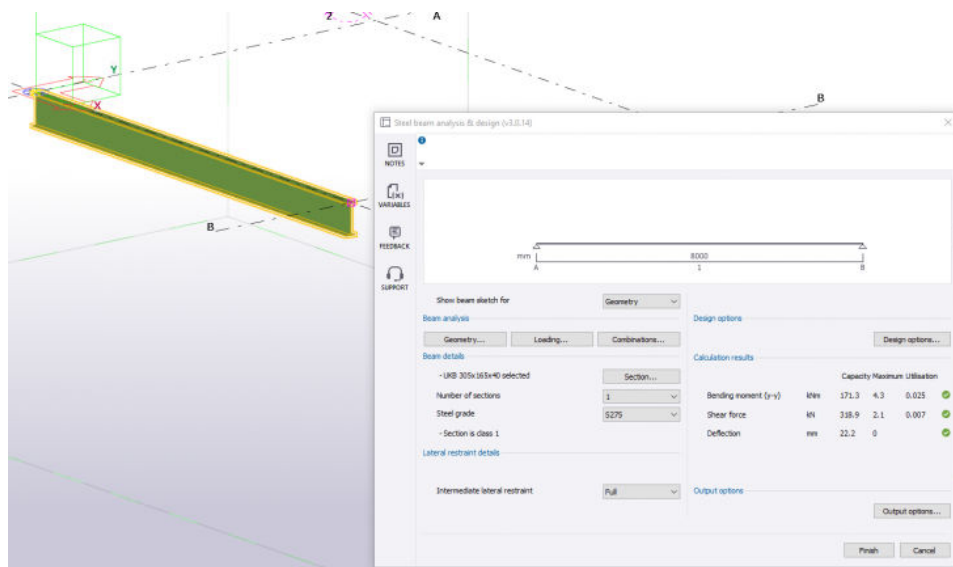
Document linking method

If the integrator is unable to identify the structural element, the document linking method will be used, and you will be asked to choose which calculation to use.

- a. In the **Select calculation** dialog, select the required calculation and click the **Calculate** button.



The calculation dialog box is displayed.



For document linking, no information is transferred from Tekla Structures to Tekla Tedds. Instead of information transfer, the default values applicable for the Tekla Tedds calculation will be populated.

- b. Once the Tekla Tedds design calculation has been completed, click the **Finish** button to complete the design.

This creates a new Tekla Tedds calculation document (.ted) and links it to the selected model object.

- c. In the displayed dialog, save the documented results of the calculation.

We recommend that you save the document in a subfolder under the Tekla Structures model folder, which will ensure that the documents are transferred with the model, for example, when using Tekla Model Sharing.

Link an existing document to a model object

You can link an existing Tekla Tedds document (.ted) to the selected model object.

1. Select an object in the Tekla Structures model.
2. On the **Tekla Tedds** ribbon tab, click  **Add**.
3. In the **Select Tedds document** dialog, browse for and select a previously saved Tekla Tedds document (.ted).

The selected Tekla Tedds document is linked to the model object that you selected.

Update document and model

You can update the Tekla Tedds calculation document linked to the selected model object with the current data from the Tekla Structures model, recalculate the document, and update the model from the completed Tekla Tedds design.

1. Select an object in the Tekla Structures model.
2. On the **Tekla Tedds** ribbon tab, click  **Update**. The calculation is started. The current data from the Tekla Structures model will be transferred to the existing Tekla Tedds design and the calculations will be shown so that any other data can be modified before completing the design.
3. In the calculation dialog, click **Finish**.

The Tekla Tedds document linked to the selected model object is updated with the current data from the Tekla Structures model and the document is recalculated. The document will be saved, and finally, the completed Tekla Tedds design data will be transferred back to the Tekla Structures model to update the model object.

Update document

You can update the Tekla Tedds calculation document linked to the selected model object with the current data from the Tekla Structures model and recalculate the document.

1. Select an object in the Tekla Structures model.
2. On the **Tekla Tedds** ribbon tab, click  **Update document**. The calculation is started. The current data from the Tekla Structures model will be transferred to the existing Tekla Tedds design and the calculations will be shown so that any other data can be modified before completing the design.
3. In the calculation dialog, click **Finish**.

The Tekla Tedds document linked to the selected model object is updated with the current data from the Tekla Structures model and the document is recalculated and saved. No data will be transferred back to the Tekla Structures model object.

Update model

You can recalculate the Tekla Tedds calculation document linked to the selected model object using the existing design data and update the Tekla Structures model from the completed Tekla Tedds design.

1. Select an object in the Tekla Structures model.

2. On the **Tekla Tedds** ribbon tab, click  **Update model**. The calculation is started. The calculations will be shown so that any other data can be modified before completing the design.
3. In the calculation dialog, click **Finish**.

The Tekla Tedds document linked to the selected model object is recalculated using the existing design data. The document will be saved, and finally, the Tekla Tedds design data will be transferred back to the Tekla Structures model to update the model object.

View and modify document

You can view and modify the Tekla Tedds calculation document linked to the selected Tekla Structures model object.

1. Select an object in the Tekla Structures model.
2. On the **Tekla Tedds** ribbon tab, click  **Open**. The Tekla Tedds document will be opened and you can modify the data.
3. To save the changes in the document, click  **Save**.

Create a new project for calculations linked to current model

You can create a new project in the Tekla Tedds application and transfer all Tekla Tedds calculation documents linked to the model to the created project.

1. On the **Tekla Tedds** ribbon tab, click  **Project**. The Tekla Tedds application will be opened and you can see the new project there. The new project contains all of the Tekla Tedds calculations associated with the currently open Tekla Structures model. You can use the commands within Tekla Tedds to modify various aspects of the project. You can change the documentation order and modify the calculation headers, for example.
2. To save the changes to the project, click **Save project**. The saved project data will be available in the future sessions of the Tekla Tedds application.

Remove a document

You can remove the Tekla Tedds calculation document linked to the selected Tekla Structures object.

1. Select an object in the Tekla Structures model.
2. On the **Tekla Tedds** ribbon tab, click  **Remove**.

The association between the Tekla Structures object and the saved Tekla Tedds document is removed. The document is still retained in the saved location so that it may be added again if required using the **Add** command.

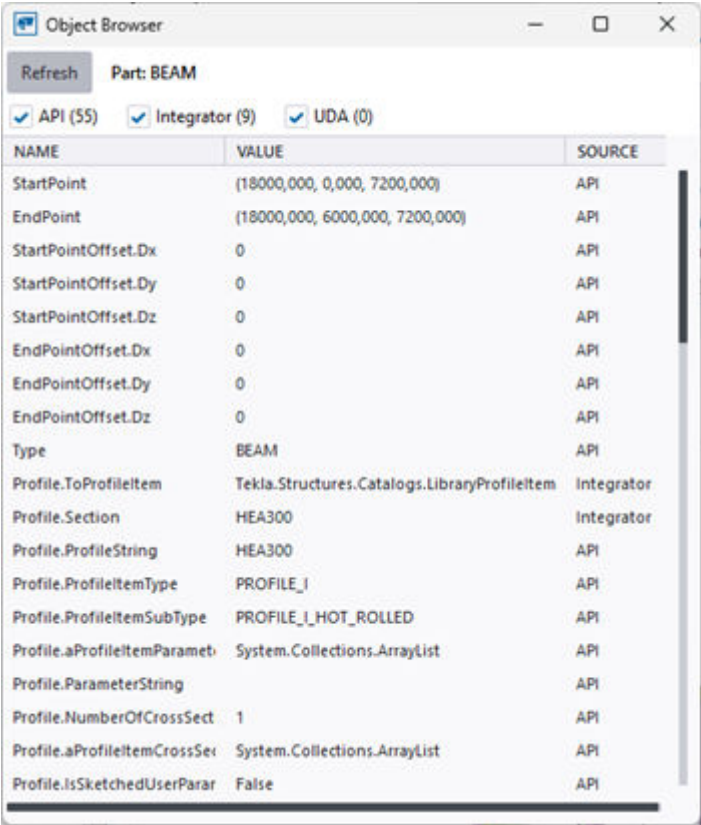
If you remove the document, the **Tedds document** UDA in the model object properties will be set to **No**.

View model object properties

You can view the properties of the selected model object in a separate dialog box. This is particularly useful when you are [writing your own integrations](#).

- 1. Select an object in the Tekla Structures model.
- 2. On the **Tekla Tedds** ribbon tab, click **Tools --> Object browser**.

The object properties are displayed in **Object browser**.



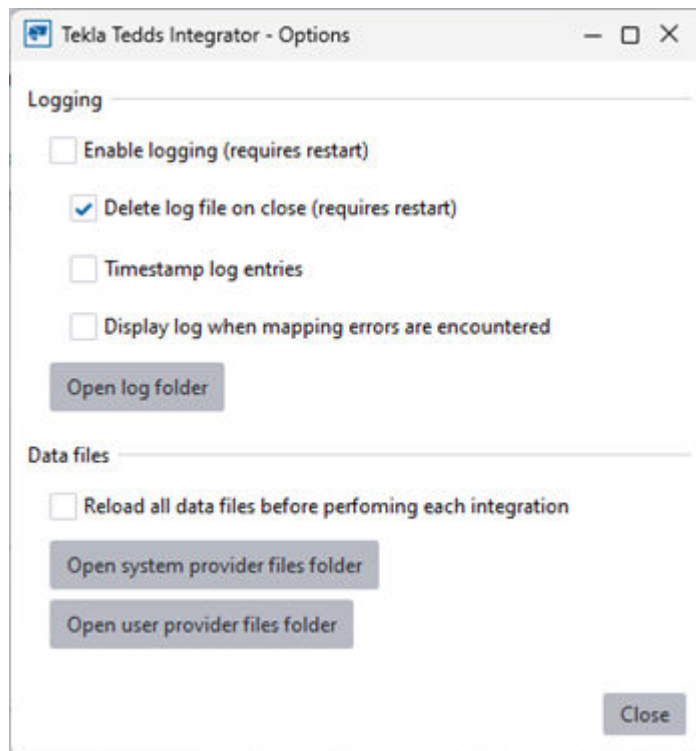
- 3. To update the list, click **Refresh**
- 4. You can limit the number of properties by selecting the desired object property sources.

View and modify Tekla Tedds integrator settings

You can view and modify Tekla Tedds Integrator settings.

- 1. On the **Tekla Tedds** ribbon tab, click **Tools --> Options**.

2. Modify the settings if required.



Enable logging: A record of actions taken by Tekla Tedds Integrator will be recorded to the log file. The log file will be created in C:\Users\<username>\AppData\Local\Trimble\Tekla Structures\<version>\TeklaTeddsIntegrator.

Delete log file on close (requires restart): Delete the log file when you close the integrator.

Timestamp log entries: Add a time stamp at the start of each line in the log to indicate when it was recorded.

Display log when mapping errors are encountered: When errors are encountered during property mappings, the log file will be shown automatically.

Open log folder: Open the folder storing the log data.

Reload all data files before performing each integration: Every time you use a command that uses the information in the IdentityProviders, DataProviders and TypeConverters folders, the data files will be reloaded. Enable this setting when modifying data files so that your changes will be reflected the next time you use a command in Tekla Tedds Integrator.

Open system provider files folder, Open user provider files folder: Open the system data or user data folder. Each part of the system is configured using data files that are stored in one of two locations, the *system data location*, which contains the files for the calculations already supported by the integrator, and the *user data location*, where you can

[save your own integrations](#). Each location has a hierarchy of folders for storing the various data files used to configure the different parts of the system. Within each folder files can be stored at either the root level for the default configuration or within subfolders for either design code specific data or Tekla Structures specific data.

Default system data location: `..\Tekla Structures\<version>\Environments\common\system\Analysis`

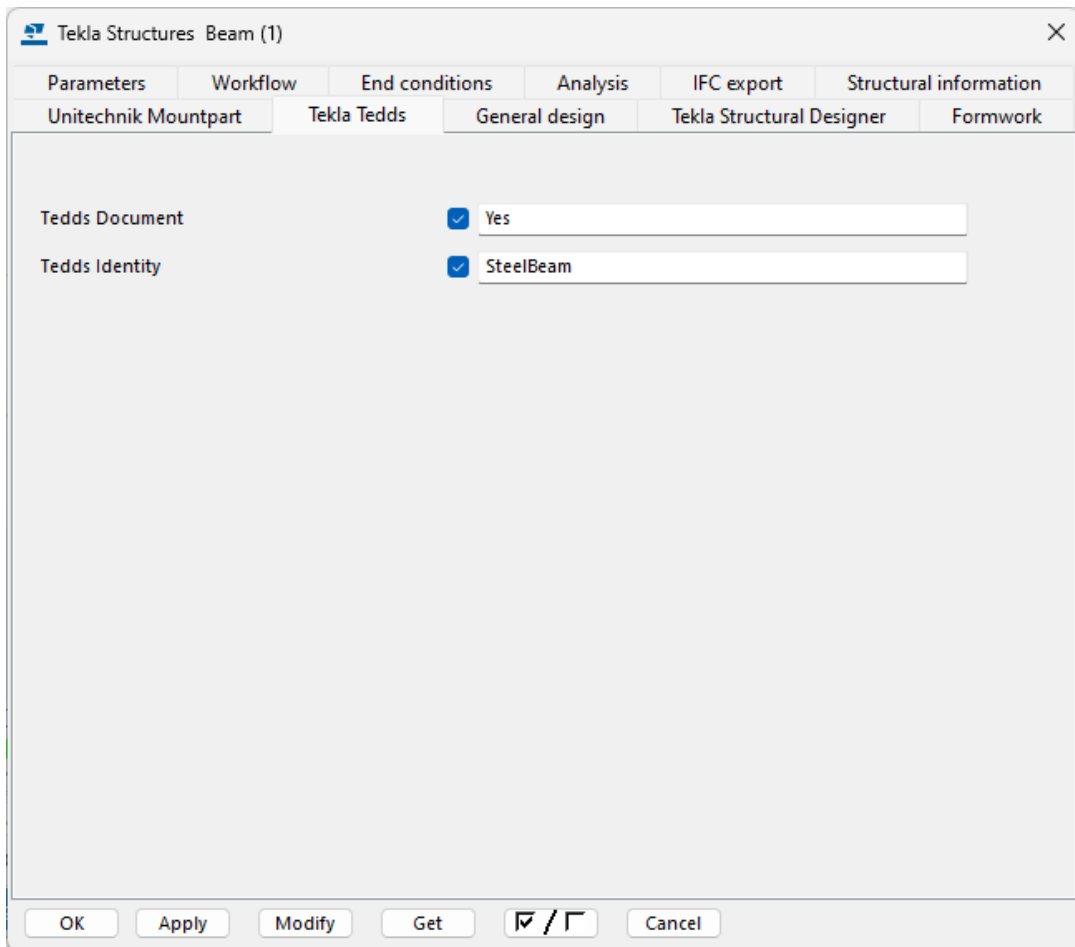
Default user data location:

`C:\Users\<username>\AppData\Local\Trimble\Tekla Structures\<version>\TeklaTeddsIntegrator.`

3. To save your changes and close the dialog, click **Close**. The changed settings are saved in the `TeklaIntegrator.dll.config` configuration file in the `C:\Users\<username>\AppData\Local\Trimble\Tekla Structures\<version>\TeklaTeddsIntegrator` folder.

Tekla Tedds user-defined attributes

Once a Tekla Tedds calculation document has been linked to an object in the Tekla Structures model, the object will get two user-defined attributes.



The screenshot shows the 'Tekla Structures Beam (1)' dialog box. The 'Tekla Tedds' tab is selected, displaying two user-defined attributes. The 'Tedds Document' attribute is set to 'Yes', and the 'Tedds Identity' attribute is set to 'SteelBeam'. The dialog includes standard buttons at the bottom: OK, Apply, Modify, Get, a checkbox with a slash, and Cancel.

Tedds document: This attribute indicates whether a Tekla Tedds document is associated with an object or not. The name of the user-defined attribute is TEDDS_DOCUMENT, and the value is either **Yes** or **No**.

Tedds identity: This Tekla Tedds Integrator attribute is only populated when you use the **New** or **Update** commands for an object which is supported by data linking. The attribute identifies which Tekla Tedds calculation should be used by the integrator. The name of the user-defined attribute is TEDDS_IDENTITY, and the value is a structural identity name as defined by Tekla Tedds Integrator identity provider feature.

Enable the user interface for Tekla Tedds Integrator

The Tekla Tedds Integrator extension is included in Tekla Structures, but parts of the user interface might not be visible by default in all environments. An administrator must enable the user interface for the feature in the environment.

By default, only these parts of the Tekla Tedds Integrator user interface are visible:

- The Tekla Tedds Integrator commands in the **Applications & components** catalog.
- The **Tedds Documents** Representation option in the **View Properties** dialog box. This representation shows which model elements have Tekla Tedds documents attached.

These parts of the Tekla Tedds user interface are not visible until you enable the user interface for the feature in the environment:

- The **Tekla Tedds** tab on the ribbon
- The **Tekla Tedds** tab in the user-defined attributes dialog.

To enable the user interface for Tekla Tedds Integrator:

1. Add %XSDATADIR%\environments\common\system\Analysis to the XS_SYSTEM path in an env_<environment>.ini or role_<role>.ini file.
2. Update the **Applications & components** catalog in one of these ways:
 - Group Tekla Tedds tools in the **Applications & components** catalog.
 - Hide Tekla Tedds tools in **Applications & components** catalog if Tekla Tedds is not supported in your area.

Robot

The Robot Millennium A&D application is owned by Autodesk Inc. Full product details can be found on the Robot Millennium web site.

- This application is suitable for basic interoperability, and it can export and import `cis/2` files.
- If you install Tekla Structures and Robot Millennium on the same computer, then a direct link can be used.
- Currently only the EC3, LRFD, CM66, E32 and ANS design codes are available in Robot when using the direct link.
- If you are upgrading to Robot 2012, you will need to uninstall Robot 2011 along with the Autodesk Robot Structural Analysis link. Then install Robot 2012 and the link again. This way you make Tekla Structures point to the Robot 2012 application.

To get more information and to download, go to [Tekla Warehouse](#)

See also

[Linking Tekla Structures with Robot](#)

[Analysis and design direct links \(page 333\)](#)

SAP2000

The SAP2000 analysis & design application is written by Computers & Structures, Inc. Full product details can be found on their website.

- The SAP2000 analysis & design application can export and import cis/2 and ifc files, and export SDNF files.
- If Tekla Structures and SAP2000 are installed on the same computer, then a direct link can be used.
- It is important that you run SAP2000 for the first time as a standalone application before you load the link. Just start SAP2000 and create a new model, save it and close SAP2000. This will then update your registry which is needed by the link.

To get more information and to download, go to [Tekla Warehouse](#).

See also

[Linking Tekla Structures with SAP2000](#)

[Analysis and design direct links \(page 333\)](#)

STAAD.Pro

The STAAD.Pro analysis and design application is owned by Bentley Systems, Incorporated. Full product details can be found on their website.

- STAAD.Pro can export and import CIS/2 files, along with their .std format. It has become a semi-industrial standard especially in the plant and heavy engineering segments.
- If Tekla Structures and STAAD.Pro are installed on the same computer, then a direct link can be used.
- Profile mapping for different installation environments is achieved by mapping the profiles used by Tekla Structures and Bentley in files called `ProfileExportMapping.cnv` and `ProfileImportMapping.cnv` located in the `TeklaStructures\TS_STAAD` folder. Currently these files are only used in import.

To get more information and to download, go to [Tekla Warehouse](#).

See also

[Linking Tekla Structures with STAAD.Pro](#)

[Analysis and design direct links \(page 333\)](#)

ISM

Bentley's Integrated Structural Modeling (ISM) is a technology for sharing structural engineering project information among structural modeling, analysis, design, drafting and detailing applications.

ISM is similar to Building Information Modeling (BIM), but focuses on the information that is important in the design, construction and modification of the load bearing components of buildings, bridges and other structures. Full product details can be found on their website.

The ISM link is different from the other analysis and design links in that the physical model is also transferred at the same time as the analysis and design model and the ISM model can be imported into an empty Tekla Structures model. The round-trip of model information is also controlled by a synchronizer.

If Tekla Structures and an ISM enabled Analysis & Design application or Bentley Viewer v8i are installed on the same computer then a direct link can be used.

In order to use the link, the ISM Structural Synchronizer version 3.0 needs to be loaded before the link.

For more information and to download, go to [Tekla Warehouse](#).

See also

[Analysis and design direct links \(page 333\)](#)

S-Frame

S-Frame Analysis is owned and developed by S-FRAME Software Inc. It is a complete 4D structural modeling, analysis and design solution for steel, concrete, linear and non-linear structural models.

- The Tekla API link allows you to write code to connect to an open model in Tekla and query or manipulate the model. The link was established by using both the S-Frame and Tekla APIs. It uses a library database to manage items between Tekla Structures and S-Frame.
- S-Frame can export and import .dxf files. If Tekla Structures and S-Frame are installed on the same computer, then a direct link can be used. A copy of the link and instructions on using the link can be requested from <https://s-frame.com>. Descriptions regarding the link can be found here: [Building information modeling \(BIM\) links](#).
- In some areas S-Frame used to be distributed by CSC, in which case the installation points to different folders. The model name must not include spaces as this currently is an issue as the analysis and design frame is not created if spaces are included.

The whole process involves the following steps: importing to S-Frame, displaying imported items, and exporting from S-Frame. This process is described below.

Importing objects to S-Frame and displaying the objects

1. The S-Frame software checks to see if there is an open model in Tekla Structures using the Tekla API.
2. If a connection can be established, the Tekla Structures model is queried for a list of model objects, such as modeled members or panels.
3. The returned objects are iterated through, recognized types are processed, and equivalent S-Frame objects are added or updated to a library database.
4. The IDs from Tekla Structures are stored so that items can be mapped back and forth between Tekla Structures and S-Frame.
5. Once the objects have been iterated through, the library database is queried, and the updated or created objects referenced in the library are displayed in S-Frame display window.

Exporting from S-Frame

1. The S-Frame is queried for objects that are displayed in the S-Frame display window.
2. The library is iterated through for types of known objects (members and panels) that can be mapped back and forth between Tekla Structures and S-Frame.
3. Using the unique IDs stored in the import, the Tekla Structures model is queried to see if items exist. If they do not, they will need to be created, and the library will be updated.
4. Items can then be added or updated to Tekla Structures to match what is in S-Frame.

FEM

Tekla Structures FEM import and export tool support several formats and provide several options for importing and exporting models.

FEM (Finite Element Method) is an analysis and calculation method used in structural engineering. In this element method, the target is divided into appropriate finite elements interconnected at points called nodes.

You can import the following formats into Tekla Structures using the FEM import tool.

Option	Software
DSTV	DSTV format data (Deutsche Stahlbau-Verband). Several different systems, for example, RSTAB static software and Masterseries Analysis & Design system. DSTV manufacturing format is the standard format used for manufacturing steel components on numerically controlled (NC) machines. It also has an Analysis & Design format that is used for transferring Analysis & Design models to the physical 3D model. Different programs produce different DSTV files. For example, the DSTV file produced by RSTAB static software only contains a static model. Tekla Structures exports either the static model (CROSS_SECTION), or the CAD model (MEMBER_LOCATION).
SACS	SACS modeling and analysis software
S-Frame	Analysis software, for example, FASTSOLVE
Monorail	Monorail system
STAAD	STAAD format data (Structural Analysis And Design). STAAD modeling and analysis system. FEM import is an old way to import STAAD data. We recommend that you use a direct link to ISM or STAAD.Pro, which are available in Tekla Warehouse. If Tekla Structures and STAAD.Pro or ISM are loaded onto the same machine then direct links can be used. To make a STAAD input file compatible with the Tekla Structures STAAD import, use the option Joint coordinate format (Single) to save the input file in STAAD. This creates a line for each coordinate in the input file.
Stan 3d	Stan 3d analysis software
Bus	BUS 2.5 analysis software

Import FEM

1. On the **File** menu, click **Import --> FEM**.
2. In the **New Import Model** dialog, select **Import FEM**.
3. Select `import model` (default) from the list or enter a new name.
4. Click **OK**.
5. Click **Properties...** to open a dialog where you can define the settings for the import file:

Setting	Description
Conversion tab	
Profile conversion file Material conversion file Twin profile conversion file	Define the conversion files you want to use. The maximum conversion file path length is 255 characters. Conversion files map Tekla Structures profile and material names with names used in other software. For more information about conversion files, see .
Parts tab	
Part Pos_No Assembly Pos_No	Enter a prefix and a start position number.
Parameters tab	
Input file	The name of the file you want to import. You can also browse for the file. The maximum folder path length is 255 characters.
Type	Select the input file type: DSTV, SACS, Monorail, Staad, Stan 3d, Bus
Origin X, Origin Y, Origin Z Default yield stress limit Default material when yield stress >= limit Default material when yield stress < limit	Define the origin coordinates to place the file in a specific location. The Default material when yield stress < limit setting is used for SACS import file. Define the material to use if yield stress is less than the limit. The setting Default material when yield stress >= limit is used for SACS or DSTV import files. For SACS, this field defines the material to use if yield stress is greater than or equal to the limit. For DSTV you can enter the material grade here, if it is not included in the import file.
Combine members Max length for combining	To combine several elements in the FEM model into one part in Tekla Structures, set Combine members to Yes. For example, if a beam in a file consist of more than one element, and you select Yes, the elements are combined to form one beam in the Tekla Structures model. If you use the value No, Tekla Structures creates a beam for each element in the FEM model. Max length for combining is only applied if you set Combine members to Yes. Use this setting to define the maximum length for combining parts. Tekla Structures combines elements into one part

Setting	Description
	only if their combined length is less than the value you enter here.
Staad tab	
Material	Select the material grade.
Report tab	
Create report	Set to Yes to create a report.
Display report	Set to Yes to display the report.
Report template	Select the report template. You can also browse for the template.
Report file name	Enter the report file name or browse for a report file. If you do not give the report any other name, the report is saved with the name import_revision_report.rpt in the model folder.
DSTV tab	
Version	Select the DSTV version.
Import static elements Import other elements	If the DSTV file to be imported contains a static and a CAD model, you can choose which one to import. Answering Yes to Import static elements imports the static model. Answering Yes to Import other elements imports the CAD model.
Stan 3d tab	
Scale	Specify the scale of the import model. You can import Stan 3d without specifying the scale as long as both the Tekla Structures model and the import model are in millimeters. If the Stan 3d file is in millimeters, use the scale 1. If the Stan 3d file is in meters, use the scale 1000.
Material	Enter the material for the parts to import.
Bus tab	
Pos_No	Indicate the Pos_No of the girders, columns, braces and cantilevers you import.
Material	Enter the material for the parts to import.
Name	Enter the name of the parts to import.
Class	Enter the class of the parts to import.
Beams behind plane	The value Yes aligns the tops of all beams at the floor level.
Advanced tab	

Setting	Description
Action when objects status is (compared to)	Previous plan lists the objects in your model, compared with the objects in the file to be imported. They can be New, Modified, Deleted, or Same. Tekla Structures compares the state of imported objects with those in your model. They can be Not in model, Different, or Same. Use the options under Not in model, Different, and Same to specify the actions when importing changed objects. The options are No action, Copy, Modify, or Delete. Usually there is no need to change the defaults.

6. Click **OK** to go to the **Import Models** dialog.
7. Select the model to import.
8. Click **Import**.
Tekla Structures displays the **Import model info** dialog.
9. Select which version of parts to import.
10. Click **Accept all**.
If you have changed the model and want to re-import it, you can also reject all changes by clicking **Reject all**, or accept or reject individual changes by clicking **Select individual...**
11. Tekla Structures displays the message **Do you want to save the import model for subsequent imports?** Click **Yes**.
Tekla Structures displays the import model in a model view.
12. Right-click the model view and select **Fit work area to entire model** to ensure that the imported model is completely visible.
13. If parts are missing, check the **Depth up** and **Depth down** values in the **View Properties** dialog and change them if necessary.

Export FEM

1. Open a Tekla Structures model.
2. On the **File** menu, click **Export --> FEM**.
The **Export FEM** dialog opens.
3. Go to the **Conversion** tab and enter the names of the conversion files, or browse for the files.
4. Go to the **Parameters** tab, and enter the name of the output file, or browse for the file.

5. Select the output file type: DSTV, **MicroSAS** or Staad.
6. Set **Split members** to **Yes** to split a part in the Tekla Structures model into several elements in the exported model.
7. If you are exporting to MicroSAS, set **Combine segmented members (MicroSAS)** to **Yes** to combine multiple parts to form one part in the exported model.

For example, if you have divided a beam into several elements and select the Yes option, Tekla Structures combines the elements so that they form one beam in the exported model. With the option No every element of the beam in the model forms individual beams.

8. If you are exporting to Staad, go to the Staad tab:
 - Select an option from **Profile table** list.
 - Use the setting **Parametric shapes when possible** to define how Tekla Structures exports the profiles PL, P, D, PD, SPD to Staad. **Yes** exports the profiles as parametric shapes so that STAAD can identify them correctly. **No** exports all profiles as standard STAAD shapes.

Example of a plate PL10*200 when exported as parametric shape (**Yes**):

13 PRI YD 200.000000 ZD 10.000000.

Example of the same plate exported as a standard shape (**No**):

13 TABLE ST PL10*200

9. If you are exporting to DSTV, go to the DSTV tab:
 - Select the DSTV version from the version list.
 - In **Element reference with**, select whether you want to export into a static model (**CROSS_SECTION**), or into a CAD model (**MEMBER_LOCATION**).
10. Select the parts in the model to export.
11. Click **Apply** and **Create**.

Tekla Structures creates the export file in the current model folder.

Supported DSTV entities

The DSTV entities are listed below. Tekla Structures supports those marked with an asterisk (*). See the DSTV standard "Stahlbau - Teil 1. März 2000" for more information.

Static data:

vertex (*)

polyline

substructure (*)

node (*)
element (*)
element_eccentricity (*)
raster
boundary_condition
elastic_support
nodal_reaction
element_reaction

General data:

material (*)
cross_section (*)

CAD data:

member (*)
member_location (*)
construction-data
cutout
hole

STAAD table type specifications

Tekla Structures supports the following STAAD table type specifications:

- ST (single section from the standard built-in tables)
- ST PIPE (parametric)
- ST TUBE (parametric)
- RA (single angle with reverse Y_Z axes)
- D (double channel)
- LD (long leg, double angle)
- SD (short leg, double angle)
- TC (beams with top cover plates)
- BC (beams with bottom cover plates)
- TB (beams with top and bottom cover plates)

You can import the types CM and T, user-provided steel table types (UPT), and other non-standard profiles, if you have defined them in the profile conversion file. You must use the underscore character in the STAAD name, for example, UPT_1_W10X49. Tekla Structures automatically converts twin profiles in this import routine.

3.14 Steel fabrication

Fabrication applies to the building of structures by cutting, shaping and assembling components made from steel. Steel fabrication shops generally concentrate on the preparation, welding and assembly aspect with a much greater use of the multi functioning machines.

Fabrication (cutting and drilling features) of structural steel elements has always been performed using manually operated techniques, and these remain today as fabrication methods. The emergence of CNC (computer numerical control) technology brought automation and greater accuracy to these techniques, resulting in families of special purpose machines dedicated to performing individual fabrication tasks.

The following tools are included for steel fabrication purposes in Tekla Structures installation:

[NC/DSTV \(page 364\)](#)

[MIS \(page 405\)](#)

[CIS/2 \(page 413\)](#)

[ASCII \(page 413\)](#)

[PDMS/E3D \(page 413\)](#)

There are also some steel tools that you can download from [Tekla Warehouse](#), for example:

[STP/STEP files export for CNC cutting](#)

NC files

Tekla Structures produces NC files in the DSTV format. You can select the information to be included in the NC files and NC file headers, and define the desired pop-mark and contour mark settings. You can also produce MIS (Manufacturing Information System) list files according to the DSTV standard. You can convert the resulting DSTV file into the DXF format.

NC (Numerical Control) refers to a method where machine tool operations are controlled with a computer. The NC data controls the motion of CNC (computer numerical control) machine tools. During the manufacturing process a machine tool or machining center drills, cuts, punches or shapes the piece of material.

After you have finished detailing a Tekla Structures model, you can export the NC data as NC files from Tekla Structures to be used by CNC machine tools. Tekla Structures transforms the part length, hole positions, bevels, notches, and cuts into sets of coordinates that the machine tools can use to create the part in a shop. In addition to the CNC machine tools, the NC files can also be used by MIS and ERP software solutions.

The data for the NC files comes from the Tekla Structures model. We recommend that you complete the detailing and create drawings before producing the NC files.

Tekla Structures produces NC files in the *DSTV* format (Deutscher Stahlbau-Verband) in the current model folder. In most cases, each part has its own NC file. You can also produce NC files in the DXF format by converting DSTV files to DXF files.

DSTV is a standard interface for geometrical description of steel structure pieces for the post-processors with numerical control. The essential aim of this interface is to be neutral, which means that with only one standard description you can manage several different NC machines. The interface standardizes the link between a CAD-program or a graphical system via a CAM file for the NC machines. The geometry of the piece is introduced completely neutrally, and after knowing the parameters of the NC machine, the post-processor is able to translate this neutral language to the NC machine language. For more information, visit <https://dstv.deutscherstahlbau.de/>.

Notes and limitations:

- Duplicate bolts on a part (bolts in the same location as another bolt) are by default ignored in DSTV NC export. The tolerated distance for bolts to be considered duplicates can be adjusted with the `XS_BOLT_DUPLICATE_TOLERANCE` advanced option.
- The DSTV standard does not support curved beams, and therefore Tekla Structures does not create NC files for curved beams. Use polybeams instead of curved beams.
- Do not use shortening on saw cut members, or members that have the end cut at an angle. If you use shortening, the DSTV files are not correct.
- Contour mark and pop-mark settings should be fixed before numbering and drawing creation, because both affect numbering. For more information, see the following support article: "[How scribing affects DSTV and drawing workflow](#)".

Create NC files in DSTV format

DSTV format is an industrial standard defined by the German Steel Construction Association (Deutsche Stahlbau-Verband). A DSTV file is a text file in ASCII format. In most cases each part has its own DSTV file.

1. On the **File** menu, click **Export --> NC files**.
2. If you have some predefined settings that you want to use, select the settings from the settings file list at the top and click **Load**.
3. In the **NC files** dialog, select the checkbox in the **Create** column next to **DSTV for plates** and/or **DSTV for profiles**.
4. To modify the NC file settings, select an NC file settings row, and click **Edit...**

In the **NC file settings** dialog, modify the settings on the **Files and part selection**, **Holes and cuts**, **Hard stamp** and **Advanced options** tabs. Click **OK** to save your NC file settings and to close the **NC file settings** dialog.

Hard stamps can be created for both the main part and the secondary parts. By default, Tekla Structures creates hard stamps only for the main part. Set the advanced option `XS_SECONDARY_PART_HARDSTAMP` to `TRUE` to also create hard stamps for secondary parts.

You can select to create only DSTV files, MIS files, both, or DSTV files embedded in MIS files.

If you want to add new NC file settings, click **Add...** This will add a new row in the **NC file settings** list, and the **NC file settings** dialog is displayed, where you can give the settings a new name.

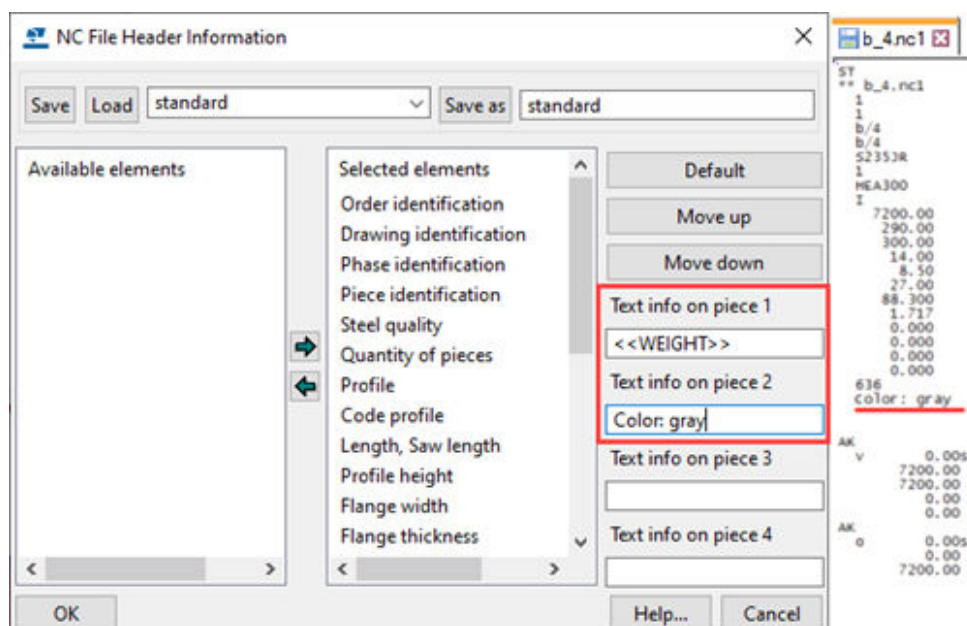
You can enter a unique name for the settings using **Save as**. Tekla Structures saves the settings in the `..\attributes` folder under the current model folder.

For more information about the NC file settings, see the "NC file settings" section below.

5. You can customize the order in which information is displayed in an NC file, and add additional information on individual parts in the NC file header. To select the information to be included in the NC file header, click **Header...**, modify the information, and click **OK**:
 - In the **NC File Header Information** dialog, include in the **Selected elements** list the header information elements that you want, and arrange the elements in the desired order by selecting the element and using the **Move up** and **Move down** buttons.

For example, to add the project number in the header, add the **Order identification** element.
 - If needed, add additional information on individual parts.

You can enter text in the **Text info on piece 1 - Text info on piece 4** boxes, and enter desired template attributes in double angle brackets, for example `<<WEIGHT>>` to display the weight of the part



- To control the number of decimals in profile names, use the advanced option XS_MAX_DECIMALS_IN_PROFILE_NAME.
 - If you want to restore the default file header information, click the **Default** button in the **NC File Header Information** dialog.
6. To create pop-marks and modify the pop-mark settings, click **Pop-marks...**
For more information about creating pop-marks and about the pop-mark settings, see the section "Create pop-marks in NC files" below.
 7. To create contour marks, and modify contour mark settings, click **Contour marking**.
For more information about creating contour marking and about the contour marking settings, see the section "Create contour marking in NC files" below.
 8. To save the settings that you have modified with another name for later use, click enter a new name next to **Save as** and click **Save as**.
 9. In the **NC files** dialog, use the **All parts** or **Selected parts** options to select whether to create the NC files for all parts or only for the selected parts.
If you use the **Selected parts** option, you need to select the parts in the model.
 10. Click **Create**.
Tekla Structures creates .nc1 files for the parts using the defined NC file settings. By default, the NC files are created in the current model folder. The file name consists of a position number and the extension .nc1.
You can also customize the file name using a tool called [DSTV file name modifier](#). For example, you might want to include the project name.

11. Click **Show NC log** to create and show the log file `dstv_nc.log` that lists the exported parts and the parts that were not exported.

If all expected parts are not exported, check that the parts which were not exported pass all the profile type, size, hole and other limits set in the NC file settings.

Sometimes the NC file is not created, and a message is displayed on the status bar telling that NC files have not been written. For details about the possible causes, see ["Troubleshooting when NC file is not created"](#)

For a DSTV file description, see "DSTV file description" in Manage Tekla Structures.

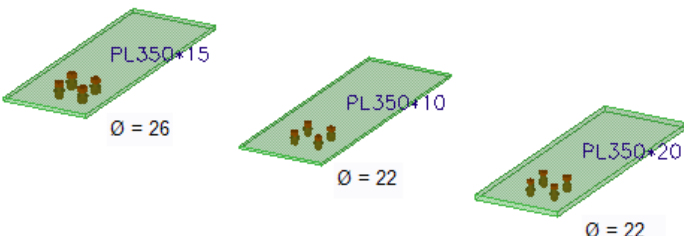
To learn more about the DSTV syntax, see [Standard Description for Steel Structure Pieces for the Numerical Controls](#).

NC file settings

Files and part selection tab

Setting	Description
File format	DSTV is the only available value.
File location	The default folder is <code>\DSTV_Profiles</code> or <code>DSTV_Plates</code> under the current model folder. The MIS files are created under the current model folder. You can define another destination folder for NC files in one of the following ways: • You can enter the folder path in the File location box. You can also browse for the path. For example, enter <code>C:\NC</code>. • If you leave the field empty, the NC files will be created in the current model folder. • To create the NC file in a specific folder under the current model folder, enter <code>.\<folder_name></code>. For example, enter <code>.\MyNCFiles</code>. • You can use the model-specific advanced option <code>XS_MIS_FILE_DIRECTORY</code> to define the destination folder for the exported NC files. Go to the CNC category in the Advanced options dialog, and enter the desired folder path for the advanced option <code>XS_MIS_FILE_DIRECTORY</code>. The NC files will be created in the specified

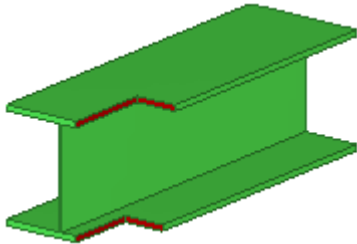
Setting	Description
	folder under a folder that has the name of the current model. For example, if you define C:\NC, and the name of the current model is MyModel, the NC files will be created in the folder C:\NC\MyModel.
File extension	.nc1 is the default value.
Include revision mark to file name	Add a revision mark to the NC file name. The file name then includes a number indicating the revision of the file, P176.nc1 becomes P176_1.nc1, for example.
Create what	Select the type of files to create: NC files creates only DSTV files. Part list creates only a MIS list file (.xsr). If you create an MIS list file, enter a name for the list in the Part list file name box. Also, you need to click the Browse... button next to the Part list file location box and browse for the location where you want to save the list . NC files and part list creates both the DSTV files and an MIS list file. Combined NC files and part list embeds DSTV files in an MIS list file (.xsr).
Maximum size	The options define the maximum length, width, and height of the parts the machine tool can handle. Larger parts are sent to other machines.
Profile type	All profiles that are set to Yes in the Profile type list can be handled by the machine tool. Profile types are named according to the DSTV standard. I: I profiles U: U and C profiles L: L profiles M: Rectangular tubes R: Round bars and tubes B: Plate profiles CC: CC profiles T: T profiles

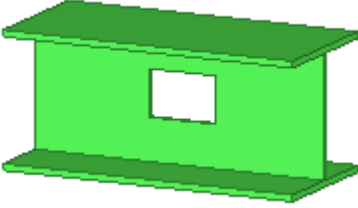
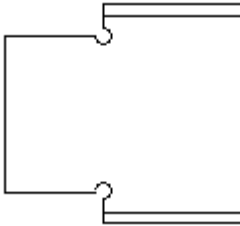
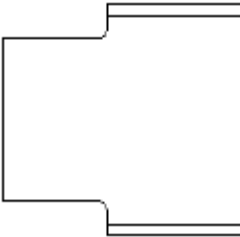
Setting	Description
	SO: Z profiles and all the other types of profiles By default, Tekla Structures unwraps round tubes as plate profiles and uses the plate profile type B in the NC file header data. To change this, use the advanced option <code>XS_TUBE_UNWRAP_USE_PLATE_PROFILE_TYPE_IN_NC</code>.
Maximum size of holes	The Maximum size of holes options define how large holes the machine tool is able to drill. The NC file is not created if a part contains larger holes or its material is thicker than the specified values. The hole size is connected to material thickness or plate thickness. Each row contains the maximum hole diameter and the material thickness. Both conditions have to be met for the NC file to be created. For example, a row with the values 60 45 means that when the material thickness is 45 mm or smaller, and the hole diameter is 60 mm or smaller, the NC file is created. You can add as many rows as needed. The following example shows how the Maximum size of holes can be defined. In this example, we have the following situation: • Three plates of different thickness. • Two bolt groups with equal sizes, and one bolt group with a larger size.  Maximum size of holes are defined as follows: Test1 creates a folder under the model folder for the plates that meet the following criteria: • Hole diameter: 22 • Plate thickness: 10 Test2 creates a folder under the model folder for the plates that meet the following criteria: • Hole diameter: 22

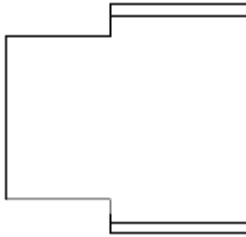
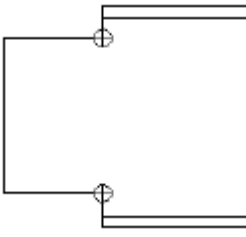
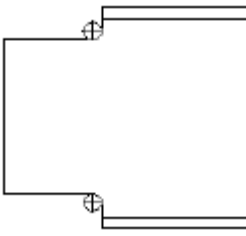
Setting	Description
	• Plate thickness: 20 When you create NC files for the plates, the folder Test1 includes the plate PL350*10 and the folder Test2 includes the plate PL350*20. The plate PL350*15 is not included in any folder, because the hole size criterion is not met. The order in which you enter the criteria is important: enter the most exclusive criteria first. If you define the criteria in a different order, the results will also be different.

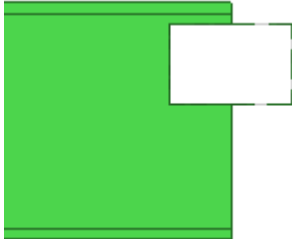
Holes and cuts tab

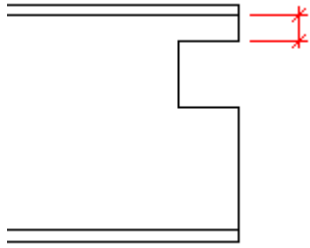
See also XS_DSTV_CREATE_NOTCH_ONLY_ON_BEAM_CORNERS.

Setting	Description
Inner corners shape	The Inner corners shape option defines the shape of, for example, web notches or flange cuts at the beam end.  The Inner corners shape option also affects cuts on the flange:  The Inner corners shape option does not apply to rectangular openings that are located in the middle of a part:

Setting	Description
	 The Inner corners shape option does not apply to those inner contours that are already rounded in the model. The model values remain intact. The examples in the below show how the different inner corner shape options affect the part in the NC file. The original part in the model has flanges cut entirely and the web is notched. Option 0: Radius  The inner corners are shaped like holes with a given radius. A separate BO block is not written to the NC file. Option 1: Tangential  The inner corner is rounded according to the value in the Radius box. Option 2: Square

Setting	Description
	 The corner is as it is in the model. Option 3: Drilled hole  A drilled hole is added to the inner corner. The hole radius is the same as the value in the Radius box. Holes are written as a separate BO block to the NC file. Option 4: Tangential drilled hole  A drilled hole is added tangentially to the inner corner. The hole radius is the same as the value in the Radius box. Holes are written as a separate BO block to the NC file. If the inner corner Radius is set to be too large, an NC file is not created to avoid manufacturing errors. The <code>dstv_nc.log</code> file in the model folder shows the error messages, and indicates the parts that have failed

Setting	Description
	and the maximum allowed inner corner radius. For the radius to be valid, the hole (including angles) must be equal to or greater than radius x 2. For example, a hole with angles needs to be even smaller than radius x 2, so that it would not hit the weld preparation area.
Distance from flange within which web is not cut	The Distance from flange within which web is not cut option defines the height of the flange clearance area. The clearance check only affects the I, U, C, and L DSTV profile types. If a cut in a part is located closer to the flange than the clearance in the model, the cut points inside that clearance are moved to the border of the clearance area when the NC file is written. The part how it is modeled. The cut goes closer to the top flange than the defined flange clearance in the NC file settings:  The part how it is written in the NC files. The dimension shows the clearance. The top of the original cut is moved so that the clearance area is left free. The bottom of the cut is not moved.

Setting	Description
	
Machine slots as	The Machine slots as option defines how slotted holes are created: Ignore slots: Slotted holes are not created in the NC file. A single hole in the center of the slot: Drills a single hole in the center of the slotted hole. Four small holes, one at each corner: Drills four smaller holes, one at each corner. Internal contours: Flame-cuts the slots as internal contours. Slots: Leaves slots as they are.
Maximum diameter for holes to be drilled	The Maximum diameter for holes to be drilled option defines the maximum hole diameter. Holes and slotted holes that are larger than the maximum hole diameter are manufactured as internal contours.
Maximum diameter for circular cuts to be drilled	Maximum diameter for circular cuts to be drilled defines the maximum circular part cuts. They are written as holes if the diameter of the cut is less than the value defined for the setting. Smaller internal circular cuts are converted to holes.

Hard stamp tab

Setting	Description
Create hard stamp	When selected, creates hard stamps.
Hard stamp content	The Elements list defines which elements are included in hard stamps and the order in which the elements

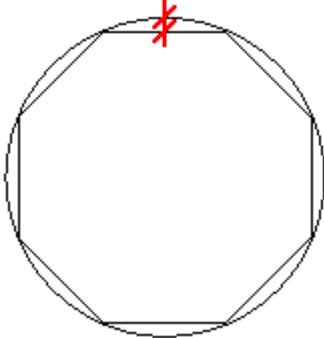
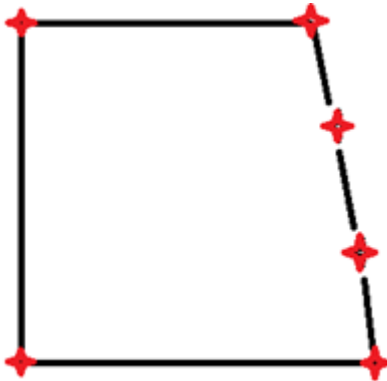
Setting	Description
	appear in the hard stamp. You can also define the Text height and Case. Project number: Adds the project number to the hard stamp. Lot number: Adds the lot number to the hard stamp. Phase: Adds the phase number to the hard stamp. Part position: Prefix and position number of the part. Assembly position: Prefix and position number of the assembly. Material: The material of the part. Finish: The type of finish. User-defined attribute: Adds a user-defined attribute (user fields 1-4) to the mark. Text: Opens a dialog where you can add user-defined text to the hard stamp. Including part position and/or assembly position in the hard stamp affects the NC filename: • Part position: P1.nc1, P2.nc1 • Assembly position: A1.nc1, A2.nc1 • Assembly and part position: A1-P1.nc1, A2-P2.nc1 The following example shows a hard stamp that contains the elements Phase, Part position, Material, and Text. SI u 30.00s 270.00 0.00 005 1b/4S235JRNEW
Hard stamp placing	If you set the option By orientation mark to Yes, the default face is changed from bottom (u) to top (o)

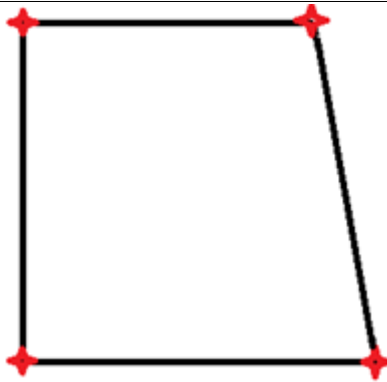
Setting	Description
	for L profiles, rectangular tubes and round bars. The Side option defines the side of the part on which the hard stamp is placed. The Position along the part and Position in depth of part options define the position of hard stamps on parts. These options move the hard stamp on the same face it is created, but they cannot move the stamp to a different face. If the face is, for example, the bottom flange, you can move the stamp to a different place on bottom flange, but not to the top flange. Default faces for different profiles: I profile: Bottom flange (u) U and C profiles: Back side of web (h) L profiles: Back (h) or Bottom (u) Rectangular tubes: Bottom flange (u) Round bars: Bottom flange (u) Circular tubes: Front (v) T profiles: Back side of web (h) Plate profiles: Front (v) See also XS_SECONDARY_PART_HARDSTAMP. For more information about custom positions for hard stamps, see DSTV hard stamp custom positions.

Advanced Options tab

Setting	Description
Number of decimals	Define the number of decimals shown in NC files.
Change external contour (AK block) radius sign	Change the AK block curve radius signs on top (o) and back (h) faces.

Setting	Description						
	This change only affects on top (o) and back (h) faces.						
Below is an example, where the Change external contour (AK block) radius sign is not selected.							
AK							
	0.00s	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	300.00	0.00	0.00	0.00	0.00	0.00
	3000.00	300.00	0.00	0.00	0.00	0.00	0.00
	3000.00	0.00	0.00	0.00	0.00	0.00	0.00
	1356.75	0.00	0.00	0.00	0.00	0.00	0.00
	1356.75	115.98	-40.00	0.00	0.00	0.00	0.00
	1356.75	155.99t	-40.00	0.00	0.00	0.00	0.00
	1316.75	155.99	0.00	0.00	0.00	0.00	0.00
	1086.75	155.99	40.00	0.00	0.00	0.00	0.00
	1046.75	115.98	0.00	0.00	0.00	0.00	0.00
	1046.75	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Below is an example, where the Change external contour (AK block) radius sign is selected.							
AK							
	0.00s	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	300.00	0.00	0.00	0.00	0.00	0.00
	3000.00	300.00	0.00	0.00	0.00	0.00	0.00
	3000.00	0.00	0.00	0.00	0.00	0.00	0.00
	1356.75	0.00	0.00	0.00	0.00	0.00	0.00
	1356.75	115.98	40.00	0.00	0.00	0.00	0.00
	1316.75	155.99	0.00	0.00	0.00	0.00	0.00
	1086.75	155.99	-40.00	0.00	0.00	0.00	0.00
	1046.75	155.99w	-40.00	0.00	0.00	0.00	0.00
	1046.75	115.98	0.00	0.00	0.00	0.00	0.00
	1046.75	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Change internal contour (IK block) radius sign				Change the IK block curve radius signs for top (o) and back (h) faces. This change only affects top (o) and back (h) faces.			
Curve detection Chord tolerance				Curve detection controls whether three points should be read as a curve instead of two straight lines. When Curve detection is set to Yes , Tekla Structures checks the edges of a solid against a virtual curve described by the edges to see if the edges are curved or straight based on the Chord tolerance value. Enter the			

Setting	Description
	Chord tolerance value in millimeters. Curve detection is on by default. The image below describes the chord tolerance. 
Convert I profile to T profile when flange is missing	Select whether to convert I profiles to T profiles when a flange is missing. You can select either Yes or No.
Skip unnecessary points	Select whether to keep or skip the points that are almost collinear. If the creation points of a contour plate differ less than 0.3 mm from a straight line, they are skipped in the NC file when this setting is selected. When the setting is not selected, every creation point of a plate is written to the NC file. Skip unnecessary points not selected:  Skip unnecessary points selected:

Setting	Description
	
Create KA block for	Select the following options to show bent line information for bent plates and polybeam plates in the NC file KA block: Unfolded bent plates and Unfolded polybeam plates. See also XS_DSTV_DO_NOT_UNFOLD_POLYBEAM_PLATES.

Create pop-marks in NC files

Pop-marks are small holes that help the shop assemble individual parts to form an assembly. Tekla Structures is able to write the pop-mark information in NC files to help position parts that will be manually welded to the assembly main part. Pop-marks are usually made using a drilling machine that drills a small hole in the surface of the material.

Limitation: Tekla Structures pop-marking does not work with polybeams.

Tekla Structures only creates pop-marks for parts for which you have defined pop-mark settings. You can save the pop-mark settings in a `.ncp` file, which Tekla Structures saves by default in the `..\attributes` folder under the current model folder.

NOTE Pop-marking affects numbering. For example, if two parts have different pop-marks, or one part has pop-marks and the other one does not, Tekla Structures gives the parts different numbers.

1. In the **NC files** dialog, select the parts for which you want to create the pop-marks by selecting the corresponding checkboxes in the **Pop-marks** column.
2. Click the **Pop-marks...** button.
3. In the **Pop-Mark Settings**, click **Add** to add a new row.
4. To define which parts are pop-marked and where the pop-marks are created, enter or select information for each item on a row.

The order of the rows in the **Pop-Mark Settings** dialog is important. Enter the most limiting definition first, and the most generic one last.

First define the pop-mark settings on the **Parts to pop-mark** tab:

Setting	Description
Main part profile type	Select the main part profile type that is pop-marked. The list contains profiles according to the DSTV standard.
Main part name	Enter the names of the main part profiles. You can enter several part names separated by commas, for example, COLUMN, BEAM. You can use wildcards (* ? []). For example, HE* matches all parts with a profile name that begins with the characters "HE". Part name can contain more names separated by comma.
Sec part profile type	Select the secondary part profile type.
Secondary part name	Enter the names of the secondary part profiles. You can enter several part names separated by commas. You can use wildcards (* ? []). Part name can contain more names separated by comma
Pop-mark location	Select how the secondary part is projected onto the main part. • Left side: The left side of the secondary part is marked on the main part. The left side is the side of the secondary part that is closest to the start point of the main part. • Right side: The right side of the secondary part is marked on the main part. • Both sides: Combines Left side and Right side. • Center: Center of the secondary part. • Left side holes: Marks the main part with the position of holes in

Setting	Description
	the secondary part, on the left side of the secondary part. • Right side holes: Marks the main part with the position of holes in the secondary part, on the right side of the secondary part. • Both side holes: Combines Left side holes and Right side holes. • Middle line: Marks two points on the middle line of the secondary part x axis.
Move to flange	Select to which part of the main part flange the pop-marks are moved. The options are None , Both flanges , Top flange , and Bottom flange .
Edge distance	Enter the minimum distance from a pop-mark to the edge of the main part. Tekla Structures does not create pop-marks inside this distance. If a pop-mark is inside the defined edge distance, Tekla Structures moves it, unless you have set Pop-mark location to Center.
Secondary pop-marks	Select whether pop-marks are created to the secondary parts.
Add pop-mark to parts welded on site	Select whether pop-marks are created for parts that are welded on site.

Then define the pop-mark settings on the **Pop-marking options** tab:

Setting	Description
Pop-marks on the back	Select one of the options: Rotate part if pop-marks or other items only on the back Rotate part and drill through pop-marks on the back if other items or more pop-marks only on the back. Also set the Hole diameter. Drill through pop-marks on the back if no other items on the back. Also set the Hole diameter.
No pop-marks on overlapping holes	Select if you do not want to have pop-marks on overlapping holes.

Setting	Description
Add pop-marks to centers of studs	Select to have pop-marks in the stud centers.
Show pop-marks in the model	Select to show pop-marks in the model.
Consider zero diameter holes as pop-marks	Write zero diameter bolt holes as a pop-marks.

- Click **OK**.
- Select the parts in the model and create the NC files.

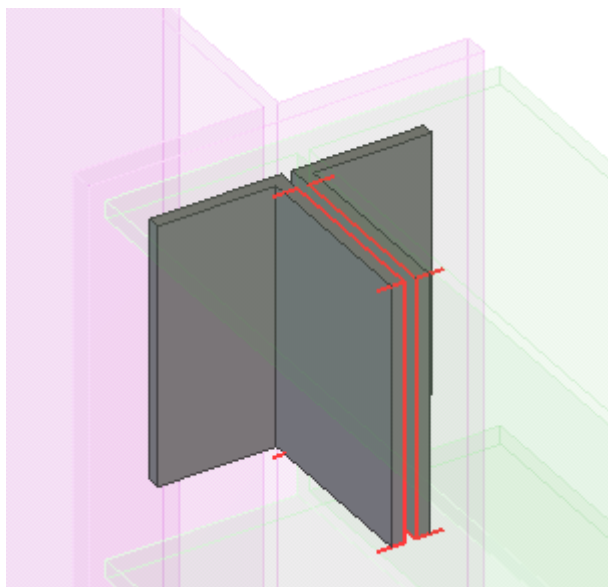
Pop-marks are written in the `BO` block in the DSTV file as 0 mm diameter holes.

If needed, pop-marks can also be displayed in drawings. In drawings, select the **Pop-marks: on/off** checkbox in the part properties to display the pop-marks.

The default symbol for pop-marks is `xsteel@0`. You can change the symbol with the advanced option `XS_POP_MARK_SYMBOL`.



Tekla Structures displays thick red lines for each pop-mark pair in the model view which was last updated.



Examples

Tekla Structures marks the center point of all round secondary profiles on a main part, and does not create pop-marks closer than 10 mm to the main part edge.

Parts to pop-mark		Pop-marking options				
Main part profile type	Main part name	Sec part profile type	Secondary part name	Pop-mark location	Move to flange	Edge distance
All profiles	*	Round bar	*	Center	None	10.00

Tekla Structures projects the hole location in the secondary plates onto a main part.

Parts to pop-mark		Pop-marking options				
Main part profile type	Main part name	Sec part profile type	Secondary part name	Pop-mark location	Move to flange	Edge distance
All profiles	*	All profiles	*PLATE*	Both side holes	None	1.00

Create contour marking in NC files

Tekla Structures is able to generate contour marking in NC files. This means that information on the layout and the parts that are welded together can be added to the NC files and passed on to the machine tool.

Limitation: Tekla Structures contour marking on polybeams does not work in all cases. The visual placement of contour marking on polybeams has been improved.

Tekla Structures only creates contour markings for parts for which you have defined contour marking settings. You can save the contour marking settings in a `.ncs` file, which Tekla Structures saves by default in the `..\attributes` folder under the current model folder.

You can add contour marking to both the main and the secondary parts.

NOTE Contour marking affects numbering. For example, if two parts have different contour markings, or one part has contour markings and the other one does not, Tekla Structures gives the parts different numbers.

1. In the **NC files** dialog, select the parts for which you want to create the contour marks by selecting the corresponding checkboxes in the **Contour marking** column.
2. Click the **Contour marking...** button in the **NC files** dialog.
3. In the **Contour marking settings** dialog, click **Add** to add a new row.
4. To define which parts are contour marked and how they are contour marked, enter or select information for each item on a row:

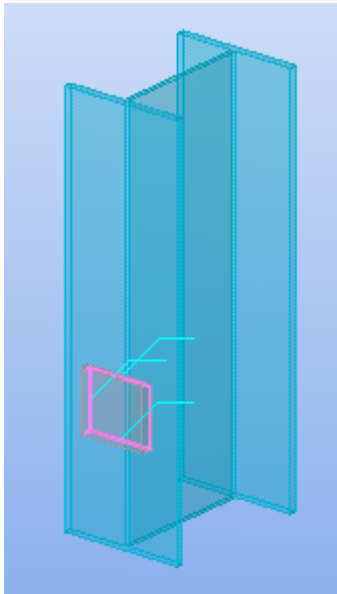
Option	Description
Main part profile type	Select the main part profile type that is contour marked. The list contains profiles according to the DSTV standard.

Option	Description
Main part name	Enter the name for the main part profiles. You can enter several part names separated by commas, for example, COLUMN, BEAM. You can use wild cards (* ? []). For example, HE* matches all parts with a profile name that begins with the characters "HE". Part name can contain more names separated by comma.
Sec part profile type	Select the secondary part profile type. The list contains profiles according to the DSTV standard.
Secondary part name	Enter the name for the secondary part profiles. You can enter several part names separated by commas. You can use wildcards (* ? []). Part name can contain more names separated by comma.
Secondary contour marking	Select whether the secondary parts are contour marked.
Punch or powder	In the list, select how the part is contour marked: • Punch: The part is punched. • Powder: The part is marked with powder. • Both: Both techniques are used.
Hard stamp	Select whether hard stamps are created.
Mark parts welded on site	Select whether you want to mark parts that are welded on site.
Edge distance	Define the minimum distance from a contour mark to the edge of the main part. Tekla Structures not create contour marks inside this distance.

5. Click **OK** and create the NC files.

Contour marking is written in the PU and KO blocks in the DSTV file.

Tekla Structures displays contour marking as thin magenta lines in the model view.



Fittings and line cuts in NC files

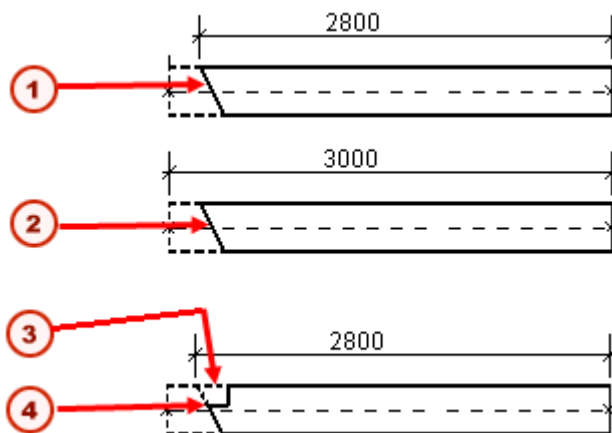
When creating NC files in DSTV format, the method you use to cut the end of the beam affects the beam length in the NC file.

- **Fittings** affect the length of the beam in the NC file.
- **Line cuts** do not affect the length of the beam in the NC file.

When you cut the beam end, use the fitting method to make sure that the beam length is correct in the NC file.

The overall length of a beam will be the fitted net length of the beam. This means that Tekla Structures always takes the fitting into account when calculating the beam length.

For lines, polygons, or part cuts, the cut does not affect beam length, but the overall length in the NC file will be the gross (initially modeled) length of the beam.



1. Fitting
2. Line cut
3. Polygon or line cut
4. Fitting

Shortest length

If you want to use the shortest possible length in an NC file, use the advanced option `XS_DSTV_NET_LENGTH`.

Net and gross length

If you want to include both net and gross length into NC file header data, use the advanced option `XS_DSTV_PRINT_NET_AND_GROSS_LENGTH`.

Create round tube NC files

You can create NC files for tubular hollow sections. You first need to use specific tube components to create the connections.

Create the following tube-to-tube and tube-to-plate connections:

- Tube-Chamfer
- Tube-CrossingSaddle
- Tube-MitreSaddle+Hole
- Tube-Saddle+Hole
- Tube-SlottedHole

After using the components, you can create an NC file for data export. The tube NC file creation results in an XML file that contains the model data.

Limitations:

To get correct tube NC export results, note the following limitations:

- Line cuts and fittings created manually or by other components will be exported as simple chamfers.
- Part cuts are not supported in the XML export to HGG tube NC files.
- Holes created by bolts are not supported, and they will not be exported.
- Curved beams are not supported.
- For square or rectangular tubes, use **File --> Export --> NC files** to create DSTV files.

1. On the **File** menu, click **Export --> Tube NC files**.
2. In the **Create Tube NC Files** dialog, enter a name for the export file, and browse for the location where you want to save the file.

By default, the file is saved in the model folder.

3. Select whether you want to create the file for selected parts or for all parts.
4. Click **Create**.

Tekla Structures creates an XML file and a log file in the location you defined.

Convert DSTV to DXF

Use the DSTV to DXF converter to convert DSTV files to DXF format files to be used in fabrication production solutions, such as plate nesting or production management. Many production automation solutions, especially some plate nesting solutions, only support the import of DXF files, not DSTV NC files.

The DSTV to DXF converter provides key layer and quantity information in the format expected by the production solutions. The converter also supports the automation of the conversion processes through the command prompt and macro templates, which allow you to set up and customize your automation routines.

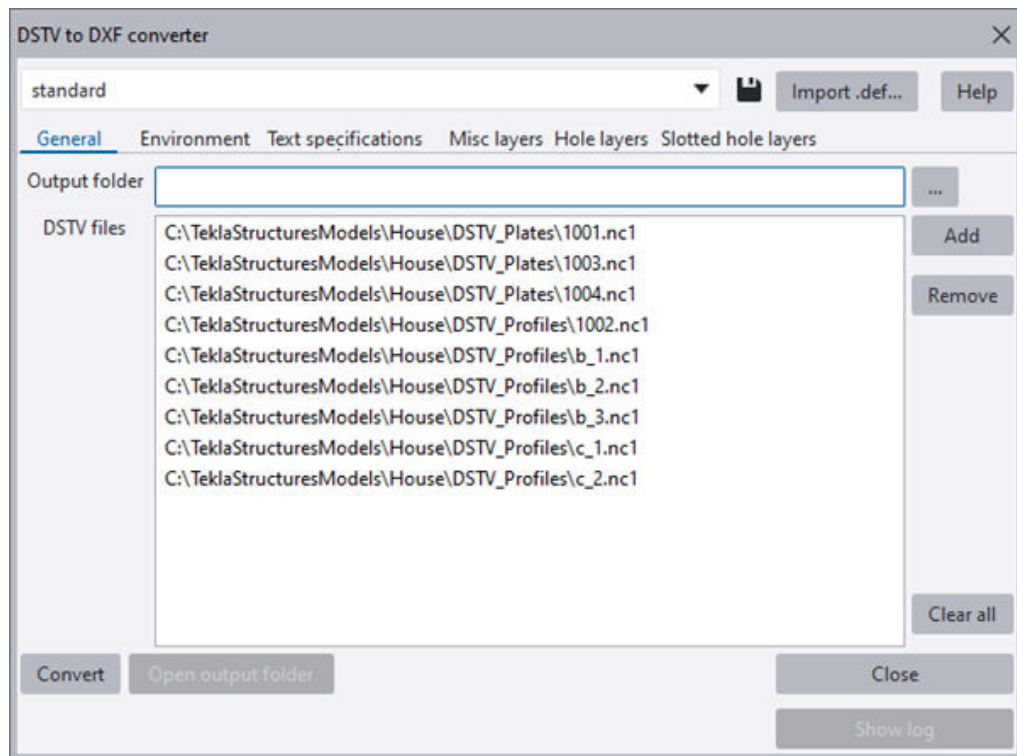
Convert using the DSTV to DXF Converter

1. To open the **DSTV to DXF Converter**, in the side pane, click the

 **Applications & components** button, search for the **DSTV to DXF Converter**, and double-click the **DSTV to DXF Converter** button.



The **DSTV to DXF Converter** dialog is displayed.

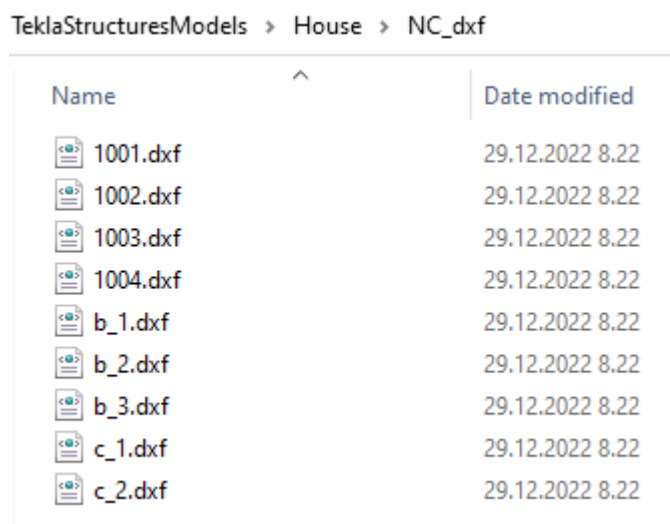


2. Define the desired settings on the various tabs, and use the **Add** button to add the .nc files.

The settings are described in the "DSTV to DXF conversion settings" section later on this page.

3. Click the **Convert** button.

The DXF files are created in the specified folder:



You can open the output folder by clicking the **Open output folder** button. To check the conversion log, click the **Show log** button.

Convert DSTV to DXF using a converter template

You can use a converter template to automate the conversion process. All you need to do is to fill in the necessary information in the template file in a text editor. Once you have it set up, you do not need open and load the settings in the **DSTV to DXF Converter** dialog, and you can do the conversion just by double-clicking one button.

1. In **Applications & components**, right-click the **DSTV to DXF Converter Template** button, click **Edit**, and select a suitable text editor.

This opens the `DSTVtoDXFConverterTemplate.cs` template located in the `..\TeklaStructures\<version>\bin\<Env>\Common\macros\modeling` folder.

2. Scroll down to modify the strings to suit local environment and user preferences:

```
/**** Modify these strings to suit local environment and
user preferences. *****/
```

```
private static string attributeFile = @"standard";
private static string inputFolder = @".\DSTV_Profiles";
private static string outputFolder = @".\NC_dxf";
private static string files = @"PL*.nc1, BPL*.nc1,
FLT*.nc1";

private static bool overwrite = true;
```

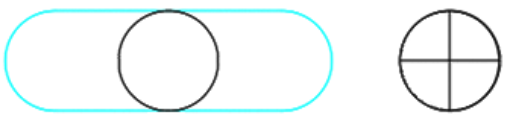
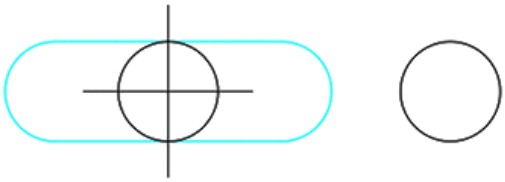
- `standard`: attribute file name you want to use for conversion
- `./DSTV_Profiles`: input folder in which single and batch files are searched for
- `./NC_dxf`: output folder where to create the *.dxf files
- `PL*.nc1, BPL*.nc1, FLT*.nc1`: list of file names each enclosed in quotes or wild card
- `true`: option to overwrite or not the existing *.dxf files.

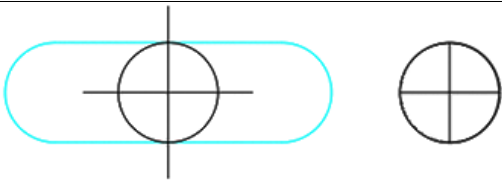
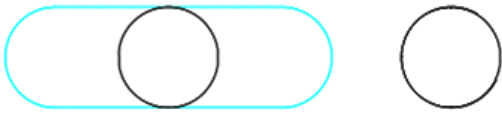
3. Save the template file.
4. To run the conversion using the template, in **Applications & components**, double-click the **DSTV to DXF Converter Template** button.

After the process ends, a message will give you information about the conversion.

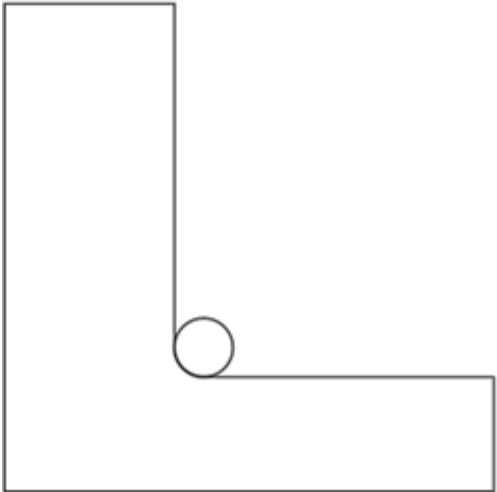
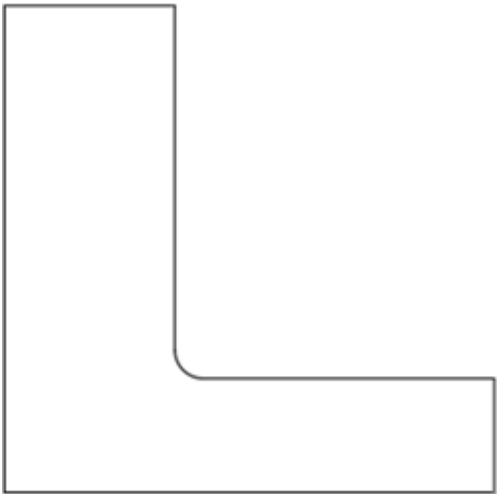
DSTV to DXF conversion settings

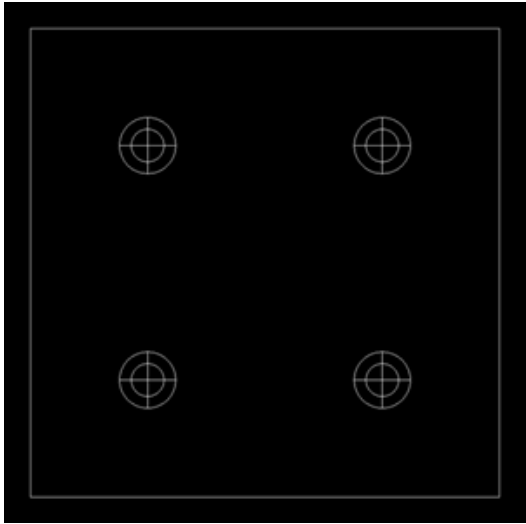
General tab	

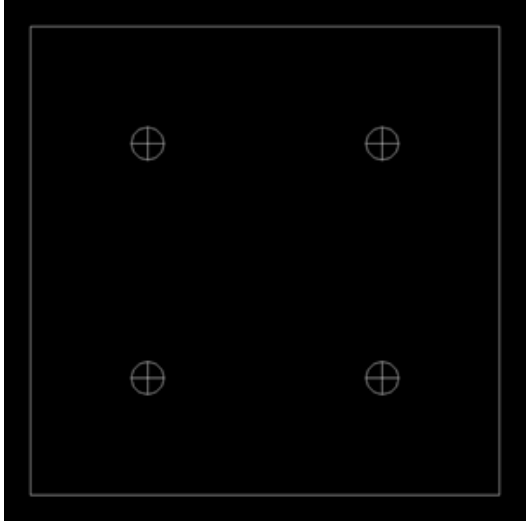
Output folder, DSTV files	- Select the desired settings file. You can use the Import .def button to import a settings file. - Define the Output folder. By default, the output folder is \NC_dxf under the model folder. - Use the Add button to add the .nc files. - You can remove files by clicking the Remove button. To remove all files at one go, use the Clear all button.
Environment tab	
Include shop data section	Specify whether to include a special data section in the DXF file to allow the DXF file to be better imported into CNC software written by Shop Data Systems. Including this special data section in the DXF file makes the DXF file unreadable by AutoCAD. No is the default value.
No input file extension in output file	Specify whether to use the input file extension in the output file. Yes: p1001.dxf. Yes is the default value. No: p1001.nc1.dxf
Draw crosshairs	Select whether to draw crosshair for holes and slotted holes. Holes (default):  Long holes:  Both:

	 None: 
Side to convert	Define the part face that is shown in the DXF file: Front (default), Top, Back, or Below. For plates, if you select Back, you need to set the advanced option XS_DSTV_WRITE_BEHIND_FACE_FOR_PLATE to TRUE for the NC file creation. This will include the back side data of a plate in the NC file.
Output contours as	Convert contours as Polylines (default) or Lines and arcs.
Contour direction	Define the contour direction. This option changes the coordinates of the vertices, and their order in the DXF file. The options are: Reverse (clockwise, default) Forward (counter-clockwise)
Convert holes to polylines	Convert holes to polylines. Yes is the default value.
Maximum diameter for holes converted to points	Convert holes with a diameter smaller than the defined value to points and follow the Hole point style and Hole point size settings. The default value is 10.00 mm.
Hole point style	Set the style for hole points. Enter one of the following values: 2 

	3  4  33  34  35  36 
Hole point size	Enter the hole point size. 1.00 mm is the default value.
Scale DSTV by	Scale the values from the DSTV file. • 1.00000 for metric units (default) • 0.03937 for imperial units NOTE: Sometimes, the elements are not properly converted in the .dxf file due to the small Scale DSTV by value (less than 1.00). In this case, you can increase the Number of decimals value and/or the Scale DSTV by value, which will create the elements in the .dxf file properly.

Add outer contour roundings	Add holes to roundings. No is the default value. This setting only affects the roundings if at the NC file creation, the Inner corners shape setting was set to 1 on the Holes and cuts tab in the NC file settings dialog. The hole size information is comes to the DSTV file from the Radius value in the NC file settings dialog, and it cannot be adjusted in the DSTV to DXF converter. Yes  No 

Minimum material between holes	Define how close the holes can be to each other in the slotted hole conversion. 2.00 mm is the default value.
Hardstamp for contour marking	Enable the conversion of the hard stamp created at the NC file creation. In the Contour marking settings in NC file settings , you need to have set the Hard stamp option to Yes . No is the default value.
Number of decimals	Set the number of decimals for values in the DXF file. 3 is the default value.
Read part mark from NC file header line	Set the line number of the NC file header for reading the part mark information. The options are: • 3 - Read the part mark information from the 3rd line of the NC file header. This is the default value. • 4 - Read the part mark information from the 4th line of the NC file header.
Draw blind holes	Include or exclude the blind holes in the DXF files. No is the default.
Draw outer diameter of countersunk holes	Select Yes to create the outer diameter of the countersunk holes in addition to the inner diameter. 

	If you select No, only the inner diameter will be created. No is the default value. 
Draw tapped holes	Select one of the following options: • Core hole size: Maps and draws tapped holes using the core hole size conversion and layers. • Nominal size: Draws tapped holes using the nominal (DSTV value) size. Tapped holes are mapped to the layers and colors as defined on the new Tapped holes tab. • No: Tapped holes are ignored and not drawn in the DSTV output.
Text specifications tab, Text properties	
Add text	Select whether to use the manual text properties or the hard stamp from the NC file: • Manual: Define the text settings. This is the default value. • From NC file: All text settings will be disabled and the information defined in the DSTV file will be used.
Text placing	Place the text manually or let the application find out a suitable place for it. The options are:

	• Fixed: Set the X and Y coordinates of the point that represents the lower-left corner of the last line of text from the origin point 0,0 of the DXF file. • Automatic: The text will be placed automatically taking into consideration the collision with outer and internal contours, holes, and contour marking. If no suitable position is found, the default value (X 30.00, Y 30.00) will be used.
Text height	Specify the text height. 10.00 is the default value.
Text line alignment	Write the text options on separate or combined lines. • Separate lines: Each text option is written on a separate line. This is the default value. • Project number and part mark separate, others combined • All into one line: All text options are concatenated on one line. When selecting one of the last two options the prefixes will be automatically removed but they can be added back and work as for the first option.
Separator symbol	Enter the separator used for the Text options if you are using one of the combined text alignment options. You can specify more than one character. Plus (+) is the default separator.
Text specifications tab, Text options	
Enable/Disable items from the text options	Enable or disable options from the converted text options. If you disable an option, the related Prefix box on the right is also disabled. Note that whitespaces will be considered in the prefixes. Project number: Enter the prefix for the project number. Project number:

	is the default. This option is disabled by default. Part mark: Enter the prefix for the part mark. Part: is the default. This option is enabled by default. Side mark: Enter the prefix for the side mark. Side: is the default. This option is disabled by default. Material: Enter the prefix for the material. Material: is the default. This option is enabled by default. Quantity: Enter the prefix for the quantity. Quantity: is the default. This option is enabled by default. Thickness: Enter the prefix for the thickness. Thickness: is the default. This option is disabled by default. Profile description: Enter the prefix for the profile description (Desc: is the default). This option is enabled by default.
Misc layers tab The maximum length of a layer name is 100 characters. If you use special characters in layer names, such as <, >, /, \, :, ;, !, *, , ,, and space " ", the extension will replace them with the "_" underscore character.	
Part mark	Define a name and a color for the part mark layer. SCRIBE is the default name.
Phantom	Define a name and a color for the phantom layer. LAYOUT is the default name.
NS pop-mark	Define a name and a color for the near side pop-mark layer. NS_POP_MARK is the default name. You can also define whether to use pop circle (default) or pop point as the pop mark type. Also define the DXF diameter (default 2.00 mm).
FS pop-mark	Define a name and a color for the far side pop-mark layer. FS_POP_MARK is the default name. You can also define the diameter (default 1.00 mm), and

	whether to use pop circle (default) or pop point as the pop-mark type. Also define the DXF diameter (default 2.00 mm).
Text	Define a name and a color for the text layer. TEXT is the default name.
Outer contour	Define a name and a color for the outer contour layer. CUT is the default name.
Inner contour	Define a name and a color for the inner contour layer. CUTOUT is the default name.
Punch contour marking	Define a name and a color for the punch contour marking layer. PUNCH_CONTOUR_MARKING is the default name.
Powder contour marking	Define a name and a color for the powder contour marking layer. POWDER_CONTOUR_MARKING is the default name.
 Bends	Define a name and a color for the bends layer. BENDS is the default name. You can enable or disable the bends layer. If the bends are enabled (default), the information on the bent lines will be written in the DXF files. If the bends are disabled, this information is not written.
Color	Colors and color numbers available for layers. 

Hole layers tab:

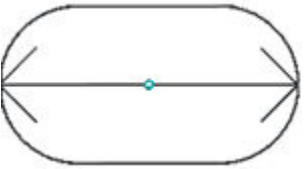
- For the hole layers, to modify the hole layer name, hole minimum diameter, hole maximum diameter, and the layer color, double-click the cell and enter a new value, or select a new value from the list.
- To add a new row, right-click and select **Add new row**.
- To delete a row, select a row, right-click, and select **Delete selected row**, or press **Delete** on the keyboard.
- To clear all rows, right-click and select **Clear all rows**.

Slotted hole layers tab:

- For the slotted hole layers, to modify the values (hole layer name, hole minimum diameter, hole maximum diameter, minimum width, maximum width, minimum height, maximum height, type, layer color, and phantom type), double-click the cell and enter a new value, or select a new value from the list.
- To add a new row, right-click and select **Add new row**.
- To delete a row, select a row, right-click, and select **Delete selected row**, or press **Delete** on the keyboard.
- To clear all rows, right-click and select **Clear all rows**.

Phantom type examples

Below there are some examples with different phantom types. The other settings used are **Slot type** = 1 , **Hole point style** = 33 and **Hole point size** = 1.

Phantom arrow	
Phantom outline	
Phantom arrow + outline	
Phantom none	

Tapped holes tab:

- **LAYER NAME:** Defines the name for the tapped holes layer.

- **DIAMETER:** Sets the bolt hole diameter for the tapped holes on the defined layer. This is the size that is found and matched in the DSTV NC file.
- **CORE HOLE SIZE:** Sets the core hole size for the tapped holes on the defined layer. This is the size that is used in the DXF output if **Core hole size** is the selected **Draw tapped holes** option.
- **COLOR:** Sets a new color for the tapped holes on the defined layer.
- To modify the values, double-click the cell and enter a new value, or select a new value from the list.
- To add a new row, right-click and select **Add new row**.
- To delete a row, select a row, right-click, and select **Delete selected row**, or press **Delete** on the keyboard.
- To clear all rows, right-click and select **Clear all rows**.

Convert DSTV to DXF through command prompt

1. Open a Tekla Structures model.
2. Open the Command Prompt window.
3. To run the DSTV to DXF converter, at the command prompt, enter the path to the `DSTVtoDXFConverter.exe` command and the desired parameters.

The command is located in the `..\Tekla Structures\<version>\bin\applications\Tekla\Tools\DSTVtoDXFConverter` folder by default.

Command syntax:

```
DSTVtoDXFConverter.exe [-cfg attributeFile] [-out outputFolder] [-in inputFolder] [-overwrite] [-f files]
```

Parameters:

`-cfg attributeFile`

- Defines the attribute file used in the conversion.
- The `standard` attribute file is used if nothing else is specified.
- You can use both full and relative paths.
- Relative paths are relative to the model folder.
- If no path is specified, the configuration file is read from the `standard` attribute file locations.
- If there are no attribute files, a warning message will appear asking you to specify a configuration file and create an attribute file in the **DSTV to DXF converter** dialog.

`-out outputFolder`

- Defines the output folder.

- You can use both full and relative paths.
- Relative paths are relative to the model folder.
- If the folder is not specified, the output folder is read from the attribute file.
- If the folder is not specified in the attribute file, the output folder is the same as the input folder.
- The output folder is created if it does not exist.
- If the output folder name contains spaces, enclose the name in quotation marks ("").

`-in inputFolder`

- The folder from which single and batch files are searched for.
- You can use both full and relative paths.
- The default is the model folder if the input folder is not specified.
- If the input folder name contains spaces, enclose the name in quotation marks ("").

`-no_over_write`

- When included, existing files are not overwritten.
- When not specified, existing files are overwritten.

`-f files`

- A list of 1 to n file names each enclosed in quotes, separated by commas
- You can also use wild card *
- If not specified, "*.nc1" is used as default
- Examples :
 1. `-f "P1.nc1"`
 2. `-f "*.nc1"`
 3. `-f "P1.nc1, F2.nc1, P3.nc1, P5.nc1, P7.nc1"`
 4. `-f "PL*.nc1, BPL*.nc1, FLT*.nc1"`

Examples of DSTV to DXF converter command

`DSTVtoDXFConverter.exe`

- opens the **DSTV to DXF converter** dialog.

`DSTVtoDXFConverter.exe -in \"./NC Plates\"`

- standard attribute file is used
- the input folder is [modelFolder]\NC Plates
- the output folder is read from standard attribute file
- all files with .nc1 extension are converted

- existing *.dxf files for selected *.nc1 files will be overwritten

```
DSTVtoDXFConverter.exe -cfg myPlateSettings -out \"./Plate DXF\" -in \"./NC Plates\" -f \"P1.nc1\"
```

- attribute file with the name myPlateSettings is used
- the input folder is [modelFolder]\NC Plates
- the output folder is [modelFolder]\Plate DXF
- the file P1.nc1 is converted
- existing *.dxf files for selected *.nc1 files will be overwritten

```
DSTVtoDXFConverter.exe -cfg myPlateSettings -out \"./Plate DXF\" -in \"./NC Plates\" -f \"P1.nc1, F 2.nc1, P3.nc1, P5.nc1, P7.nc1\"
```

- attribute file with the name myPlateSettings is used
- the input folder is [modelFolder]\NC Plates
- the output folder is [modelFolder]\Plate DXF
- the files P1.nc1, F2.nc1, P3.nc1, P5.nc1, and P7.nc1 are converted
- existing *.dxf files for selected *.nc1 files will be overwritten

```
DSTVtoDXFConverter.exe -cfg myPlateSettings -in \"./NC Plates\" -no_over_write -out \"./Plate DXF\" -f \"*.nc1\"
```

- attribute file with the name myPlateSettings is used
- the input folder is [modelFolder]\NC Plates
- the output folder is [modelFolder]\Plate DXF
- all files with .nc1 extension are converted
- existing *.dxf files for selected *.nc1 files will not be overwritten

```
DSTVtoDXFConverter.exe -cfg myPlateSettings -in \"./NC Plates\" -no_over_write -out \"./Plate DXF\" -f \"PL*.nc1, BPL*.nc1, FLT*.nc1\"
```

- attribute file with the name myPlateSettings is used
- the input folder is [modelFolder]\NC Plates
- the output folder is [modelFolder]\Plate DXF
- all the files that have PL, BPL, FLT as a prefix and .nc1 extension are converted
- existing *.dxf files for selected *.nc1 files will not be overwritten

You can also use the following parameters with DSTVtoDXFConverter.exe:

- To find out the version of the converter: DSTVtoDXFConverter.exe -!
- To see all the options and commands: DSTVtoDXFConverter.exe -?
- To list examples that use correct templates: DSTVtoDXFConverter.exe examples

Convert DSTV to DXF (old conversion tool)

You can create NC/DSTV files in DXF format by converting DSTV files to DXF files. Before running a DXF conversion, you must first create the NC files in DSTV format. The old conversion tool is available in Tekla Warehouse.

Install the DSTV to DXF converter

The old DSTV to DXF converter tool is available as an extension and can be installed as a TSEP package from Tekla Warehouse.

1. Download the DSTV to DXF converter installer package from [Tekla Warehouse](#).
2. Install the TSEP package.

Convert DSTV files to DXF

You can convert the created DSTV files in DXF format by using the **Convert DSTV files to DXF** macro.

Limitation: The macro has been designed for simple plates. Therefore it may not give correct conversion results for beams, columns, and bent polybeams.

NOTE If you run the conversion from the **Applications & components** catalog, the conversion settings are loaded from the metric .def file (tekla_dstv2dxf_metric.def).

1. [Create the NC files \(page 364\)](#) in the DSTV format.
2. Click the **Applications & components** button  in the side pane to open the **Applications & components** catalog.
3. Click the arrow next to **Applications** to open the applications list.
4. If **Convert DSTV files to DXF** is not visible in the **Applications** list, select the **Show hidden items** checkbox at the bottom of the **Applications & components** catalog.
5. Double-click **Convert DSTV files to DXF** to open the **Convert DSTV files to DXF** dialog.
6. Browse for the folder that contains the DSTV files you want to convert to DXF files.
7. Select the DSTV files and click **Open**.
Tekla Structures automatically creates an NC_dxf folder under the model folder and creates the DXF files there.

Convert DSTV files to DXF using tekla_dstv2dxf.exe

You can use a separate Tekla Structures program `tekla_dstv2dxf.exe` to convert the DSTV files to DXF format. Only one side of a part (front, top, back

or bottom) is written to the file, and therefore this export format is most suited to plates.

The program is located in the `..\Tekla Structures\<version>\bin\applications\Tekla\Tools\dstv2dxf` folder. The conversion settings are loaded from the settings in the appropriate `tekla_dstv2dxf_<env>.def` file.

1. Create a folder for the DSTV files, for example `c:\dstv2dxf`.
Do not use spaces in the folder path. You should not save the files, for example, in the Tekla Structures folder under the `\Program Files` folder, because the folder path contains spaces.
2. Copy all files from `..\Tekla Structures\<version>\bin\applications\Tekla\Tools\dstv2dxf` to the folder you created (`C:\dstv2dxf`).
3. [Create DSTV files \(page 364\)](#) and save the files in the folder you created (`C:\dstv2dxf`).
4. Double-click a suitable `dstv2dxf_conversion.bat` file.
The program converts the files to DXF format in the same folder.
If you need to adjust the conversion settings, modify the settings in the appropriate `tekla_dstv2dxf_<env>.def` file and restart the conversion. A conversion file description in the PDF format can be found in the same folder as the `tekla_dstv2dxf.exe` program.

MIS lists

You can export model data as a MIS list to be used in Manufacturing Information Systems (MIS).

The **MIS** export supports the following formats:

- DSTV - The exported file contains the MIS information written in the DSTV format.
- KISS - We recommend using the FabTrol reports instead of the **MIS** export for exporting FabTrol data. The FabTrol reports are available for the Steel Detailing role in the US environment. If you do not use a suitable environment you may also contact your local support for the FabTrol files.
Note that plates will not export in the KISS format correctly.
- EJE - US environment, Imperial role only. Structural Material Manager internally stores all dimensions in sixteenths. Its External Data Interface writes all dimensions, such as widths and lengths, except for Beam and Channel descriptions, in sixteenths of an inch. As an example the length

12'-8 7/8 is equivalent to 2446 sixteenths, which is calculated as (feet * 192) + (inches * 16) + (eighths * 2) = (12 * 192 + 8 * 16 + 7 * 2).

Tekla Warehouse also provides additional [EJE report templates](#) used to pass data from Tekla Structures into EJE's Structural Material Manager. Download the templates and save the templates in a folder defined for the templates by the advanced option XS_SYSTEM. You can modify these report templates if you wish.

- EPC - The EPC (Estimating and Production Control) module of SDS/2 requires multinumbers to be active.
- Steel 2000

Export a MIS list

1. On the **File** menu, click **Export --> MIS**.
The **Export MIS** dialog opens.
2. Select the file type from the **MIS type** list.
3. If you selected **KISS** or **Steel 2000**, define the additional options:
 - **KISS**
Enter the customer name in the **Customer name** box.
Select the **Full material list** checkbox to add labor-related information to the list (for example, holes, welds, cambers, preliminary marks).
 - **Steel 2000**
Select the **Export only shop bolts** checkbox to include only workshop bolts in the list file.
4. Enter a name for the list file in the **MIS list file** box.
By default, the list file is saved in the model folder.
You can select another folder by clicking **Browse....**
5. Ensure that you have the selection switch **Select objects in components** selected. If you have the switch **Select assemblies** selected, Tekla Structures will create empty files.
6. Click **Create all** or **Create selected** to export the MIS list file.

STEP/IGES

You can export polybeams, and straight, curved and arc shaped profiles with boolean operators directly in the STEP (.stp) or IGES (.igs) format with real arc and bend data for automated manufacturing of steel parts. The export provides solid objects.

You can export steel profiles and associated connecting entities, such as bolts and welds, as assemblies or single parts. The Tekla Structures model geometry

is directly transformed to the STEP and IGES file formats using the Open CASCADE Technology (OCCT), and no conversion files are needed.

STEP (Standard for the Exchange of Product Data) and IGES (Initial Graphics Exchange Specification) are well-established and standardized neutral 3D CAD file formats that are interoperable among various CAD programs, such as Dassault Systèmes SOLIDWORKS, Dassault Systèmes CATIA, Autodesk Inventor, Siemens NX, and Siemens Solid Edge. The STEP file format is preferred as the industry standard when exchanging data for CAD programs. However, the IGES format is still reliable for basic cross-platform compatibility, especially if you only need to store raw 3D models.

For more information about the STEP and IGES formats, see [STEP](#) and [IGES](#).

Limitations in STEP/IGES export

Currently, the STEP\IGES export does not export the following objects:

- Object types related to sheet metal unfolding, such as bent plates and lofted plates
- Cambered profiles
- Warped profiles
- Reinforcement and mesh
- Weld preparation
- Added parts
- Surface treatment
- Pours

Export in STEP or IGES format

1. In a Tekla Structures model, select the model objects to export.
If you want to export all model objects, you do not need to select any objects.
2. On the **File** menu, click **Export --> STEP/IGES**. You can also start the export from the **Quick Launch**.
3. Load any predefined export settings available in your environment, or set up the export as necessary.

For details about the export settings, see the section "STEP/IGES export settings" below.

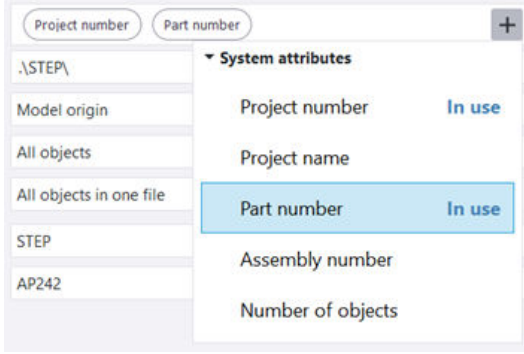
4. When you are ready, click **Export**. By default, the Tekla Structures exports the files to the \STEP folder under the current model folder.

When the export is completed, you can select to open the export folder or show the log file where the export is described in detail.

You can cancel the export by clicking **Cancel** in the export progress window. Canceling may take a while with large models, or when you have selected to export many objects in one file.

STEP/IGES export settings

Setting	Description
File name	Define the name of the export file by entering the name directly in File name or by clicking the  plus button and double-clicking the file name elements in the

Setting	Description
	system attributes list. You can use a combination of text and attributes. To delete an element from the file name, select the element and press Delete on the keyboard or right-click the element and select Delete. You can also drag elements to a new location inside the File name box.  The file name extension will be automatically added according to the selected Format.
Folder	The \STEP folder under the current model folder is the default export folder. You can browse for another folder. You can define both absolute and relative paths.
Location by	The options are: Model origin: Exports the model relative to 0,0,0. Work plane: Exports the model relative to the current work plane coordinate system. Base point: <name of base point> exports the model relative to the base point using coordinate system values from the base point definition.
Selection	Select All objects or Selected objects.
Splitting	The options are: All objects in one file

Setting	Description
	Selected number of objects in each file: Specify the number of objects. One object in each file If you export to multiple files, the export adds a running number to the end of the file name.
Format	Select STEP or IGES .
Protocol	For STEP files, select the appropriate application Protocol: AP203 (default) AP214 AP242 The application protocol (AP) to select depends on the software that will be used to open the file. AP203 is the oldest and AP242 the newest protocol.
Object types	Select whether to include Assemblies, Bolts, or Welds in the export. If you select Assemblies, steel parts are exported as whole assemblies, otherwise steel parts are exported as single objects.

View STEP or IGES files

To visualize the output for checking purposes, you can use any of the following:

- Tekla Structures: Add the exported STEP or IGES file to a Tekla Structures model as a reference file.
- Trimble Connect: Add a STEP or IGES file to a Trimble Connect project.
- Viewer application: There are commercial applications available, but also a few free-of-charge applications, of which we recommend the following:
 - [Open Cascade CAD Assistant](#)
 - [Open Design Alliance Open STEP Viewer](#)
 - [CADSoftTools ShareCAD](#)
 - [FreeCAD](#)

Example of export file contents

Example of a STEP export file:

```
ISO-10303-21;
HEADER;
FILE_DESCRIPTION(('Open CASCADE Model'),'2;1');
FILE_NAME('Open CASCADE Shape Model','2024-10-08T10:46:37',('Author'),(
  'Open CASCADE'),'Open CASCADE STEP processor 7.8','Open CASCADE ',
  'Unknown');
FILE_SCHEMA(('CONFIG_CONTROL_DESIGN','SHAPE_APPEARANCE_LAYER_MIM'));
ENDSEC;
DATA;
#1 = APPLICATION_PROTOCOL_DEFINITION('international standard',
  'config_control_design',1994,#2);
#2 = APPLICATION_CONTEXT(
  'configuration controlled 3D designs of mechanical parts and assemblies'
);
#3 = SHAPE_DEFINITION_REPRESENTATION(#4,#10);
#4 = PRODUCT_DEFINITION_SHAPE('', '#5);
#5 = PRODUCT_DEFINITION('design', '#6,#9);
#6 = PRODUCT_DEFINITION_FORMATION_WITH_SPECIFIED_SOURCE('', '#7,
  .NOT_KNOWN.);
#7 = PRODUCT('BEAM B81AB6C6-03D5-4201-8DAA-2FE45702F477',
  'BEAM B81AB6C6-03D5-4201-8DAA-2FE45702F477', '#8);
#8 = MECHANICAL_CONTEXT('', #2, 'mechanical');
#9 = DESIGN_CONTEXT('', #2, 'design');
#10 = SHAPE_REPRESENTATION('', (#11,#15),#19);
#11 = AXIS2_PLACEMENT_3D('', #12,#13,#14);
#12 = CARTESIAN_POINT('', (0.,0.,0.));
#13 = DIRECTION('', (0.,0.,1.));
#14 = DIRECTION('', (1.,0.,-0.));
#15 = AXIS2_PLACEMENT_3D('', #16,#17,#18);
```

Example of an IGES export file

```

,31HOpen CASCADE IGES processor 7.8,13HFilename.iges,
16HOpen CASCADE 7.8,31HOpen CASCADE IGES processor 7.8,32,308,15,308,15,G0000002
,1.,2,2HMM,1,0.01,15H20241008.104643,0.000138044,10800.000486,7H,G0000003
,11,0,15H20241008.104643,,G0000004
402 1 0 0 0 0 0 00000000D0000001
402 0 0 1 1 1 BEAM B81 D0000002
186 2 0 0 0 0 0 00002000D0000003
186 0 0 1 0 0 0 0D0000004
514 3 0 0 0 0 0 00001000D0000005
514 0 0 4 1 0 0 0D0000006
510 7 0 0 0 0 0 00001000D0000007
510 0 -703 1 1 0 0 0D0000008
190 8 0 0 0 0 0 00001000D0000009
190 0 -703 1 1 0 0 0D0000010
116 9 0 0 0 0 0 00001040D0000011
116 0 0 1 0 0 0 0D0000012
123 10 0 0 0 0 0 00001020D0000013
123 0 0 1 0 0 0 0D0000014
123 11 0 0 0 0 0 00001020D0000015
123 0 0 1 0 0 0 0D0000016
508 12 0 0 0 0 0 00001000D0000017
508 0 0 1 1 0 0 0D0000018
504 13 0 0 0 0 0 00001000D0000019
504 0 0 24 1 0 0 0D0000020
110 37 0 0 0 0 0 00001000D0000021
110 0 0 1 0 0 0 0D0000022
502 38 0 0 0 0 0 00001000D0000023
502 0 0 32 1 0 0 0D0000024

```

Example of STEP/IGES export log

The log file StepIgesExport_<user_name>.log is written to the \logs folder under the current model folder. Below is an example of the log file:

```

*** STEP/IGES exporter log file ***

Tekla Structures version: 2025
Tekla Structures build number: 5552

Units: Imperial

Model path and name: C:\TeklaStructuresModels\Steel Fabrication

Selected Export options:
Location option: Global origin
Selection: Selected objects
Format: STEP
Protocol: AP203
Object types: assemblies, bolts, welds

Export started.
Date: 2024:10:07
Time: 14:23:40

Information: Export completed:
*****
14:23:40 - Info: Number of objects to export: 23
14:23:45 - Info: Exported file: C:\TeklaStructuresModels\Steel
Fabrication\STEP\WORK-5552.stp

```

Export completed.
Date: 2024:10:07
Time: 14:23:45
Duration: 00:04

CIS/2

In order to use CIS/2 you need to download interoperability with Smart3D (S3D) from Tekla Warehouse.

You have the following S3D tool available for downloading in Tekla Warehouse:

[Smart3D Interoperability](#)

Tekla User Assistance contains the following article about S3D:

[Smart3D Interoperability](#)

PDMS/E3D

You have the following tools available for download in Tekla Warehouse:

[PDMS/E3D and Tekla Structures Interoperability: Export to PDMS/E3D](#)

[PDMS/E3D and Tekla Structures Interoperability: PDMS/E3D extension](#)

[BIM Publisher](#)

Tekla User Assistance contains the following articles about PDMS/E3D:

[PDMS/E3D and Tekla Structures Interoperability: Q&A, collected 7 th March 2017](#)

The [Aveva PDMS/E3D extension](#) page contains downloadable videos and a PDF.

[PDMS](#)

ASCII files

ASCII stands for American Standard Code for Information Interchange. Some plant design systems export ASCII files, for example, ModelDraft, PDS and PDMS.

You can import and export profiles and plates created as beams using the ASCII format. Contour plates cannot be imported.

Import a model in ASCII format

1. Create a new model in Tekla Structures.
2. Create a new 3D view.
3. Copy the ASCII file to the model folder.
4. Name the file `import.asc`.
5. On the **File** menu, click **Import** --> **ASCII**.

Tekla Structures displays the main parts created from the ASCII file in the model.

Export a model in ASCII format

1. Open the Tekla Structures model you want to export.
2. Select the parts in the model you want to export.
3. On the **File** menu, click **Export** --> **ASCII**.

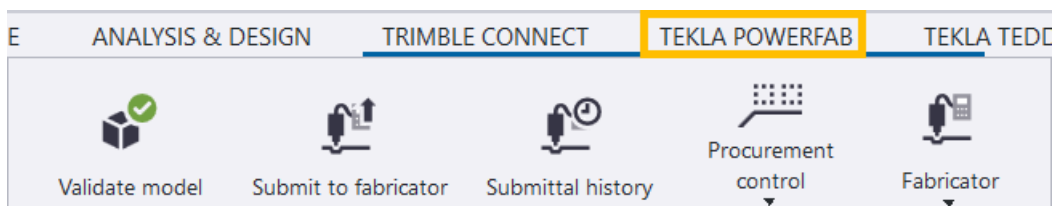
Tekla Structures creates a `model.asc` file in the current model folder.

ASCII file description

For a file description, see "ASCII file description" in Manage Tekla Structures.

Tekla PowerFab Connector

The Tekla PowerFab Connector workflow enables seamless and easy cooperation between steel detailers and fabricators who are using Tekla PowerFab.



The fabricator using Tekla PowerFab can share their up-to-date catalog of profiles, materials, and finishes and real-time fabricator statuses to the detailer via a cloud storage. To get access to this data, you need to select the fabricator in Tekla Structures. See [Fabricator settings \(page 415\)](#).

As a detailer, you can submit packages related to estimating, purchasing, drawings, and fabrication from Tekla Structures directly to Tekla PowerFab at any stage of the project. To enable seamless collaboration, you need to have a Trimble Connect project selected to which both you and the fabricator are connected. See [Submit to fabricator \(page 417\)](#).

You can modify the settings for each submittal type. See the following:

- [Estimating settings \(page 419\)](#)
- [Procurement settings \(page 424\)](#)
- [Drawings for external approval settings \(page 425\)](#)
- [Fabrication settings \(page 426\)](#)

You can either export the packages locally to check the data or submit it to the fabricator. You can also validate the fabricator settings and production content to ensure the accuracy of information being submitted. See [Validate Tekla PowerFab submittal \(page 428\)](#).

You can view all the submittals for the current model and upload local packages to the cloud. See [View submittal history \(page 431\)](#).

You can manage the procurement process with the **Procurement control** tool. See [Procurement control \(page 432\)](#).

The **Status Sharing** tool on the Trimble Connect ribbon tab has the **Show only actions from Tekla PowerFab** switch for quickly displaying the fabricator status. **Status Sharing** records the status of actions in a cloud service and shares them with the project collaborators without any manual actions.

Fabricator settings

To ensure that there are no profiles in your Tekla Structures model that the fabricator does not have in their database, you can select the fabricator using Tekla PowerFab to share their catalog data with you for the model. The fabricator's list of valid profiles, materials, and finishes is then automatically uploaded to Tekla Structures.

Before you can select a fabricator for the model and get access to fabricator data, the fabricator needs to invite you from Tekla PowerFab.

When a new fabricator shares their content, you are notified when opening Tekla Structures. The available profiles can be found in the profile catalog. A new group is added to the profile catalog containing only the profiles that are mapped correctly.

When the fabricator settings are loaded to Tekla Structures, the profile catalog settings are mapped against the fabricator settings. You can spot if you are using profiles, materials, or finishes that do not match the fabricator settings, but your settings are not automatically replaced. New materials, for example, are not added but existing matching materials for the profile are listed.

If the fabricator makes changes to their settings, they are updated to Tekla Structures automatically.

The fabricator settings are available for all users in the model and in shared models.

You can also select to use the fabricator's procurement control settings. See [Procurement control \(page 432\)](#).

Select a fabricator

To select a fabricator, do the following:

1. Open a model.
2. Do either of the following:
 - On the **Menu**, select **Project properties**.
 - a. Go to **Fabricator's settings**.
 - On the ribbon, select **Tekla PowerFab --> Fabricator**
3. In **Select fabricator**, select the fabricator.
4. Click **Apply**.

Fabricator settings start downloading. They are added to the model folder.

You get a notification of the completion of fabrication settings update.

5. Click **OK**.

All users in the model can now use the fabricator's settings.

Use fabricator settings

When you have selected the fabricator for the model, you can use and verify the available profiles, materials, and finishes in the model.

You can see the available profiles in the profile catalog that has a dedicated section named after the selected fabricator. This section shows a subset of your existing profile catalog.

The materials that are available for the project and the finish values from the fabricator can be found in the property pane or contextual toolbar where you can select them in a dropdown list.

When you have selected a fabricator, you can validate the model to see if you have the correct settings. When you have an invalid profile, material, or finish, a blue notification icon  appears in the input field in the property pane and contextual toolbar.

You can also use the **Validate model** tool to validate your entire model or a selected part of it. See [Validate Tekla PowerFab submittal \(page 428\)](#).

1. To check the correct fabricator profiles, do the following in the property pane:

- a. In **Profile**, click the three dots  next to the box.

The **Select profile** dialog opens. The section dedicated to the selected fabricator lists all the profiles that match your own material catalog.

- b. Select a profile that you want to use.
- c. Click **OK**.

- d. In the property pane, click **Modify** or press **Enter**.
2. To check the correct fabricator materials, in **Material**, select one from the dropdown list.

The list contains all the available materials for the selected profile.

 - a. Click **OK**.
3. To check the correct finishes, in **Finish**, select one from the dropdown list.

Learn more

Learn more about the integrated workflow between Tekla Structures and Tekla PowerFab.

Click **Learn more**.

See also

[Validate Tekla PowerFab submittal \(page 428\)](#)

Submit to fabricator

You can export and submit a package for estimating, procurement, external approval, and fabrication directly from Tekla Structures to Tekla PowerFab. You can submit the packages either locally or directly to Tekla PowerFab.

Before you submit, do the following:

- When you want to ensure that the profiles, materials, and finishes are valid, select a fabricator. See [Fabricator settings \(page 415\)](#).
 - Validate the package, see [Validate Tekla PowerFab submittal \(page 428\)](#). (Optional)
1. On the Tekla PowerFab ribbon, click **Submit to fabricator**.

You can also access the dialog from **Procurement control**.
The **Submit to Tekla PowerFab** dialog opens.
 2. In **Project**, check that you have the correct Trimble Connect project selected.

The **Project** dropdown lists the Trimble Connect projects available for you. The fabricator using Tekla PowerFab must be connected to the same Trimble Connect project to enable collaboration using the Tekla PowerFab Connector workflow. The fabricator will get notifications once they have joined the same project.
 3. Select the submittal type.
 4. To adjust the settings related to the submittal type, click .
- For values, see the following:
- [Estimating settings \(page 419\)](#)

- [Procurement settings \(page 424\)](#)
 - [Drawings for external approval settings \(page 425\)](#)
 - [Fabrication settings \(page 426\)](#)
5. Change the **File name** and **Folder** if needed.
 6. In **Selection**, select the scope of the submittal.

Setting	Description
Estimating	• All objects • Selected objects
Procurement	• All objects with procurement number: Submit all the parts that have the Numbered status. • Selected objects with procurement number: Submit all the selected parts that have the Numbered status.
Drawings for external approval, Fabrication	• All objects • Selected from Drawing list • Selected from model

7. In **Notes**, enter any notes for the fabricator.
8. Do either of the following:
 - To check the package contents before submitting, click **Export only**.
You can go to the folder, open the file, and check it.
After checking the package, you can submit it in the **Submittal history** dialog. See [View submittal history \(page 431\)](#).
 - To submit the package to Tekla PowerFab, click **Export and submit**.

The submittal is uploaded to the selected Trimble Connect project. Folder names are created automatically. Do not modify the folder name or locations in Trimble Connect.

When submitting for procurement, if you have deleted or excluded parts after the previous submittal, you are prompted to check the content. The details about the deleted and excluded parts are saved in a log file that you can access by clicking **View content**. When you continue, the log file containing the deleted and excluded parts since the last submittal are stored with the local submittal package.

After you have submitted the package, the fabricator gets a notification about the submittal in Tekla PowerFab and can accept or reject the submittal.

You can view the status and notes from the fabricator for each submittal package in **Submittal history**.

See also

[Tekla PowerFab Connector \(page 414\)](#)

[Link a Tekla Structures model to a Trimble Connect project \(page 108\)](#)

[View submittal history \(page 431\)](#)

[Estimating settings \(page 419\)](#)

[Procurement settings \(page 424\)](#)

[Drawings for external approval settings \(page 425\)](#)

[Fabrication settings \(page 426\)](#)

Estimating settings

You can define estimating settings for exporting .ifc files to the fabricator.

1. On the **Tekla PowerFab** ribbon, click **Submit to fabricator**.

The **Submit to Tekla PowerFab** dialog opens.

2. Select **Estimating**.

3. Define the estimating settings.

- a. Click the edit button  on the **Estimating** row.

The **Estimating settings** dialog opens.

- b. Define the values.

Setting	Description
Location by	Model origin exports the model relative to 0,0,0. Work plane exports the model relative to the current work plane coordinate system.
Object color	Default: Uses object class colors Use current view colors exports the objects using the colors defined in object representation, not the class colors. The defined transparency settings are also exported. See Change the color and transparency of model objects by using object representation in the Create models Product Guide.
Layer names as	Default Layers names as part names: Uses part names, such as COLUMN and BEAM, as layer names for exported

Setting	Description
	objects. If this option is not selected, then layer name will be the object's phase number followed by the phase name. You can use phases, part names, or template attributes as layer names for exported objects. Select Name or Phase from the list, or type the attribute name in the box. Note: You cannot use user-defined attributes as the layer name.
Format	The options are IFC and IfcZip .
Export type	Select the desired export type. Steel fabrication view: • This export type is designed for the fabrication workflow, and to be provided for manufacturing. • Steel fabrication view is recommended for exporting detailed information on steel objects for steel fabrication: • Exports assembly presentation and dedicated property sets. • Bolt holes are exported as voids. • Steel fabrication model view configuration file for property sets and properties (IfcPropertySetConfigurations_AISC.xml) is included in the installation by default. Coordination view 1.0: • This export type is for those who need to export openings as separate objects. • We recommend that you use Coordination view 1.0 instead of Coordination view 2.0 when you need to have voids and

Setting	Description
	openings presented by using opening elements: - Reinforcing bars are exported as extrusions. - Voids and openings are exported as opening elements (ifcOpeningElements). - Curved elements are exported as extrusions. - Bolts are exported as B-rep. See IFC interoperability concepts (page 204). Coordination view 2.0: - The certified Coordination view 2.0 should be your default. - We recommend that you use this export type when the geometry needs to be edited and modified in the receiving application: - Reinforcing bars are exported as extrusions. - The export uses CSG (Constructive Solid Geometry) for presenting cuts and voids. - Curved elements are exported as extrusions. - Bolts are exported as B-rep. See IFC interoperability concepts (page 204). Surface geometry: - If the model is used only for viewing purposes, or as a reference model, Surface geometry is your choice. Surface geometry is ideal when the need is to view the model without any need for re-using or editing: - Reinforcing bars are exported as B-rep.

Setting	Description
	- Export does not support CSG (Constructive Solid Geometry). - Curved elements are exported as B-rep. - Bolts are exported as B-rep. See IFC interoperability concepts (page 204).
Property sets	- To use a default property set, select the property set from the Property sets list. - To modify an existing property set, select the property set from the list and click . See Modify property sets for IFC export (page 223). - To define a new property set, select <new> and click . See Create property sets for IFC export in the Manage Tekla Structures Product Guide.
Export flat wide beams as plates	Select this option if you want to export flat and wide beams as plates. Select this option if you have modeled plates as beams or columns with flat profiles. For example, some system components use beams or columns instead of plates.
Spatial hierarchy from Organizer	Spatial hierarchy from Organizer uses the spatial hierarchy (Building-Site-Section-Floors) created in Organizer in export. Do the following: 1. Select Spatial hierarchy from Organizer. 2. Create a project hierarchy in Organizer. 3. In Organizer, right-click the project, and select Use for reporting. 4. Before the IFC export, synchronize or write the

Setting	Description
	Organizer data in the Tekla Structures model by right-clicking the project in Organizer, and selecting Write to the model for reporting. Note: The selected objects are only exported when Spatial hierarchy from Organizer has been selected. If you do not select Spatial hierarchy from Organizer, the export uses the IFC export hierarchy defined in the part UDAs. If you have not defined part UDAs, project property UDAs are used. See Edit project properties in the Get familiar with Tekla Structures Product Guide. Also note that in bridge models the export always uses the hierarchy defined in project property UDAs.
Exclude single part assemblies	Select Exclude single part assemblies when you export assemblies.
Object types	Select the object types to export: Assemblies Bolts Welds Grids Reinforcing bars Surface treatment and surfaces Spaces - If you select Assemblies, you can exclude single part assemblies by selecting Exclude single part assemblies in the Options area. - Edge chamfers are omitted from the exported IFC model. This is to enable better interoperability with plant design systems. If the geometry with edge chamfers is needed, you can set the IFC export type to B-rep separately for those objects in the object user-defined

Setting	Description
	attributes dialog on the IFC export tab. The export does not export what you select if certain object types are selected. For example, if a concrete part is selected and the Reinforcing bars checkbox is selected, all rebars in the concrete part will be exported. It is not possible to select which rebars to export with the part. The workaround is to generate two IFC export files: one with concrete parts only, and one with selected rebars only.

- To save the settings, click .
- To return to the **Submit to Tekla PowerFab** dialog, close the **Estimating settings** dialog.

You are ready to submit for estimating. See [Submit to fabricator \(page 417\)](#).

Procurement settings

You can check the status of the objects to be submitted to the fabricator for procurement. You can accept changes in objects, exclude or include objects, and submit the objects that are ready to be submitted.

You can define which additional properties you need to share with the fabricator. For example, you can share the phase or lot number of each part in the submittal by adding the property sets.

- In the **Submit to Tekla PowerFab** dialog, select **Procurement** and click the edit button .

The **Procurement settings** dialog opens.

- Do one of the following

To	Do
Property sets	- To use a default property set, select the property set from the Property sets list. - To modify an existing property set, select the property set from the list and click . See Modify property sets for IFC export (page 223).

To	Do
	To define a new property set, select <new> and click . See Create property sets for IFC export in the Manage Tekla Structures Product Guide.

- To save the changes, click .
- Close the **Procurement settings** dialog to return to the **Submit to Tekla PowerFab** dialog.

You are ready to submit for procurement. See [Submit to fabricator \(page 417\)](#).

Drawings for external approval settings

You can submit the drawings for external approval before submitting the package to fabrication.

You can define the properties for the drawings in the **Drawings for external approval settings** dialog.

- To access the **Drawings for external approval settings** dialog, in the **Submit to Tekla PowerFab** dialog, select **Drawings for external approval** and click the edit button .

The **Drawings for external approval settings** opens.

- Select which information you want to include in the export file.

Setting	Description
Assembly drawings General arrangement drawings Multidrawings Single-part drawings	- Select if you want to include drawing files in PDF format. Do not include: Drawing files are not included in the export. Include: Drawing files are included in the export. Include only drawing info: Drawing files are not included in the export. Only drawing details such as drawing number, description, and revision number are included. Creates a placeholder for the drawing in Tekla PowerFab during the import. - If you selected Include, drawing files from the defined folder are included in the export.

Setting	Description
	The default folder is . \PlotFiles\. To change the folder, click ... next to the box. Then, browse to and select the folder. See Print to a PDF file, plot file (.plt) or printer in the Create drawings Product Guide.
Drawing UDAs	When selected, all user-defined attributes (UDA) for drawings with values are included in the export.

- To save the settings, click .
- Close the **Drawings for external approval settings** to return to the **Submit to Tekla PowerFab** dialog.

You are ready to submit the drawings for external approval. See [Submit to fabricator \(page 417\)](#).

Fabrication settings

You can modify the fabrication settings for submittal to fabrication. This includes drawings, NC files, and bill of material data.

- To access the **Fabrication settings** dialog, in the **Submit to Tekla PowerFab** dialog, select **Fabrication** and click the edit button .

The **Fabrication settings** dialog opens.

- Select which information you want to include in the export file.

Setting	Description
Drawings	
Assembly drawings General arrangement drawings Multidrawings Single-part drawings	a. Select if you want to include drawing files in PDF format. Do not include: Drawing files are not included in the export. Include: Drawing files are included in the export. Include only drawing info: Drawing files are not included in the export. Only drawing details such as drawing number, description, and revision number are included. Creates a placeholder for the drawing

Setting	Description
	in Tekla PowerFab during the import. b. If you selected Include, drawing files from the defined folder are included in the export. The default folder is . \PlotFiles\. To change the folder, click ... next to the box. Then, browse to and select the folder. See Print to a PDF file, plot file (.plt) or printer in the Create drawings Product Guide.
Drawing UDAs	When selected, all user-defined attributes (UDA) for drawings with values are included in the export.
Bill of material data	
Part UDAs	When this option is selected, user-defined attributes (UDAs) for parts with values are included in the export. We recommend that this is always selected.
Bolts-nuts-washers	When this option is selected, bolt, nut, and washer information is included in the export.
Bolt-nut-washer UDAs	When this option is selected, user-defined attributes (UDAs) for bolts, nuts, and washers with values are included in the export. We recommend that this is always selected.
Studs	When this option is selected, stud information is included in the export. We recommend that this is always selected.
Stud UDAs	When this option is selected, user-defined attributes for studs with values are included in the export. We recommend that this is always selected.

Setting	Description
Assembly UDAs	When this option is selected, user-defined attributes for assemblies with values are included in the export. We recommend that this is always selected.
CNC files	
Do not export CNC files	When this option is selected, CNC files will not be included in the export.
Generate CNC files - settings	When this option is selected, Tekla Structures generates CNC files from the current model. The exported CNC files are UTF-8 encoded. In the list below, select the CNC export settings file that you want to use.
Use CNC files from folder	When this option is selected, CNC files from the folder set below are included in the export. The default folder is .\NC_Files\ To change the folder, click ... and browse to and select the folder. Note: The file names need to match the piece mark, excluding the file extension. For example, the right CNC file name for piece mark w104 would be w104.

3. To save the settings, click .
4. Close the **Fabrication settings** to return to the **Submit to Tekla PowerFab** dialog.

You are ready to submit for fabrication. See [Submit to fabricator \(page 417\)](#).

Validate Tekla PowerFab submittal

To ensure that each submittal to the fabricator contains valid and up-to-date information, you can use the **Validate Tekla PowerFab submittal** tool at any stage of your detailing process.

You can validate model parts, profiles, materials, and finishes, and the numbering, drawing, PDF file, and NC file statuses of parts and assemblies.

Validate fabricator settings

You can use the **Validate Tekla PowerFab submittal** tool before submitting parts to Tekla PowerFab for estimating and procurement to check if the profiles, materials, and finishes in the model match the fabricator database.

Before you start, note the following:

- Before you can validate the model, you must select the fabricator in **File** --> **Project Properties** --> **Fabricator's settings**. See [Fabricator settings \(page 415\)](#).
- If a profile is available from the fabricator but does not exist in the Tekla Structures profile catalog, it is not listed.

The grid lists the parts grouped by profile, material, and finish. These three properties come from the fabricator settings.

Any changes made by the fabricator are automatically updated in the fabricator data in Tekla Structures.

To check the material, profiles, and finishes, do the following:

1. On the **Tekla PowerFab** ribbon, click **Validate model**.
The **Validate Tekla PowerFab submittal** dialog opens.
2. Go to the **Fabricator settings** tab.
The blue notification icon and the description in the **Notes** column indicate that the object in the model is not available from the fabricator.
If a profile is available from the fabricator but it does not exist in the Tekla Structures profile catalog, it is not listed for you.
3. To narrow down the selection, use the following options:
 - The drop-down list in the upper-left corner to view all or selected objects or to use a specific filter for narrowing down the selection.
 - **Show only objects that have problems:** Shows only objects that are not supported by the fabricator
4. To check the correct fabricator profiles, do the following in the property pane:
 - a. In **Profile**, click the three dots  next to the box.
The **Select profile** dialog opens. The section dedicated to the selected fabricator lists all the profiles that match your own material catalog.
 - b. Select a profile that you want to use.
 - c. Click **OK**.
 - d. In the property pane, click **Modify** or press **Enter**.

5. To check the correct fabricator materials, in **Material**, select one from the dropdown list.

The list contains all the available materials for the selected profile.

- a. Click **OK**.

6. To check the correct finishes, in **Finish**, select one from the dropdown list.
7. In **Validate Tekla PowerFab submittal**, click **Refresh** to refresh the list.

The notification disappears.

8. Click **Refresh**. The fabricator settings are validated and the notification icons disappear from the dialog.

When all the materials and finishes are correct, you can continue to submit to Tekla PowerFab for estimating and procurement. See [Submit to fabricator \(page 417\)](#).

Validate production content

Before submitting to Tekla PowerFab for approval and fabrication, on the **Production content** tab, you need to validate the steel parts and assemblies.

You validate to ensure that the objects you want to submit have the following:

- up-to-date numbering
- drawings in the **Document manager**
- up-to-date PDF files of the drawings
- up-to-date NC files of the parts

NOTE Production content shows PDF status only if your selected submittal type includes drawings. NC shows only if NC files are included in the selected submittal type. NC files show only for parts because they cannot be created for assemblies.

1. On the **Tekla PowerFab** ribbon, click **Validate model**.
The **Validate Tekla PowerFab submittal** dialog opens.
2. Go to the **Production content** tab.
3. Use the drop-down list in the upper-left corner to select what you want to view in the list and click **Refresh**.
4. Select the **Submittal type** and modify as needed.
5. To modify drawing data, click **Open Document manager**.
6. To modify **Fabrication settings**, click the edit button . See [Fabrication settings \(page 426\)](#).
7. To create NC files, click **Create NC files**.

8. To create drawings, click **Create drawings**.

See Create fabrication drawings in the Create drawings Product Guide.

View submittal history

You can view all the local packages and submittals issued for the selected project and upload local packages to the cloud in the **Submittal history** dialog.

The dialog shows the content, the current status, and fabricator's comments for each submittal. The fabricator is notified when you have uploaded a new package to the cloud.

When the fabricator either accepts or rejects the submittal package and adds possible comments, the status is updated in **Submittal history** without delay.

If you change the project in the **Submit to Tekla PowerFab** dialog, the project in the **Submittal history** dialog is updated automatically.

1. To open and view the submittal history, do either of the following.
 - On the **Tekla PowerFab** ribbon, click **Submittal history**.
 - In the **Submit to Tekla PowerFab** dialog, click **Submittal history**.

The **Submittal history** dialog opens.

Setting	Description
Submittal type	Submittal package type
Package name	Name of the package as defined in Submit to Tekla PowerFab
Date issued	Date of submitting the package
Issued by	Name of the detailer submitting the package
Notes by detailer	Any comments entered by the detailer in the Submit to Tekla PowerFab dialog
Project	Name of the Trimble Connect project
Cloud server status	• Uploaded: The package was uploaded to cloud successfully • Upload failed: The upload to cloud failed • Local only: The package was saved locally
Status	The status selected by the fabricator in Tekla PowerFab • Accepted • Rejected

Setting	Description
	- Pending - Reviewing The up-to-date status is shown here when both the detailer and the fabricator are connected to the same project and both are online.
Checked date	The date the package was checked by the fabricator
Checked by	The name of the fabricator checking the package
Notes by fabricator	Any comments entered by the fabricator in Tekla PowerFab

- To upload the selected local package to cloud, in the **Cloud server status** column, click the upload icon .

The package is uploaded to the project mentioned in the **Project** column, and the **Cloud server status** changes to **Uploaded**.

The fabricator gets a notification when there is a submittal package available.

Any actions by the fabricator are updated automatically in the list.

Procurement control

You can manage the procurement process using the **Procurement control** tool. The tool is linked with the **Advance Bill** module in Tekla PowerFab.

The tool utilizes procurement numbering that adds a preliminary number to parts that will be used by Tekla Structures and Tekla PowerFab. The number is used for tracking the progress of parts in the procurement workflow.

This numbering system does not allow setting start numbers, which are determined by the order of submittals instead. For each submittal to the fabricator, the numbering starts from the highest last submitted number.

- On the Tekla PowerFab ribbon, click **Procurement control** --> **Procurement control**.

The **Procurement control** dialog opens.

Column	Description
Status	Part status: New: The part has never been submitted and does not have a procurement number yet

Column	Description
	• Modified: The part has been submitted before but it has changed beyond the tolerance. The part needs a new procurement number before resubmitting. • Numbered: The part is new or modified after the previous submittal and has been numbered with a new procurement number. The part is now ready to be resubmitted to the fabricator. • Submitted: The part has already been submitted to the fabricator with a procurement number and there are no significant changes that affect procurement numbering.
Quantity	The number of objects
Used number	The number that is last used in a submittal or the number that will be used when the part is ready for submittal
Suggested number	When you open the Procurement control dialog, the visible parts are automatically prenumbered. You can use these preliminary numbers. When you want to number the parts in the row, you can click Number selected rows or Number all.
Length	The current net length of the part
Length change	The difference in length between the previous submittal and the procured value If you change back to the original value, the status changes back to Submitted. For tolerances, see Procurement control settings below.
Profile	Current profile

Column	Description
Profile change	The difference in profile between the previous submittal and the procured value If you change back to the original value, the status changes back to Submitted .
Material	Current material
Material change	The difference in material between the previous submittal and the procured value If you change back to the original value, the status changes back to Submitted .

- To define what you want to show in the list, use the drop-down list in the upper-left corner of the dialog and click **Refresh**.

The latest selection is saved for future use.

NOTE Procurement control only works for basic steel beams and plates. Therefore, you cannot add other materials or special objects like polybeams, bent plates, lofted plates, or spiral beams.

- To exclude objects, select one or more rows, and click the exclude button . (Optional)

You can exclude parts that do not need to be procured.

The objects you select are highlighted in the model.

You can view the excluded objects in **Excluded objects** that you can expand using the arrow.

To include objects, click the include button .

- To exclude plates or secondaries, click **Exclude plates** or **Exclude secondaries**.
- To number parts with the status **New** or **Modified**, select one or more rows, and click **Number selected rows** or **Number all**.
The status changes to **Numbered** and the figure in **Suggested number** appears in **Used number**.
You can unnumber numbered parts by clicking **Unnumber selected row**.
You can now submit all the parts with the status **Numbered** to the fabricator. See Step 6.

To define or modify the procurement control settings, click . See Procurement control settings below.

6. To submit the object, click **Open Submit to Tekla PowerFab**.

See [Submit to fabricator \(page 417\)](#).

For the **Procurement** package, the exported file format is .trb

The **Procurement control** dialog works in the same way as numbering preview.

For more information on numbering preview, see Preview the numbering (results) in the Create models Product Guide.

Template properties

The values of the procurement per parts can be used in reports or in filtering by template attributes.

Property	Description
PROCUREMENT_STATUS	Status of procurement • 0 - New • 1 - Modified • 2 - Numbered • 3 - Submitted • 4 - Excluded (not in procurement workflow)
PROCUREMENT_POSITION	Full mark of the procured part, including prefix
PROCUREMENT_NUMBER	Only the number of the procured parts
PROCURED_PROFILE	The profile value from the last submittal of the part
PROCURED_MATERIAL	The material value from the last submittal of the part
PROCURED_LENGTH	The LENGTH_NET value from the last submittal of the part

TIP You can exclude parts that are in your selection filters but you do not want the fabricator to procure them.

When a part is excluded, it is not taken into account in the workflow at all, nor is it included in the Tekla PowerFab Advance Bill module. If you only want

to submit a certain phase of the project, you should not exclude the parts in other phases but only select the parts in the specific phase and number them.

When you have submitted a part and want to undo the submittal, you can exclude the part and submit. The excluded part is now submitted to the fabricator as a “deleted part”. This means that the part is deleted from the procurement workflow.

Procurement control settings

You can define settings that affect procurement numbering and tolerances for change detection. in the **Procurement control settings** dialog.

If **Use fabricator settings** is used, the values in the **Procurement control settings** are overwritten with the preferred values from your selected fabricator.

For procurement numbering, parts are grouped by three parameters:

- net length
- profile
- material

NOTE Tolerances for procurement numbering are incremental.

For example, when the beam net length tolerance is 200 mm, the beam length is in length groups 0–199.99, 200–399.99, 400–599.99, etc.

After a part is submitted with a procurement number to the fabricator, the integrated change detection informs the detailer if the part has been significantly changed from the original procurement.

The change detected in the length of a procured part depends on the tolerances. There are different tolerances for extending and shortening of the length.

1. On the **Tekla PowerFab** ribbon, click **Procurement control** --> **Procurement control settings**.

The **Procurement control settings** dialog opens.

2. Define the acceptable tolerance values and the mark prefix.

If you have selected to use fabricator settings, the values are greyed out and you cannot modify them.

Setting	Description
Procurement numbering	
Beam net length tolerance	Tolerance for beam net length Affects only the direct NET_LENGTH attribute from beam

Setting	Description
Plate length/width tolerance	Tolerance for plate length and width Affects both the length and width of a plate
Mark prefix	A prefix that is added to the preliminary numbers The prefix is visible in the preliminary numbering properties and it is added to the submittal to Tekla PowerFab. This prefix is used on a project level. We recommend that you do not change it after the first preliminary numbering is done.
Change detection	
Beam extending tolerance	Tolerance for marking an already submitted part as modified after the net length of the beam is extended in the model.
Beam shortening tolerance	Tolerance for marking an already submitted part as modified after the net length of the beam is shortened in the model
Plate extending tolerance	Tolerance for marking an already submitted part as modified after the length or width of a plate is increased in the model.
Plate shortening tolerance	Tolerance for marking an already submitted part as modified after the length or width of a plate is reduced in the model.

3. Click **Apply**.

Exported bolt XML data

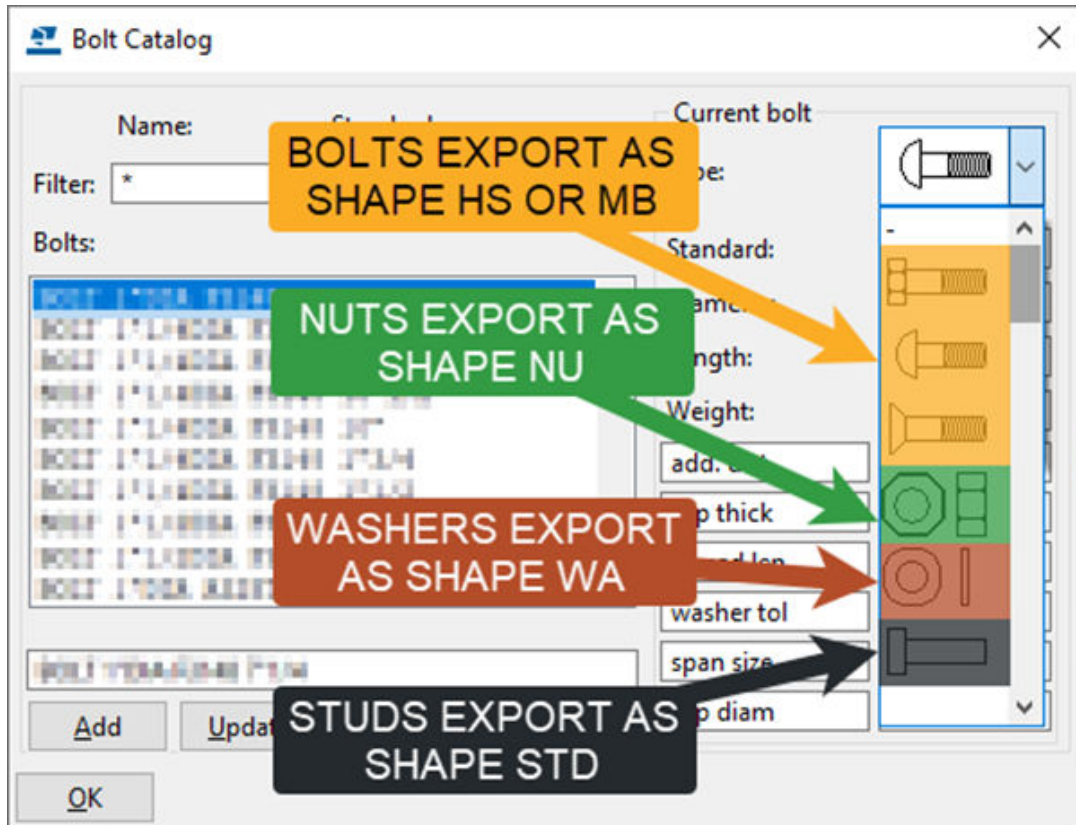
Default data included in XML file

Data	Description	Example Data
PartId	Globally Unique Identifier (GUID) of the bolt group.	<PartId>1cd0dbe6-bc01-4dd4-a47d-4a78c4766642</PartId>
PartMark*	This will always be blank because bolts in Tekla	<PartMark />

Data	Description	Example Data
	Structures do not have part marks.	
MainMember*	This will always be false because bolts in Tekla Structures are always attached to a member and never the main member.	<MainMember>>false</MainMember>
PartQuantity	Number of bolts in the bolt group.	<PartQuantity>3</PartQuantity>
Shape	The default values for shape are HS, MB, NU, WA, or STD. *	<Shape>HS</Shape>
Dimensions	The diameter and length of the bolt as defined in the Bolt catalog properties.	<Dimensions Metric="0">HS 0.75" x 2.5"</Dimensions>
Grade	For Bolts (HS or MB), the grade is defined by the Standard set in Bolt assembly catalog properties.* For Nuts, washers, and Studs, the grade is defined by the Standard set in the Bolt catalog properties.*	<Grade>F1852</Grade>
Length**	The length value will not be populated as it is provided in the Dimensions.	<Length UOM="in"></Length>
Remark	Will report Field or Shop based on bolt group the Bolt type property.	<Remark>Field</Remark>
* The SHAPE and GRADE data may be overridden by the hard-coded translations. See section "Hard-coded translations" below. ** These fields are sections that are required for parts, but are not applicable to bolts. Because the format for bolts is the same, the values will be empty.		

Shape

The default values for SHAPE are HS, MB, NU, WA, or STD depending on the type specified in the **Bolt Catalog**.



You can manually override the individual bolt group bolt `SHAPE` by specifying a user-defined value for the bolt shape. It is not possible to manually override the nut or washer `SHAPE` values.

Tekla Structures Bolt (1)

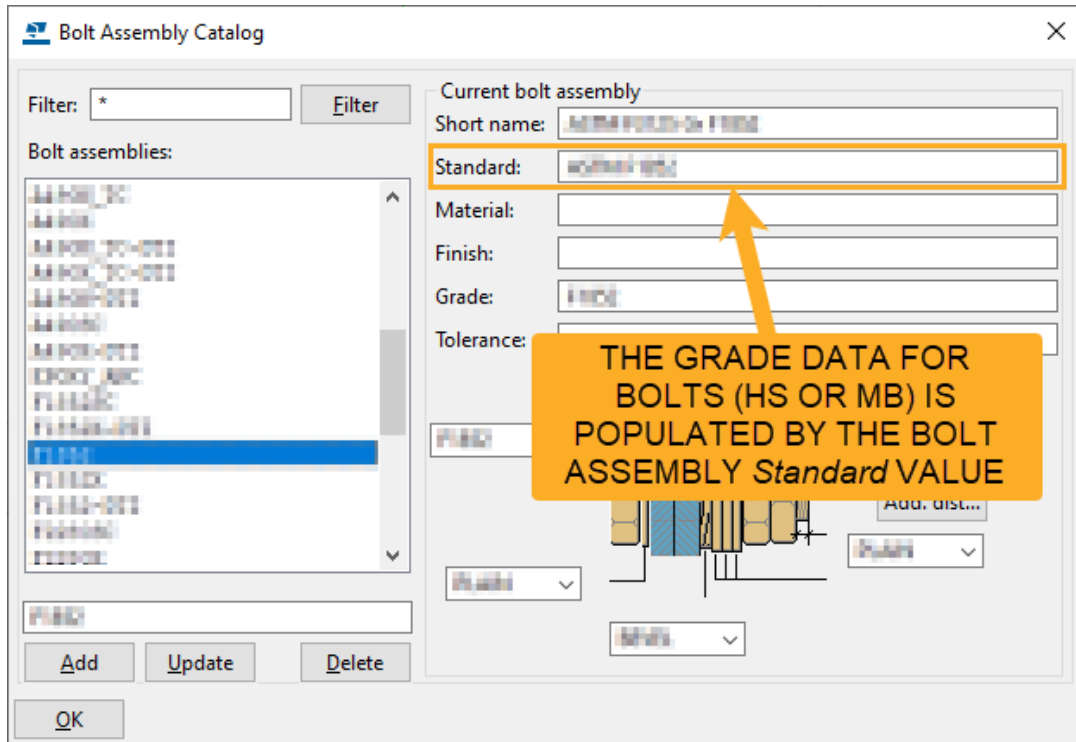
Parameters

Bolt Comment	☒	
Bolt User Field 1	☐	
Bolt User Field 2	☐	
Bolt User Field 3	☐	
Bolt User Field 4	☐	
Bolt User Field 5	☐	
Bolt User Field 6	☐	
Bolt User Field 7	☒	
Bolt User Field 8	☒	
Bolt Shape	☒	
Existing Bolt	☒	
Locked	☒	

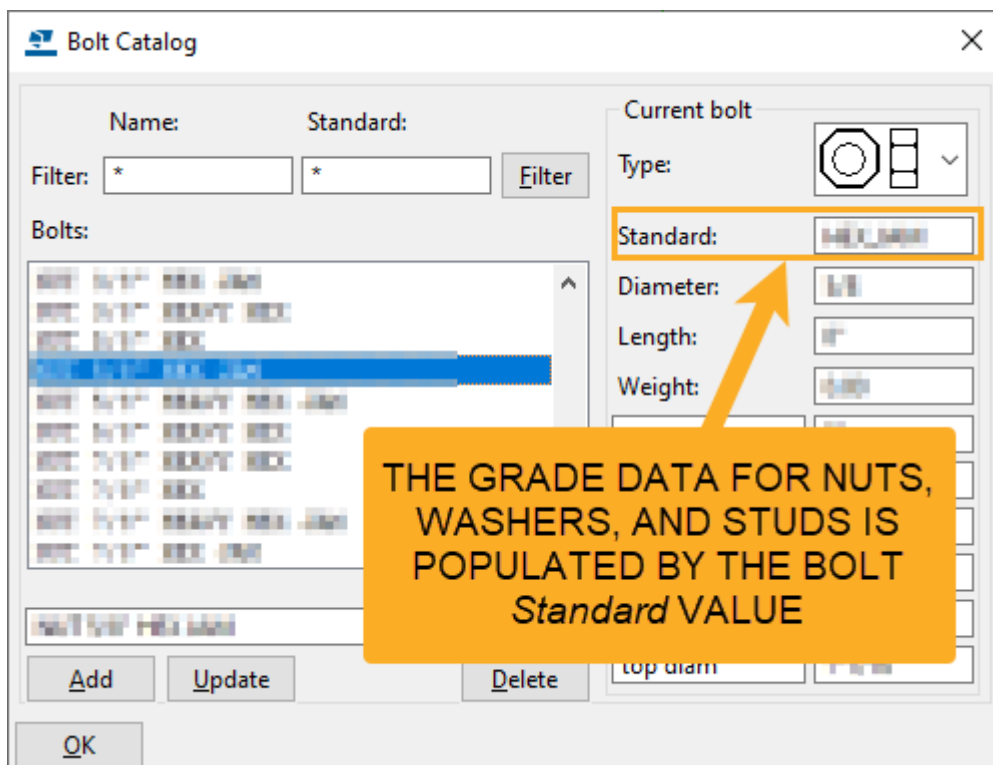
☒ / ☐

Grade (Material)

Bolt assembly GRADE data is output differently depending on the component of the assembly. Bolts obtain the GRADE data based on the **Standard** value for the assembly in the **Bolt Assembly Catalog**.



All other bolt assembly elements obtain the GRADE data based on the **Standard** value for the assembly in the **Bolt Catalog**.



Hard-coded translations

When **Export to Tekla PowerFab** compiles the XML file data, there are a few hard-coded translations that are performed. These can affect both the <SHAPE> and <GRADE> data that is exported.

NOTE The translations are not applied when you specify a user-defined bolt shape.

Anytime a **Grade** contains the text "TC", then the shape is set to "HS":

```
<SHAPE>HS</SHAPE>
```

If the bolt **Grade** contains "TC" and "A325", then the grade is set to "A325TC":

```
<GRADE>A325TC</GRADE>
```

If the bolt **Grade** contains "TC" and "A490", then the grade is set to "A490TC":

```
<GRADE>A490TC</GRADE>
```

If the bolt **Grade** does not contain "TC", but does contain "A325", "A490", "F1852", "F2280", or "F3148", then the shape is "HS", and the grade is left as-is:

```
<SHAPE>HS</SHAPE>
```

If the bolt **Grade** does not contain "TC" and is not any of those grades, then the shape is set to "MB":

```
<SHAPE>MB</SHAPE>
```

Example XML data for bolt assembly

```
<AssemblyPart>
  <PartId>1cd0dbe6-bc01-4dd4-a47d-4a78c4766642</PartId>
  <PartMark />
  <MainMember>>false</MainMember>
  <PartQuantity>1</PartQuantity>
  <Shape>HS</Shape>
  <Dimensions Metric="0">HS 0.75" x 1.5"</Dimensions>
  <Grade>A325TC</Grade>
  <Length UOM="in"></Length>
  <Remark>Field</Remark>
</AssemblyPart>
<AssemblyPart>
  <PartId>1cd0dbe6-bc01-4dd4-a47d-4a78c4766642</PartId>
  <PartMark />
  <MainMember>>false</MainMember>
  <PartQuantity>1</PartQuantity>
  <Shape>NU</Shape>
  <Dimensions Metric="0">NU 0.75"</Dimensions>
  <Grade>HEAVY_HEX</Grade>
  <Length UOM="in"></Length>
  <Remark>Field</Remark>
</AssemblyPart>
<AssemblyPart>
  <PartId>1cd0dbe6-bc01-4dd4-a47d-4a78c4766642</PartId>
  <PartMark />
  <MainMember>>false</MainMember>
  <PartQuantity>1</PartQuantity>
  <Shape>WA</Shape>
  <Dimensions Metric="0">WA 0.75"</Dimensions>
  <Grade>PLAIN</Grade>
  <Length UOM="in"></Length>
```



```
<Remark>Field</Remark>
</AssemblyPart>
```

Import from Tekla PowerFab

After you have submitted the desired Tekla Structures model data to Tekla PowerFab, and updates have been made in Tekla PowerFab, you can export the production status from Tekla PowerFab as an XML file to be imported back to Tekla Structures.

In Tekla Structures, the Tekla PowerFab import reads the XML data and compares it to the current model data. The comparison is shown in a separate results list. You can then update the model with the product status data from Tekla PowerFab.

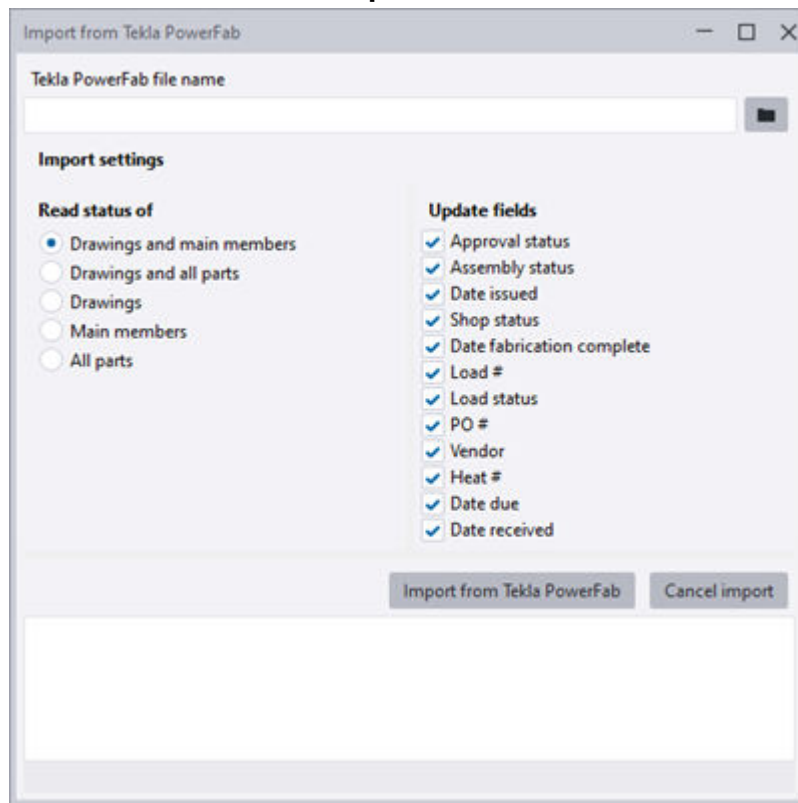
For more information about exporting the production status from Tekla PowerFab, see [Export the production status to Tekla Structures or Advance Steel](#).

Starting from Tekla Structures 2025, you can quickly and easily get an up-to-date fabricator catalog and finishes and real-time fabricator statuses from the fabrication management system using [Connector \(page 414\)](#).

Import production status from Tekla PowerFab

1. In Tekla Structures, open a model where you want to update the production status from Tekla PowerFab.

2. On the **File** menu, click **Import --> Tekla PowerFab**.



3. Browse to the Tekla PowerFab XML file that you want to import. The file can have the extension `.pfmt` or `.zip` if it is compressed.
4. In **Read Status of**, select the option for the types of parts or drawings whose production status you want to import.
5. In **Update fields**, select the data to be updated in the import.
6. Click **Import from Tekla PowerFab**. The import progress and any warning or error messages are displayed in the message area at the bottom of the dialog. When the import completes, the Import results list is displayed.

View production status and update model

In the **Import results** list, the drawings are listed first, followed by the parts that have been imported. The list contains the following data columns by default:

Drawing number

Assembly mark

Part mark

Sequence

Lot number

The rest of the data columns consist of the **Update fields** options that you have selected in the import settings. The import compares the XML data against the existing data in the Tekla Structures model. When the imported data is different from the model data, the data is highlighted in yellow in the list.

DRAWING NUMBER	ASSEMBLY MARK	PART MARK	SEQUENCE	LOTNUMBER	APPROVAL STATUS	ASSEMBLY STATUS	DATE ISSUED	SHOP STATUS	DATE FABRICATION COMPLETION
AB2	AB2	m112	4		Approved	Cut/Saw		Completed-in yard	10/16/2020
AB2	AB2	AB2	4		Approved	Paint		Completed-in yard	10/16/2020
AB2	AB2	p23	4		Approved	Cut/Saw		Completed-in yard	10/16/2020
AB2	AB2	m108	4		Approved	Cut/Saw		Completed-in yard	10/16/2020
AB2	AB2	m108	4		Approved	Cut/Saw		Completed-in yard	10/16/2020
AB2	AB2	m108	4		Approved	Cut/Saw		Completed-in yard	10/16/2020
AB2	AB2	m108	4		Approved	Cut/Saw		Completed-in yard	10/16/2020
AB2	AB2	m112	4		Approved	Cut/Saw		Completed-in yard	10/16/2020
AB2	AB2	AB2	4		Approved	Paint		Completed-in yard	10/16/2020
AB2	AB2	p23	4		Approved	Cut/Saw		Completed-in yard	10/16/2020
AB2	AB2	m108	4		Approved	Cut/Saw		Completed-in yard	10/16/2020
AB2	AB2	m108	4		Approved	Cut/Saw		Completed-in yard	10/16/2020
AB2	AB2	m108	4		Approved	Cut/Saw		Completed-in yard	10/16/2020
AB2	AB2	m108	4		Approved	Cut/Saw		Completed-in yard	10/16/2020
AB2	AB2	m108	4		Approved	Cut/Saw		Completed-in yard	10/16/2020
AB2	AB2	m112	4		Approved	Cut/Saw		Completed-in yard	10/16/2020
AB2	AB2	AB2	4		Approved	Paint		Completed-in yard	10/16/2020
AB2	AB2	p23	4		Approved	Cut/Saw		Completed-in yard	10/16/2020
AB2	AB2	m108	4		Approved	Cut/Saw		Completed-in yard	10/16/2020
AB2	AB2	m108	4		Approved	Cut/Saw		Completed-in yard	10/16/2020
AB2	AB2	m108	4		Approved	Cut/Saw		Completed-in yard	10/16/2020
AB2	AB2	m112	4		Approved	Cut/Saw		Completed-in yard	10/16/2020
AB2	AB2	AB2	4		Approved	Paint		Completed-in yard	10/16/2020
AB2	AB2	p23	4		Approved	Cut/Saw		Completed-in yard	10/16/2020
AB2	AB2	m108	4		Approved	Cut/Saw		Completed-in yard	10/16/2020
AB2	AB2	m108	4		Approved	Cut/Saw		Completed-in yard	10/16/2020

You can do any of the following in the **Import results** list:

To	Do this
Zoom to selected parts in model	1. Select parts in the list. 2. Click the Select and zoom button.
List parts currently selected in model	1. Select parts in the model. 2. Select the Use model selection checkbox. 3. Click the Refresh button.
List only drawings and parts with information that is different than in the model	1. Select the Modified objects only checkbox. 2. Click the Refresh button.
Colorize parts by production status	You can set up object representations in Tekla Structures to view the Tekla PowerFab production status: • Select a representation from the Representation list and click Set.

	The Representation list shows all object group representations available in your environment and role. To use the desired object representations in Tekla PowerFab import, you first need to create object groups for the desired Tekla PowerFab stations and then define colors for these object groups in Tekla Structures. For Tekla PowerFab -specific instructions, see Tekla PowerFab object representation when importing to Tekla Structures.
Update model with information displayed in the list	Click Update. When the update has completed, the list will reload showing that the values are now the same as in the model (no longer highlighted in yellow). NOTE: Only the drawings and parts currently shown in the list are updated. If you have the Use model selection checkbox selected, all parts and drawings are not necessarily shown, and you need to clear the Use model selection and click Refresh before clicking Update.

3.15 Automated precast fabrication

With Tekla Structures you can efficiently deliver all types of precast concrete elements at the right time to the right place by integrating design and detailing with manufacturing, project management and efficient information sharing.

For the precast fabricators, the target is to offer functionalities to help to optimize the whole precast construction process from modeling to fabrication to site operations, minimize errors and waste in all stages and improve collaboration between project parties in design, production and site.

The offering consist of several product listed below.

Unitechnik

Unitechnik (from the company Unitechnik) is the most common format for exporting precast and mesh geometry as well as production data. Unitechnik

is for precast panels and slabs and other products that are manufactured in a pallet circulation as well as for reinforcement meshes.

The Unitechnik format is not used only by UniCAM but also by other industry solutions such as Leit2000.

[Export to Unitechnik \(page 448\)](#) versions 5.0c - 6.1 are available in Tekla Structures core installation in the most extensive precast-related configurations.

ELiPLAN

ELiPLAN is an ERP software from machinery provider Elematic. The file format `.eli` also contains production data and geometry for CAM-operated hollow-core slab production.

Both [EliPLAN export from and import to \(page 546\)](#) Tekla Structures are available in the Tekla Structures installation in the most extensive precast-related configurations.

HMS

HMS is a CAM software for hollow-core production.

The [export to HMS \(page 569\)](#) software is included in the Tekla Structures installation in the most extensive precast-related configurations.

BVBS

Reinforcement geometry can be exported to German BVBS (Bundesvereinigung Bausoftware) format. The result is a text file in ASCII format.

You can export cut and bent reinforcing bars, reinforcing bar groups and reinforcement meshes, which can be rectangular, polygonal, non-bent or bent, and may include cuts. The export of hooks is also supported.

The supported version of the BVBS format is 2.0 from year 2000.

[BVBS export \(page 530\)](#) is available in Tekla Structures installation in the most extensive configurations.

UXML

UXML (from the company Unitechnik) is for precast panels and slabs and other products that are manufactured in a pallet circulation as well as for reinforcement meshes.

Tekla Structures supports exporting both to Unitechnik and UXML formats.

Precast Production Export for UXML can be found as an extension in [Tekla Warehouse](#). For instruction on how to use the export, see [Precast Production Export](#).

PXML

The data format of progress XML also known as PXML has been developed by Progress Software Development, which is part of precast solution provider Progress Group. Data format is based on hierarchically structured XML for the generation of data and production control and scheduling at precast or rebar prefabrication factories. PXML contains both the product geometry to be used in production and the attribute data for managing the related processes (ERP data). In particular, there are two different areas of application:

- interface between systems of different manufacturers
- internal (proprietary) storage of data of CAD/CAM systems

PXML is the main data format to bring design geometry between detailer's Tekla Structures and factory's Progress software such as ebos, erpbos, ProFit and AviCAD.

Precast Production Export for PXML can be found as an extension in [Tekla Warehouse](#). For instruction on how to use the export, see [Precast Production Export](#).

Precast planning tools

There are some precast planning tools available in Tekla Warehouse, such as:

- [Palletizer](#): Practical, easy-to-use and efficient workflow tool for arranging different types of precast elements on production pallets.
- [Stacker](#): Interactive 3D-model-based truck-load planning application helps you to efficiently plan the transportation units for optimal deliveries with less crane time needed at the factory and site.

For other concrete tools in Tekla Warehouse, see [Concrete](#).

Unitechnik

You can export the 3D geometry of the cast units in the Unitechnik format. The result is a text file in the ASCII format.

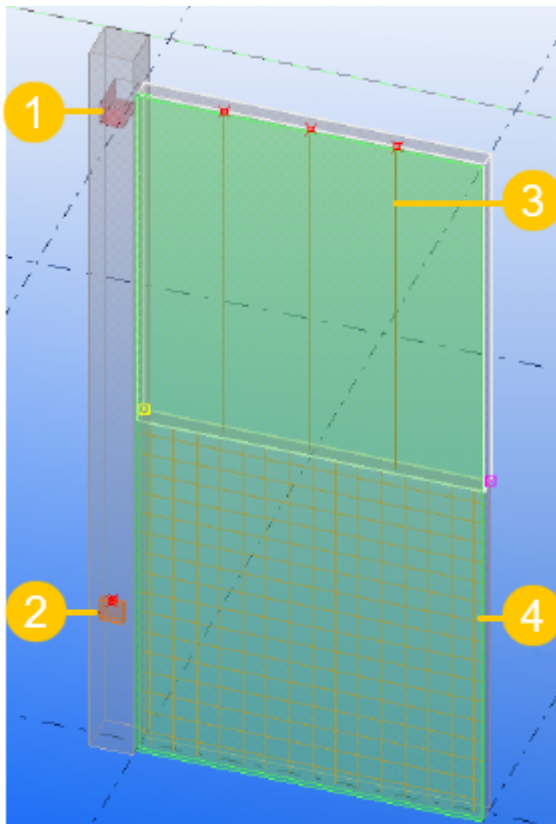
Supported versions of the Unitechnik format are:

- 6.1.0 17.9.2009
- 6.0.0 14.6.2005
- 5.2b 11.9.2000
- 5.0c 30.10.1997

The Unitechnik format is intended for the production of the geometry of pallet- or table-produced precast elements such as solid, sandwich or double walls as well as panel slabs and half-slabs. You can export cast units consisting of concrete, steel and surface materials. Exporting of reinforcing bars (bent and not-bent), reinforcing bar groups and meshes with hooks is also supported.

Example

Exported cast unit:



(1) Hole

(2) Steel embed

(3) Reinforcing bars, cages also supported (UT version 6.1.0)

(4) Insulation plate (green)

For details about exporting in the UXML and PXML formats, see [Precast Production Export](#). You can download Precast Production Export from [Tekla Warehouse](#).

To ensure the best possible export result, see [Best practices in modeling, validating and exporting for Unitechnik \(page 515\)](#).

Limitations in Unitechnik export

The Unitechnik format is for flat panels and slabs for production in pallet circulation plants. It is an open format used by many different production system master computers, and therefore the specifications are quite strict, and field character lengths are limited, for example. The different master computers from different solution providers also have different interpretations of the Unitechnik data. The original format is from early 2000's,

and it is a bit outdated in many aspects. As a result, the Unitechnik format has certain limitations:

- Cast units with cast unit type cast-in-place are not exported.
- All Unitechnik fields have a maximum character length, both for geometry and attribute information.
 - While Tekla Structures supports input of longer strings, the data has to be cut and simplified, or the export may be prevented completely. The log will notify if this happens.
 - Negative values in certain geometry fields (negative pallet X, Y, and Z coordinates, for example) will cause errors in production systems, even though the geometry comes correctly from the model.
 - Also the number of fields per hierarchy object is limited, although each has also unspecified reserve fields for customer-specific cases.
- 3D shapes are not supported.
 - 3D concrete shapes are not supported (except for edge shapes in line attributes)
 - 3D embed shapes are not supported
 - 3D bent rebar shapes are not supported
- When using terminal hook flecion forms, the rebars and meshes can be bent only in one direction (hooks up or hooks down, for example).
- One Unitechnik file may only have one HEADER block, but it may have several SLABDATE blocks.
 - Double wall elements are an exception. They should be exported in one file, with each shell having its own HEADER information.

Export in Unitechnik format

1. Go to the part properties of the parts that you plan to export, and edit the user-defined attributes on the **Unitechnik** and **Delivery** tabs (or **Unitechnik Mountpart** tab for steel parts) as required. The user-defined attributes are environment specific, so you may not have all the settings below available:

Unitechnik tab:	
Parts:	
Product type	Product type is important for identifying the object type in CAM software. Undefined product type will result in error notification while importing the production data file. You can define the product type by

	selecting one of the options, or by defining a user-defined text. Product type affects the file structure of the exported element. Certain product types, such as double walls, sandwich walls and thermo walls set custom export logics to ensure that the panel production stages are transferred correctly. With double walls and thermo walls, you can use the user-defined product type setting for the special logic with an alternate product type identifier.
User-defined product type	Optional field for product type.
Product group	Optional field for product group. The product group is used in the SLABDATE block.
Product addition	This attribute is exported with Unitechnik export (79) to object's SLABDATE block as a representative number 00-03. The available options are Standard element , Balcony , Roof , and Plastered element .
Storey	Optional field used for planning the transport and erection processes.
Surface smoothing	Select whether to smooth the surfaces or not. The default value is blank.
Concreting identification (LOT block)	You can select No special treatment or Shovel concrete , or leave the field empty.
Layer split thickness	Manually define the layers with names and thicknesses.
Layer not to export	Specify the layer that you do not want to export.
Mountpart data from UDA	Select whether you want to export mountpart data from the user-defined attributes.
Exclude from export	Select whether you want to exclude mountparts from export.
Identification of installation	Select one of the following options: Installed (0) Only plotted (1) Only installed (2)

	Not installed, not plotted (3) Installed in reinforcement (4) Installed automatically (5)
Type of mounting part	Define the type of mounting part by entering a user-defined attribute.
Reference number	Define the reference number of a mounting part by entering a user-defined attribute.
Mountpart name	Enter the mountpart name.
Info 1 text (UT 6.0)	Specify more information, if necessary.
Info 2 text (UT 6.0)	Specify more information, if necessary.
Delivery tab:	
Unloading type	Specify the unloading type.
Transport type	Pallets (00) A-frame (01) Inside loader (02)
Transport unit number Transport sequence number	Optional fields used for planning the transport and erection processes. These can be defined in the export settings to be included as part of SLABDATE block.
Transport pile number	Optional field that specifies the transport pile number.
Transport pile level number	Optional field that specifies the transport pile level number. If there are elements in the stack that need to be layered on the same level, then the pile level is used if the transport sequence number is the same for the pile. This can be defined in the export settings to be included as part of SLABDATE block. For example, you may have a pile of 6 slabs, and they each have sequential pile level numbers 1, 2, 3.. 6.
Surface objects:	
Use surface as pallet base	Orient the object without changing the top-in-form face or the rotation in export settings.

Align pallet direction	If you did not select to use the surface object as the pallet base, you can use Align pallet direction to rotate the element in plane so that the selected face is towards the pallet X axis, and aligns towards the X direction. This setting overrides all other rotation settings.
Line type	Select manual or predefined line type.
Line attribute code	If you selected manual line type, type the line attribute code.

2. Check the settings on the **Unitechnik** tab in user-defined reinforcement attributes and change them as required. Ensure that rebars are not accidentally grouped into mesh or cage.

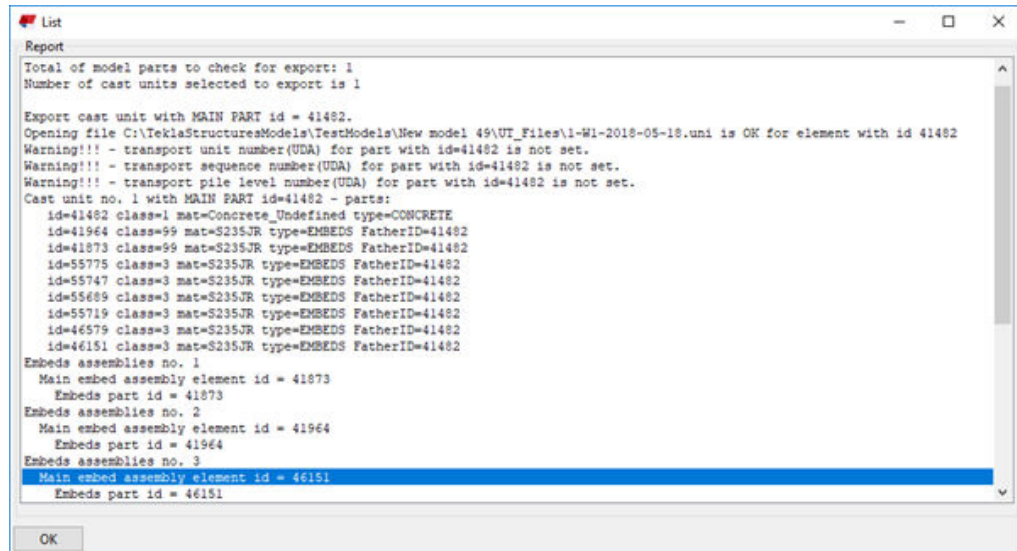
Unitechnik reinforcement type	Overrides the automatically assigned Unitechnik reinforcement type, which is used to define the rebar/mesh wire layer within the element or mesh.
Cage group number	Used to group together specific rebars into a cage.
Cage type	Unitechnik cage type data attribute
Cage shape	Unitechnik cage shape data attribute
Mesh type	Overrides the automatically assigned Unitechnik mesh type.

3. We recommend that you define the top-in-form face. Do this before creating any drawings.
4. Update numbering.
Export Unitechnik reads and exports data from the numbering series of parts. It is important that all exported parts are numbered correctly. Incorrectly numbered parts are not exported.
5. On the **File** menu, click **Export --> Unitechnik** .
The **Export Unitechnik** dialog is displayed.
6. Define the Unitechnik export properties on the various tabs.
7. Select objects using **Select assemblies** (recommended) or **Select objects in assemblies** depending on the option that you selected for **Create from** on the **Main** tab. You can also enter the cast unit positions to be exported manually.
8. Click **Create**.
By default, .uni output files are created in the \UT_Files folder under the current model folder. The number of output files depends on the

options selected from the **Create from** list on the **Main** tab, and on the total number of selected parts, cast units, or assemblies.

During the export, information on the export progress is shown in the export progress window.

When the export is ready, the export log is displayed. See the **Log files** tab for additional log options.



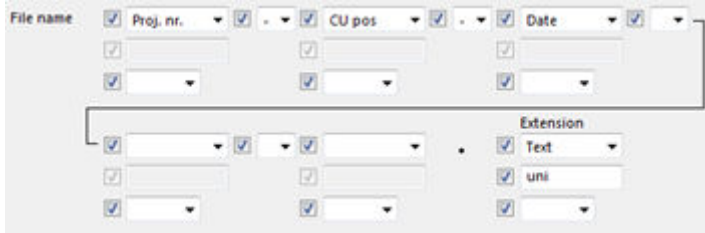
The maximum number of exported elements or layers is limited to 99. If the limitation is exceeded, you will be notified by a console and log file message.

Unitechnik export: Main tab

NOTE When specifying object names: If names consist of several words, enclose those in quotation marks and use spaces between words, for example, "WORD1 WORD2".

Option	Description
Unitechnik version	Select the Unitechnik version.
Create from	Select which parts or cast units are exported. Selected cast units Only cast units that have one or more parts selected in the model are exported. Each cast unit has one output file. Select By cast unit Id or By cast unit position.

Option	Description
	• All parts All cast units are exported. Each cast unit has one output file. Select By cast unit Id or By cast unit position. • Selected parts (separately) Only the selected concrete parts (also embeds and insulation parts belonging to the selected part) are exported. Each part has one output file. • Selected parts (cast united) Selected parts belonging to one cast unit are grouped and exported together in one output file. Select By cast unit Id or By cast unit position. • Selected assemblies This option is recommended in most cases. All selected assemblies are exported. One assembly equals one cast unit and has one output file. Selection of subassemblies is also allowed. In the rebar assembly export, the rebar assembly types Mesh, Bent mesh, and Roll mat are collected and exported as mesh. The rebar assembly type is defined in the rebar assembly properties. If the rebar assembly type is undefined or Cage, the rebar assemblies are exported as cages. Rebar assemblies of the type Braced girder are exported as braced girders, and the assemblies of the type Embed are exported as mountparts. As the cage is not supported in Unitechnik versions below 6.1.0., the cage rebars will be exported as loose. • Cast units in list Select the cast units for export from the Cast unit position list you enter. • By cast unit Id Each cast unit has its own output file. • By cast unit position Identical cast units share an output file.

Option	Description
Export using filter	Use a selection filter to select the parts for export. You can use the selection filter for including the parts in or excluding the parts from the export.
Parts excluded from export (class or name)	If you do not want to export some parts, enter the classes or names of these parts. You can also filter out rebars with this setting. Parts with classes in this list will not be exported.
Directory path	Define where the export files are saved. The default folder is <code>.\UT_Files</code> under the current model folder.
File name Extension	Select the name of the output file from the lists and specify the file name extension. You can use up to 5 strings to generate the export file names. Select options from the lists, definition values or attributes, and an optional string length limiter. You can leave the box empty if you do not need all 5 strings. You can use the delimiter period (.), dash (-), or underscore (_) between the strings.  • Proj. nr is the number of the project. • Proj. name is the name of the project. • CU nr is the assembly position number of the main part of the cast unit. • Phase is the current phase. • CU pos is the assembly position of the main part of the cast unit. • ACN is the assembly control number. To generate the assembly control numbers, go to the Drawings & reports tab and click Numbering --> Assign control numbers. • Part ID is the ID number, which is 10 characters long. If the ID number is not 10 characters long, zeros are added in front of the ID number to make it 10 characters long. For example, id number 456999 will be 0000456999.

Option	Description
	• Counter adds a running number at the end of the file name, if the name already exists. • Other options are Date, Time, Date-Time, UDA, Text, Template, and Project UDA. Date, Date-Time and Time use the format yyyy-mm-dd-hh-mm. Template means a template attribute. UDA and Template are always read from the main part. Also define the file name extension. By default it is Text and uni. You can select another option from the list.
File name mask	The format (length) of the output file name and file name extension. Numbers represent the length of the output string. If the name is longer than the selected option, it is cut.
Open folder after export	Select whether the folder where the output file is saved is opened after the export.
Blank symbol in exported file	Select the blank symbol to be used in the export file. An example with "_" symbol: <pre> HEADER__ 005 57_____ W1____ W 57_____ Corporation__ _____ _____ </pre> An example with " " symbol: <pre> HEADER__ 005 57 W1 W 57 Corporation </pre>
Output file structure	Structure of the exported file (slab date and layer part). In most cases, you do not need to use this setting. • Multiple layers One <code>SLABDATE</code> block with N layers. Each cast unit has its own <code>LAYER</code> block. Embeds,

Option	Description
	reinforcement and insulations belong to one concrete part, and they are exported to the related LAYER block. If the layers are not defined correctly, it will result in error. <pre> HEADER__ *** SLABDATE *** LAYER__ *** END LAYER__ LAYER__ *** END LAYER__ LAYER__ *** END LAYER__ END SLABDATE END HEADER__ </pre> Single layer, 1 slabdate, 1 part Each cast unit has its own SLABDATE block, no LAYER blocks. <pre> HEADER__ *** SLABDATE *** END SLABDATE SLABDATE *** END SLABDATE SLABDATE *** END SLABDATE END HEADER__ </pre> Single layer, n slabdate, n parts Cast units with equal geometry are collected in one SLABDATE block. No LAYER or LOT blocks are defined. Embeds, reinforcement and insulation belonging to a cast unit with the same geometry are collected and exported in one SLABDATE block. <pre> HEADER__ *** SLABDATE *** END SLABDATE SLABDATE *** END SLABDATE END HEADER__ </pre>

Option	Description
	• Single layer, 1 slabdate, n parts All similar wall shells are defined within one <code>SLABDATE</code> block instead of being defined in a separate <code>SLABDATE</code> block per wall shell. The option is useful when exporting special embeds. • Combined, n slabdate, 1 part Combined export that can contain more than one cast unit. The exported cast units are placed side by side according to the sequential logic defined on the Pallet tab. • Single layer, 1 slabdate, n steelmats Only exports the main part of the cast unit as slabdate and meshes and embeds from whole cast unit in one row in export X axis direction with a 1 mm gap between them. • 1 slabdate, scanned layers Export element layers in the same order as they are modeled in the model. Multiple parts on the same depth level are recognized as one layer.
1st exported layer	Select which part is exported in the first <code>LAYER</code>. This option allows to define which wall shell is positioned on the pallet first. The options are: • Main part (of cast unit) • Biggest part • Heaviest part
Consider layer split thicknesses	Select how the layers of the cast unit are exported. These options are available when you have set Output file structure to Multiple layers. • No The cast unit is exported as one volume. • Yes The manual layers set on the Unitechnik tab in the user-defined attributes of a part are used, and the cast unit is exported in two or three layers.
Split meshes to individual files	Select Yes to export meshes into individual files. A running number is automatically added to the file

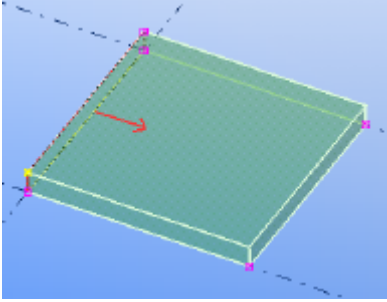
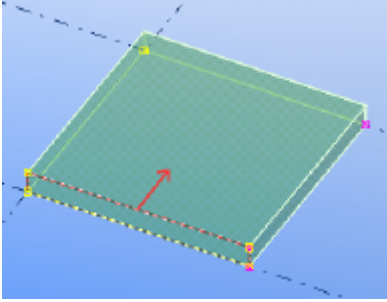
Option	Description
	name. Each exported file contains one STEELMAT block only.

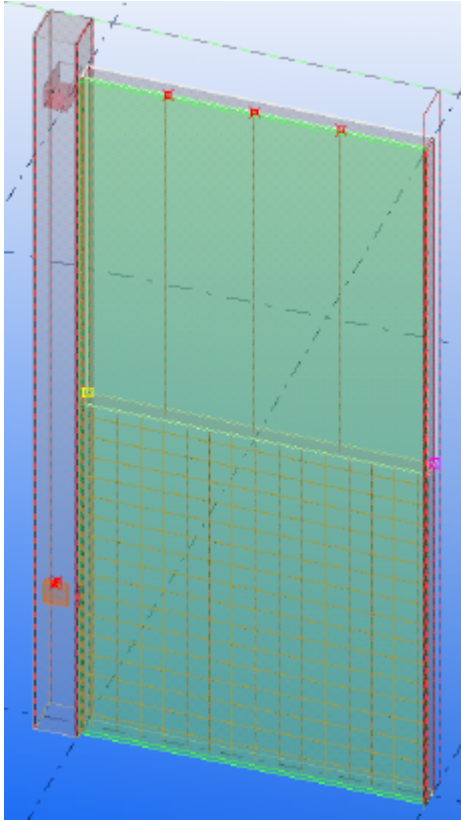
Unitechnik export: TS configuration tab

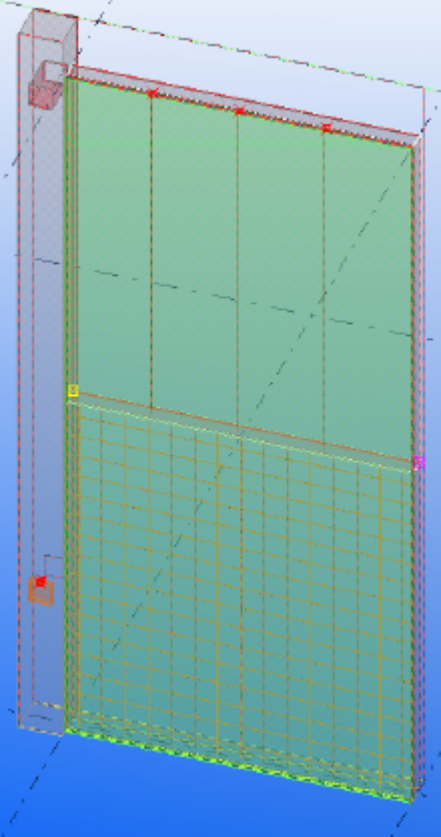
NOTE When specifying object names: If names consist of several words, enclose those in quotation marks and use spaces between words, for example, "WORD1 WORD2".

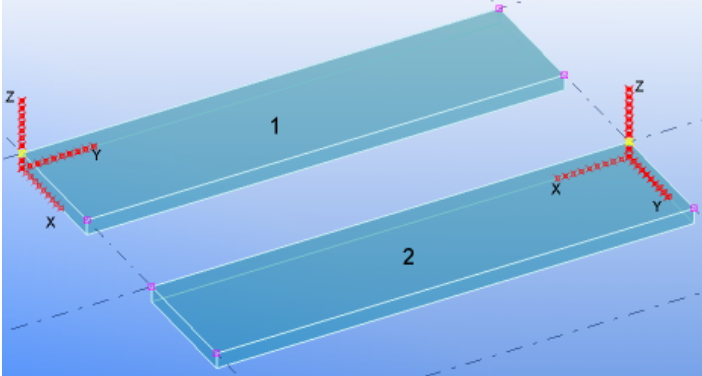
Option	Description
Rotation	Select the scanning direction, which defines which main part face is towards the pallet base. Unitechnik export uses scanning layers to obtain the geometry of all parts in a cast unit. The scanning direction depends on the plane of the cast unit main part. A floor panel is scanned from bottom to top side. A wall panel and a column are scanned from one side to the other side. The position and direction of a basic shape of the exported cast unit depends on the rotation. Note that you can use the surface object user-defined attribute Use surface as pallet base to orient the object without changing the top-in-form face or the rotation in export settings. You can also use the surface object Align pallet direction UDA, which rotates the element in plane so that the selected face is towards the pallet Y axis and aligns to the pallet X axis. This function overrides all other rotation settings. The export also checks for the <code>PALLET_ROTATION</code> UDA written by the Double wall details tool, and rotates the element either 90 degrees left or right respectively.
	No Floor: Bottom to top Wall: Front to rear side (according to the modeling direction) Column: Side to side

Option	Description
	180 Floor: Top to bottom Wall: Rear to front side Column: From one side to the opposite side
	+90 around X Floor: Left to right side Wall: Top to bottom Column: Side to side
	-90 around X Floor: Right to left side Wall: Bottom to top Column: From one side to the opposite side

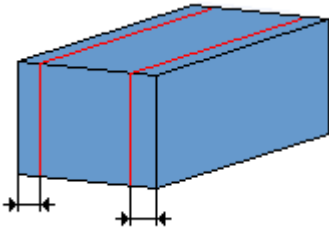
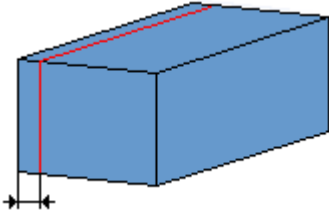
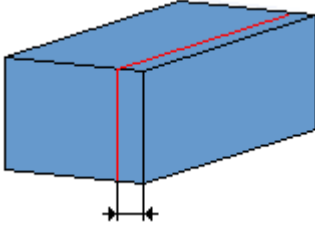
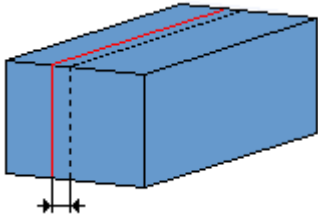
Option	Description
	
	-90 around Y Floor: Rear to front side Wall: Right to left side Column: Top to bottom 
	With the Top in form face option, the scanning direction depends on the defined top-in-form face, so that the opposite face will be towards the pallet.

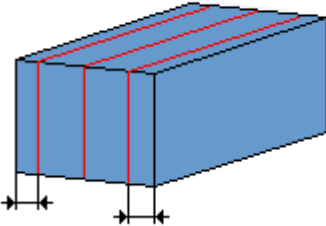
Option	Description
	Examples of rotation: • Wrong scanning plane (from the right side to the left side): 

Option	Description
	Correct scanning plane (from back to front side): 
Extra rotation	Select the rotation around the z axis, and thereby the rotation of the pallet. The z axis has the same direction, but the x and y directions are changed. To show the actual coordinate system, set Draw pallet axis to Yes on the Pallet tab. No No extra rotation. Swap X/Y Swap x and y axis. X=max(X_dim,Y_dim) main part X axis goes through the longer side of the main part. X=min(X_dim,Y_dim) main part X axis goes through the shorter side of the main part.

Option	Description
	• X=max(X_dim,Y_dim) cast unit X axis goes through the longer side of the cast unit. • X=min(X_dim,Y_dim) cast unit X axis goes through the shorter side of the cast unit. • +90 around Z Rotates x and y axis around the z axis by 90 degrees. • - 90 around Z Rotates x and y axis around the z axis by -90 degrees. • 180 around Z Rotates x and y axis around the z axis by 180 degrees. The following example shows the coordinate system with no rotation and no extra rotation settings. Panel 1 has the z axis set parallel to the shorter side. It is incorrect in the Unitechnik format, so the coordinate system has to be rotated. Panel 2 shows a rotation by 90 degrees around the z axis. 
Auto-rotate on pallet	Select whether to auto-rotate the coordinate system for export +90° or -90° when the element width exceeds the pallet width, or when the element width exceeds the element length, or to auto-rotate the element on pallet. With the Auto-rotate on pallet option, the element is rotated based on a fixed set of rules defining that the longer edge with no cuts or protruding embeds is at the bottom edge of the

Option	Description
	pallet. For the Auto-rotate on pallet option, you can also select if the default rotation direction is To long even edge (clockwise) or To long even edge (counterclockwise) .
Export CONTOUR	Select how to export the element contour. The options are Scanned, Bounding box, and Simplified. The Scanned option inquires the modeled 3D geometry using 2D scanning planes, see the Scan position setting description below. The Bounding box option defines the contour as 4 perpendicular lines between the minimum and maximum values of (x, y) coordinates. The Simplified option exports a simplified contour using 4 x, y corner points of the element. Similarly as the bounding box, but accounts for diagonal lines at the edges.
Scan position	The element contour, cutouts and line attributes are defined by scanning the cast unit in the scan direction defined by rotation settings above. A scanning plane works like a section with no view depth. The export application uses 1 or 2 scanning planes for each part included in the exported cast unit (regardless of the output file structure setting). The offset is towards the middle of panel from the scanning plane, but can be negative or positive value. The number of the scanning layers depends on the selected scan position. Each object of the cast unit is scanned in one direction. Select the position in which all parts are scanned. Each part is scanned separately. Scanning plane is parallel to the basic shape plane.

Option	Description
	Bottom and top  Two scanning planes at the top and bottom of the scanned part. Bottom only  One scanning plane at the bottom face. Top only  One scanning plane at the top face. Middle only  One scanning plane at the middle point of the scanned part.

Option	Description
	• Top, bottom and middle  Three scanning planes: one at the top face, one at the bottom face and one at the middle point of the scanned part. To move the position of the exact scanning plane, use the Scan position offset boxes below to define start offset and end offset.
Merge CONTOUR layers	You can export one scanned layer only. With two scanned layers, they have to be merged into one layer. • Intersection Creates polygon intersection of two contour geometries.  1. First scanned layer 2. Second scanned layer 3. Layer • Union Creates polygon union of two contour geometries. 

Option	Description
Export CUTOUTs	To prevent cutout export, select No. Exclude selected excludes from the export the modeled cut parts that you define by class or name. Selected only includes in the export the cut parts that you define by class or name.
Merge CUTOOUT layers	The same as Contour export , but for holes only.
Merge CUTOOUTs	Select how to merge overlapping cutouts. You can select to export a big cutout which is created by smaller cuts as separate cutouts. The options are: 1. Merged as one cutout  2. Unmerged, overlapping cutouts  3. Unmerged cutouts with no overlapping 
Cuts as mountparts	Recognize certain cuts as mountparts automatically. Select the cut type: Designated only, All, Recesses, Within contour, or Recesses within. Any embed designated as Cutpart former will always be a mountpart, unless excluded. Within contour means any cut surrounded by the concrete part at least from three sides.
Extend contour and add formwork	Select whether to extend the contour according to protruding reinforcement or embeds. This setting extends the contour and adds additional formwork mountparts to the extended area. Formwork is not added if there already is an embed with the same geometry. The contour is not extended for electric tube embeds.
Name for additional formwork (embed)	Define a name for the embed.

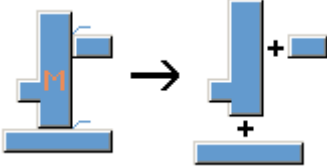
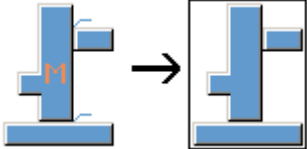
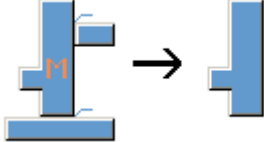
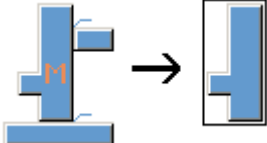
Option	Description
Geometry export	Select whether the geometry of the exported part (concrete contour, cutout, mountpart) is represented as polygons or lines. Polygons exported: <pre> ... SLABDATE 502 001 0 00 00 000 001 001 000 00 00 0000 15.920 000 00 0.000 06577.0 0250 000 000 000 000 4000 000 0.000 00000.0 000 0.000 00000.0 01 01 00 250 C30:37 2.400 02740.4 03980 04000 +0000 +0000 +0000 +0000 0 00000 0 00000 000000 000000 +00 +00 00000 00000 00000 00000 00000 00000 00000 00000 0000 0000 00 000000 000000 000000 000000 000000 000000 000000 000000 000000 END CONTOUR_ 502 01 01 00 02 P 5 03980 00000 03980 03337 0000 01990 04000 0000 01253 04000 0000 00000 03524 0000 P 3 00000 03524 00000 00000 0000 03980 00000 0000 END CUTOUT_ 502 01 01 04.000 01 P 5 02990 01000 02990 03000 0000 00990 03000 0000 00990 01000 0000 02990 01000 0000 END ... </pre>

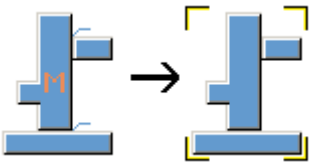
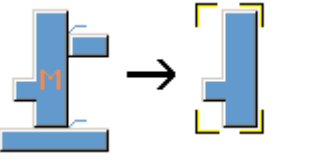
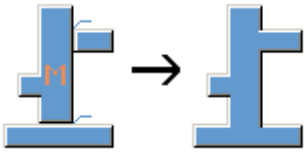
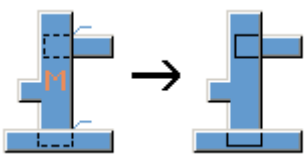
Option	Description
	Lines exported: <pre> ... SLABDATE 502 001 0 00 00 _ 000 001 001 000 00 00 0000 15.920 000 00 _ 0.000 06577.0 0250 000 000 000 000 000 4000 000 _ 0.000 00000.0 000 _ 0.000 00000.0 01 01 00 250 C30/37 _ 2.400 02740.4 03980 04000 +0000 +0000 +0000 +0000 0 00000 0 00000 000000 000000 +00 +00 00000 00000 00000 00000 00000 00000 00000 00000 00000 0000 0000 00 000000 000000 000000 000000 000000 000000 000000 000000 000000 END CONTOUR_ 502 01 01 00 06 S 03980 00000 03980 03337 0000 S 03980 03337 01990 04000 0000 S 01990 04000 01253 04000 0000 S 01253 04000 00000 03524 0000 S 00000 03524 00000 00000 0000 S 00000 00000 03980 00000 0000 END CUTOUT_ 502 01 01 04.000 04 S 02990 01000 02990 03000 0000 S 02990 03000 00990 03000 0000 S 00990 03000 00990 01000 0000 S 00990 01000 02990 01000 0000 END ... </pre>
Export rounded holes as circle (K)	Select whether you want to export rounded holes as circles (K) or polygons/lines.
Double wall turned	Select whether the first shell of a double wall on the pallet is turned. This requirement depends on the receiving master computer system. The options are: No, one coordinate system: Exported as in model, shell1 is in front, shell2 in background. Yes, turn shell1: The shell 1 is offset by the pallet width in y direction (defined on the Validation tab) and flipped around x axis Yes, turn shell1 - fixed edge up: This is meant for special machines. No, shell-specific coordinate systems: Use to export the second shell in the Z direction from the bottom of the pallet upwards.
Allow swapping of shells	Specify whether the double wall shells are swapped.

Unitechnik export: Embeds tab

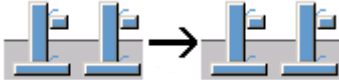
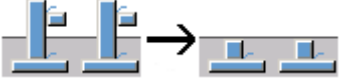
NOTE When specifying object names: If names consist of several words, enclose those in quotation marks and use spaces between words, for example, "WORD1 WORD2".

Option	Description
Normal embeds	Select which parts are considered as embeds. Embedded parts are exported in the <code>MOUNPART</code> block. If the embed block consists of several parts, it is useful to combine all embed parts into one sub-assembly block and then add as sub-assembly to a cast unit or concrete shell sub-assembly. Single part embeds can be simply added to cast unit. • Selected + steel All classes listed in the Embeds classes box are considered as embeds. All steel parts are also considered as embeds, unless excluded from export. • Selected Classes listed in the Embeds classes box are only considered as embeds. • No export Ignores the Embeds classes box and exports all steel parts as standard parts. • Selected (also reinforcement) + steel All parts and reinforcing bars listed in the Embed classes or names box are considered as embeds and plotted as lines. Also bounding box can be used. All steel parts are also considered as embeds.
Embed classes or names	Enter the classes or names of the embeds.
Embed filter	Enter the name of the filter that specifies the embeds to export.
Export assemblies	Select how the 2D geometry of embeds and steel blocks are exported.

Option	Description
	 Embeds are exported as parts. All embedded welds and assembly relations are ignored.
	 Welded embeds and the assembly block are exported as one part with the bounding box geometry of the complete sub-assembly.
	 Only the main part of the embedded block or embedded assembly is exported.
	 The main part of the embedded block extended in the x direction to cover all the parts of the embedded block is exported.
	 Only the bounding box around the main part of the embedded block or embedded assembly is exported.

Option	Description
	 Export the corner symbols of the embed sub-assembly bounding box.
	 Export the corner symbols of the main part bounding box.
	 Export all sub-assembly parts as one object with continuous geometry.
	 Export all sub-assembly parts as one object with distinct geometry of each part.
Corner symbol width / height	Enter the width and height of the corner symbol.
Def export code	Define how the insertion point and the direction for embeds is calculated. Possible values are 0, 1, 2, 3, 11, 12, 21, 22, 23, 31 and 32, 41, 42, 43. In most cases, the insertion middle point refers to the center of gravity of the embed sub-assembly or main part depending on the Export assemblies setting. 0 = Ignores the symbol and uses the sub-assembly bounding box setting according to the insertion COG setting (1 - 5), for example, PLATE 0 0 4. 1 = The insertion point is the middle point of embed and the direction is parallel to the longest

Option	Description
	side of the exported mountpart geometry. 1 is the default. 2 = The insertion point is the middle point of embed and the direction is parallel to the shortest side of the exported mountpart geometry. 3 = The insertion point is the middle point of embed, and if the mainpart is symmetrical, calculate the direction of the mountpart along the line from mainpart COG to sub-assembly COG. 11 = The insertion point is the point of embed in the middle of shorted side and the direction is along the longest side. 12 = The insertion point is the point of embed in the middle of longest side and the direction is along the shortest side. 21 = The insertion point is in the contour's top edge point closest to the embed and the direction is parallel to the longest side of the exported mountpart geometry. 22 = The insertion point is in the contour's top edge point closest to the embed and the direction is parallel to the shortest side of the exported mountpart geometry. 23 = The insertion point is in the contour's top edge point closest to the embed and if the mainpart is symmetrical, calculate the direction of the mountpart along the line from mainpart COG to sub-assembly COG. 31 = The insertion point is the point of the closest vertex on concrete part, between embeds and concrete part side and the direction is along the longest side. 32 = The insertion point is the point of the closest vertex on concrete part, between embeds and concrete part side and the direction is along the shortest side. 41 = Insertion point embed assembly COG and orients towards the start to end point axis. 42 = Insertion point embed part start point and orients towards the end point. 43 = Insertion point embed assembly COG and orients towards the axis of the longest edge.

Option	Description
Cut outer assemblies	Select how the embedded parts that are outside the concrete element are exported.
	 All parts in the embed are exported.
	 Only the embedded parts that are inside of the concrete element are exported. Embedded parts that are outside the concrete element are ignored. If an embedded part is partly inside a concrete element, the exported geometry of the embedded part is changed to cut.
	 Same as the previous option, but only embedded parts with class defined in Cut outer only classes are taken into account.
Cut outer only classes	Enter the classes of parts whose geometry is changed to cut when you have selected the last option in the Cut outer assemblies list.
Embed Z position	Select the embed z position. The options are Minimum to pallet, Start point and Z=0. When you select Z=0, all exported mountparts will be plotted on the level of the pallet. You can use the <code>spec_assemblies_def.txt</code> file to set the position of the embeds, see above. If unassigned, the setting chosen in the dialog is used by default. For example: <pre> quicky 4 1 1 middle S -100 100 100 -100 S 100 100 -100 -100 S -100 -100 100 -100 S -100 100 100 100 </pre> On the first line of the example above you have additional options for positioning the embed symbol: Quicky is the name of the embed.

Option	Description
	4 is the number of lines following. 1 is the embed installation type: 1 2 3 11 12 21 22 23 31 32 (see above). 1 defines the geometry for which the center-of-gravity is calculated, choices being 1 - 5, see above. 1 means that the symbol location is defined by the entire mountpart sub-assembly bounding box center of gravity. The special assembly symbol plotting for Z=0 is pallet, for Minimum to pallet bottom and for Start point middle.
Special embeds	Class or name list When defining special embeds as names, and object names consist of several words, enclose those in quotation marks and use spaces between words, for example, "WORD1 WORD2".
Insulation	Define the insulation classes or names. The corresponding parts will be exported as insulation parts. All parts considered insulation are exported in the MOUNPART block. Default mountpart type for insulation is 03 unless overwritten.
Electric tubes	Define the electric tubes classes or names. The corresponding parts will be exported as MOUNPART with lines geometry. Default mountpart type for electric installation is 07 unless overwritten.
Opening embed	Define the opening embed classes or names. The corresponding parts will be exported as normal embeds in the MOUNPART block. The geometry will not be considered in the CONTOUR and CUTOUT blocks of the concrete part.
Opening cutout	Define the opening cutout classes or names. The corresponding parts will be exported only in regard to their geometry in the CUTOUT block of the concrete part. They will not be exported in the MOUNPART block.
Cutpart former	Export cuts that have been specified with a class or name in the MOUNPART block. Default mountpart type for cutout box is 21 unless overwritten.
Thermal anchors	Export thermal anchors for thermal walls by specifying names or classes. You need to set Export insulation to As embed (mounpart) with thermal anchor to activate

Option	Description
	the thermal anchors function and the Thermal anchors setting.
Export insulation	Select how to export insulation: • As embed (mounpart) exports insulation parts in the <code>MOUNPART</code> block as embeds. • As concrete panel exports insulation parts in the <code>SLABDATE</code> block as concrete panels • As layers and embeds export insulation parts in the <code>SLABDATE</code> block as layers and in the <code>MOUNPART</code> block as embeds. • To export thermal anchors as a part of the insulation, select As embed (mounpart) with thermal anchor. The thermal anchors will be represented as very small vertical lines within the insulation mountpart geometry. Select if the insulation layer affects the contour using the options Layer cut to contour and Extend contour. These options are only available if the insulation is exported as a layer within the concrete element, and you have set the Export insulation setting to As concrete panel or As layers and embeds. When Layer cut to contour is used, the shuttering is placed by the determined concrete edge, however any insulation mountpart is allowed to extend outside this contour.
Export surface	Select whether surface treatment is exported in the <code>MOUNPART</code> block as embeds or in the <code>SLABDATE</code> block as concrete panels. You can also use the option No , which does not export surface treatment.
Export cut edges	Select how to export cut edges as <code>MOUNPART</code> block. The options are: • Line cuts • Chamfers • Line cuts and chamfers The geometry will be a simple line, and the <code>MOUNPARTS</code> have fixed names. Line cuts and fittings are plotted along the cut edge. Chamfers are plotted at the inner line of the chamfered edge. You can use this setting for representing sawings on standard slabs, for example.

Option	Description
Sorting embeds by	Select the export order of the embeds. The options are: ID, descending (default) ID, ascending Distance to zero point: The first embed in the list is the closest to the cast unit zero point, the shortest distance to zero point. Name, descending Name, ascending Class, descending Class, ascending
Identification of installation	Select the installation identification for the MOUNPART block. The options are Installed (0), Only plotted (1), Only installed (2), Not installed, not plotted (3), Installed in reinforcement (4), Installed automatically (5)

Unitechnik export: Reinforcement tab

You can export single reinforcing bars, groups of straight and bent reinforcing bars, and rectangular or polygonal or bent meshes. The reinforcing bar group, or rectangular or polygonal mesh is divided into several single reinforcing bars. All reinforcing bars are exported in the RODSTOCK block.

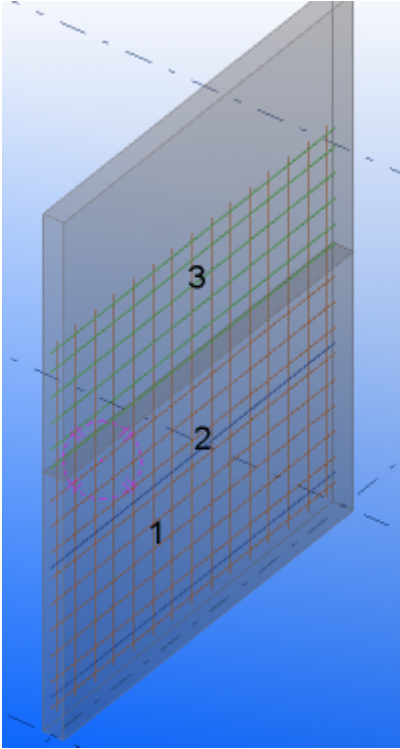
NOTE When specifying object names: If names consist of several words, enclose those in quotation marks and use spaces between words, for example, "WORD1 WORD2".

Option	Description
Rebars export - Straight	Note that the hooked bars are controlled by the Straight setting, not by the Bent setting. All including hooked - Straight reinforcing bars are exported. Hooks are supported. All without hooks - Exports straight rebars without hooks only. Collected - Uncollected reinforcement is excluded from the export.

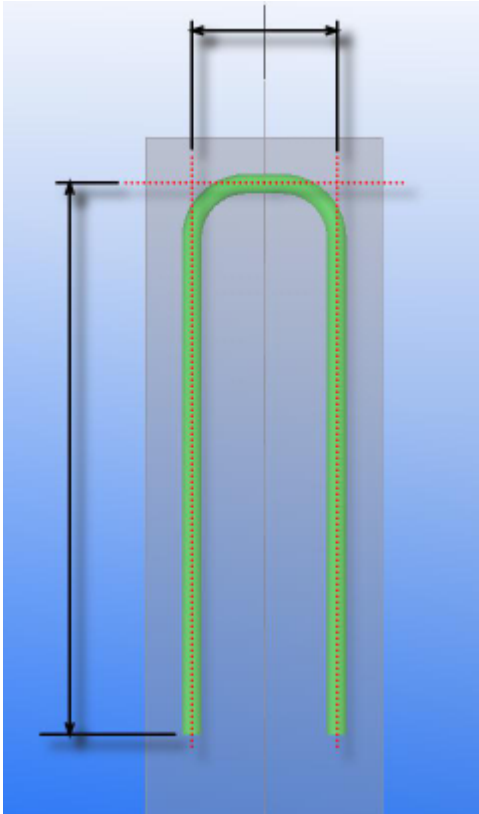
Option	Description
Rebars export - Bent	All - Bent reinforcing bars are exported. Collected - Uncollected reinforcement is excluded from the export.
Meshes export	When set to Yes, polygonal or rectangular meshes are exported. Hooks are supported. You can define the setting separately for straight or bent meshes. You can also select whether to unfold along longest line or parallel to pallet.
Bent mesh and reinforcement	When set to All as unfolded, bent reinforcement is exported as unfolded. When set to Freely selectable forms, bent reinforcement is exported as freely selectable forms, which means that they will have the geometry of each leg and bending represented in the additional row. Hooks are also supported for unfolded reinforcement, and you can select Mesh with hook forms 0, 2 and 5 . Hook forms 0, 2 and 5 are detected. Mesh with hook forms 0-5 exports end hook shape L and two types of shapes S and U (flection form 1, 2, 3, 4 and 5) as terminal hooks according to the Unitechnik specification. Other shapes are exported as unknown shape form 999. Using the option Mesh as unfolded , you can export bent meshes as unfolded, while other bent reinforcement is exported as bent. Mesh forms 0-5 or free exports end hook shape L and two types of shapes S and U (flection form 1, 2, 3, 4 and 5) as terminal hooks according to the Unitechnik specification. Other shapes are exported using freely selectable forms logic. You can select between two reinforcement starting points: Origin in unfolded rebar or Origin in start rebar point. Origin in unfolded rebar uses the first point of the main leg of rebar or mesh wire depending on the rebar orientation in export. The option also affects the z level of the reinforcement in the resulting Unitechnik file. The start points are unaffected by unfolding options.

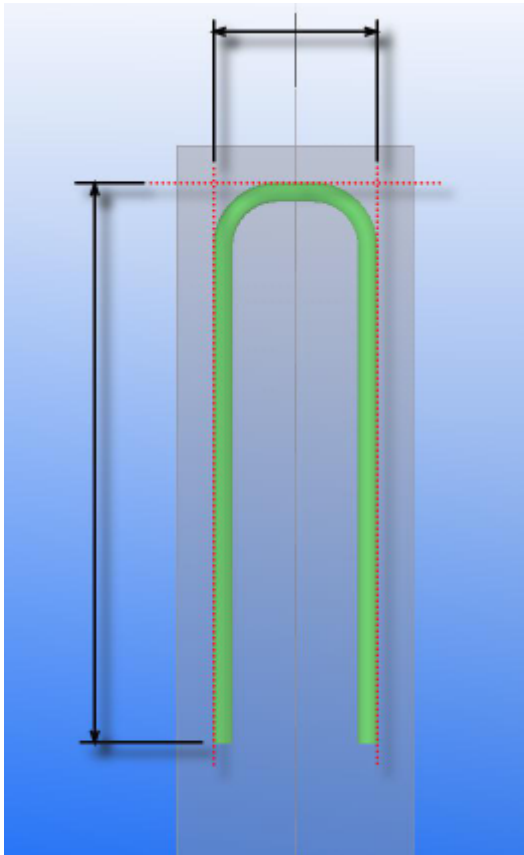
Option	Description
Export meshes as	Set the rotation of the mesh plane in the export file. The options are: Standard Embeds: Exported as mountparts. Turned to pallet (longest wire on X axis): All meshes will be individually rotated in line with the pallet axes. Turned to pallet (bent wire on X axis): Exports meshes rotated to pallet plane with bent wires parallel with the X axis of the pallet.
Braced girder classes or names	We recommend that you model braced girders with braced girder components, which are automatically recognized by the export, making the export faster and consistently precise. Enter the class or name of reinforcing bars, steel rods or profiles representing braced girders. For example, 15 17 5 means that parts with class 15, 17, or 5 are considered braced girders. You can export braced girders within the STEELMAT block using the option Within the STEELMAT block. You can also export braced girders Z coordinate as 0 using the option Without concrete cover. By default, the braced girders are exported outside of the STEELMAT block. Braced girders are represented as a single line, placed according to your selection: • As braced girder top chord (default): The geometry of the main chord (top chord) with all information is included in the export. • As braced girder bottom chords: The braced girder is exported as one object but with the quantity number 2 with the spacing included. • As braced girder all chords: One object like above but with the quantity number 3. • As top chord with end symbols: 2 mountpart symbols are placed at the top chord end points towards the braced girder direction, line 20 mm long. In addition, the above-mentioned BRGIRDER information. You can adjust the symbol length on the Symbols tab, where you can also select if

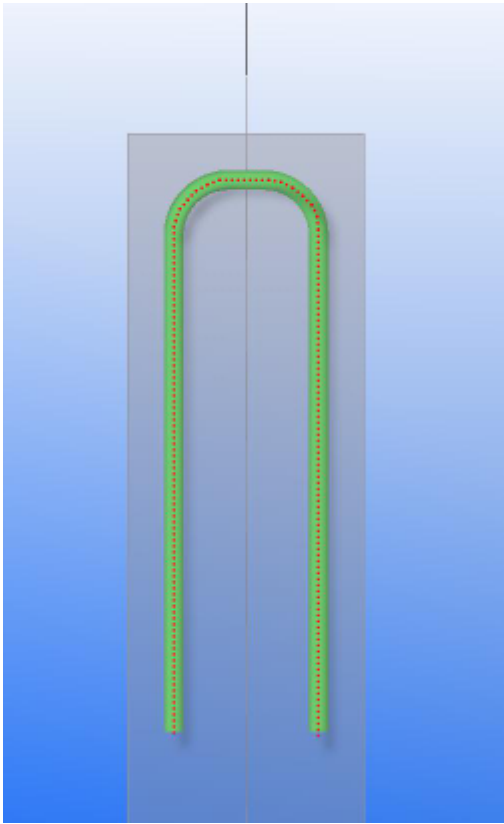
Option	Description
	braced girders exported as mountparts should also have width symbols. • As bottom chords with end symbols: 4 Mountpart symbols are placed at the bottom chord end points towards the braced girder direction, line 20 mm long. In addition, the above-mentioned BRGIRDER information. • Only top chord end symbols: 2 Mountpart symbols are placed at the top chord end points towards the braced girder direction, line 20 mm long. No BRGIRDER. • Only bottom chord end symbols: 4 Mountpart symbols are placed at the bottom chord end points towards the braced girder direction, line 20 mm long. No BRGIRDER.
Reinforcement export type	Define the structure of the exported file for reinforcement.
	Plant with lying robot only All reinforcement including mesh objects will be exported as individual rodstocks within slabdate. <pre> HEADER__ SLABDATE CONTOUR__ CUTOUT__ MOUNPART RODSTOCK BRGIRDER EXTIRON__ END SLABDATE END HEADER__ </pre>
	Fabrication of welded rebars If the export type is set to Fabrication of welded rebars, bar groups are exported as individual rodstocks, mesh objects are exported as rodstocks within STEELMAT blocks. The structure of the output file (one SLABDATE is shown only):

Option	Description
	<pre> HEADER__ SLABDATE CONTOUR__ CUTOUT__ MOUNPART RODSTOCK BRGIRDER REFORCEM STEELMAT RODSTOCK BRGIRDER END STEELMAT STEELMAT RODSTOCK BRGIRDER END STEELMAT EXTIRON_ END REFORCEM END SLABDATE END HEADER__ </pre>
	Collect reinforcement The structure of the output file is the same as for Fabrication of welded rebars. This option allows you to collect mesh, single reinforcing bars and reinforcing bar groups into groups exported in one STEELMAT block. The groups are collected based on the Collect based on field. You can also collect meshes which belong to different cast units. 

Option	Description
	1 (orange color): The mesh belongs to the bottom panel of the cast unit, mesh name is MESH1. 2 (blue color): Two single bars, the name is MESH1. 3 (green color): One reinforcing bar group belongs to the top panel, the name is MESH1. If Reinforcement export type is set to Collect reinforcement and Collect based on is set to Name, all three different reinforcement types are collected into one mesh, which is exported in one STEELMAT block. Other non-designated rebar groups are exported as individual rodstocks. If the collected mesh has only one rebar, it is exported as an individual rodstock without a STEELMAT.
	Designated welded bars This option works in the same way as Fabrication of welded rebars, but you can use it with the Collect based on option to designate the rebars that will form main layers with reinforcement type 1 or 2, while the rebars remain as RODSTOCK depending on object type.
Collect based on	Select how meshes are collected. Meshes with one bar are exported as a single reinforcing bar. • Name Meshes, single reinforcing bars and reinforcing bar groups with the same name are collected into meshes. Meshes, single reinforcing bars and reinforcing bar groups with the same name equals one mesh in the exported file. • Class Meshes, single reinforcing bars and reinforcing bar groups with the same class number are collected into meshes. Meshes, single reinforcing bars and reinforcing bar groups with one class number equal one mesh in the exported file. • Grade Meshes, single reinforcing bars and reinforcing bar groups with the same grade are collected into meshes.

Option	Description
	• UDA Meshes, single reinforcing bars and reinforcing bar groups with the same user-defined attribute are collected into meshes. The value you enter in the box next to this option is the UDA value.
Collect if distance is lower then	Define the maximum distance between the mesh rebars to be collected together into one STEELMAT.
Rebar grouping	Group similar rebars with equal spacing. Similar rebars are exported using one RODSTOCK row with correct quantity and spacing. The options are Yes and No (default). The rebar grouping is primarily intended to be used in the production of simple mesh and reinforcement.
Reinforcing bars length	Select how the reinforcing bar length is calculated. • Lines in the middle 

Option	Description
	• Lines at the edge (total length only)  The diagram shows a U-shaped reinforcing bar (green) within a concrete structure (grey). A red dashed line traces the entire path of the bar, including the two vertical legs and the curved top. Black dimension lines with arrows indicate the total length: a vertical line on the left leg and a horizontal line at the top. This illustrates the 'Lines at the edge (total length only)' calculation method. • Lines at the edge (all leg lengths) calculates the lengths of the reinforcing bar legs at the edge of the bars.

Option	Description
	• GetValue(Length) (total length only) 
Reinforcing bars diameter	Select how the reinforcing bar diameter is exported. The options are: • Actual or nominal (XS_USE_ONLY_NOMINAL_REBAR_DIAMETER) • Size • Actual • Nominal This selection affects the results of the Rebar length option.
Braced girders diameter	Select how the braced girder diameter is exported. The options are: • Actual or nominal (XS_USE_ONLY_NOMINAL_REBAR_DIAMETER) • Size • Actual • Nominal

Option	Description
Rebar direction angle limit	Select whether the reinforcing bars starting direction in XY plane is limited, as required in some production interfaces. • No The reinforcing bars exported as they're modeled in Tekla Structures. • From 0 to 180 The reinforcing bars are exported so that they have a start angle limit to be under 180 degrees, and therefore always oriented to start in positive pallet y direction. In this case the rebar start point will be always be the rebar end with smallest Y-coordinate • From 0 to 180 ordered Same as above but the reinforcing bars are sorted according to the direction angle of the reinforcing bar: the reinforcing bars with lower angles are first. • From 180 to 0 ordered The reinforcing bars are sorted according to the direction angle of the reinforcing bar: the reinforcing bars with higher angles are first.
First bending angle	Allows setting the first bending angle of free-flection rodstock to be positive or negative (as required by certain interfaces). The options are: • Always positive • Allow positive or negative
Reinforcement types	Select the reinforcing bar types in a mesh to be exported. UDA can also be specified for most of the options. The options are: • Use 1, 2 and 4 • Use 1, 2, 4, 5, 6, 8 and UDA (default) • Use 1, 2, 8 and UDA • Use 1, 2, 4, 8 and UDA • Use 1, 2 and UDA 1 and 2 are for the rods in the bottom face longitudinal and cross bars. With the Use 1, 2 and UDA option, the lowest rebar layer, including all

Option	Description
	bars in the same direction, is exported with rebar type 1, and all other layers are exported as type 2. 5 and 6 are for the rods in the top face longitudinal and cross bars. 4 is for other rebars placed in the element reinforcement. 8 is for loose bars welded into prefabricated meshes. In addition, you can use the option Bottom rebar = type 1 to specify that the reinforcement type 1 rebars will always be the lowest rebars of a mesh regardless of the mesh orientation on the pallet. The options Use 1, 2 and 4 and Use 1, 2, 4, 5, 6, 8 and UDA calculate types 1 and 2 for the main reinforcement according to the layer depth position. The options Use 1, 2, 8 and UDA and Use 1, 2, 4, 8 and UDA are for specific interfaces. By default, they use a logic that has types 1 and 2 assigned by the bar direction in pallet x-/y-axes, not by their depth in z-direction.
Classes for loose rebars (type 8)	Enter the classes of loose reinforcing bars to be collected. The bars are a part of a mesh and are exported as reinforcing bar type 8.
Classes for non-automated rebars	Enter the classes of reinforcing bars to be tagged for non-automated production.
Spacer type	You can add spacer type information to the first layer of the reinforcement (Unitechnik reinforcement type 1). The spacer type is added to the respective spacer type block in the rodstock within the Unitechnik file. The options are: Automatic, rebar type 1: Calculates the spacer type automatically according to the cover thickness. When the reinforcement type is 1 and element is thinner than 100 mm, the spacer type is exported. Automatic, all rebar types: Spacer type is always calculated for each rebar. User defined spacer type: Enter the spacer type to be input in all first layer rebars. No: Leaves 0 as spacer type.

Option	Description
Spacer start position	Enter the first spacer start position from the start point of the rebar, for example, 500 (mm).
Spacer pitch	Select User-defined mapping and enter the spacer pitch value, or select UDA or Template and enter the name of the UDA or template attribute. Enter the spacer pitch value from start point onwards in millimeters, for example, 1000.
Mesh wire layer level	Select how mesh wire levels are calculated. The options are: • Actual level: This is the relative wire level in the model. • By highest level: All wires in the layer are moved to the level of the wire with the highest z position. • By wire size: The relative level of the 2nd layer is written according to the wire size. • Manual: The 2nd layer wire level can be defined manually.
Add mesh stabilizing wires	Select whether to extend reinforcement mesh wires through openings to stabilize the mesh. Use for meshes with large openings.
Stabilization wire max spacing	Enter a value to define the maximum spacing of the wires that stabilize the reinforcement mesh. As a result, the minimum amount of extra wires will be extended within this spacing value from the closest full wire near opening. The stabilization is only done on flat meshes. For more information, see "Mesh stabilization wires" section below.
Meshes sort	Select whether meshes are sorted.
Meshes offset	Select whether the mesh has an offset defined in the STEELMAT block. If the option is set to Yes , the value for X and Y direction is set to zero. If the option is set to No , the X and Y values are exported according to modeled situation.

Mesh stabilization wires

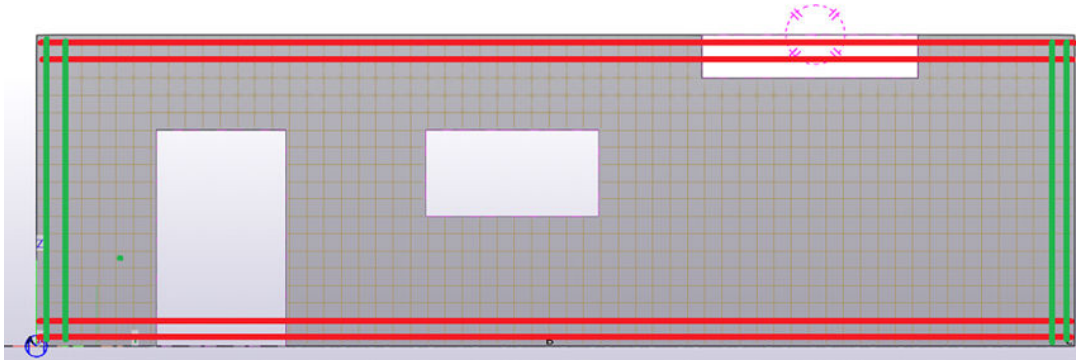
Mesh stabilization wires are added when stabilization wire maximal spacing is specified for the **Stabilization wire max spacing** setting. How the algorithm works is described below:

- First the mesh wires are divided by their orientation. This is done to create three categories: horizontal wires, vertical wires and other wires, which

are neither horizontal nor vertical. Only horizontal and vertical wires are considered for stabilization.

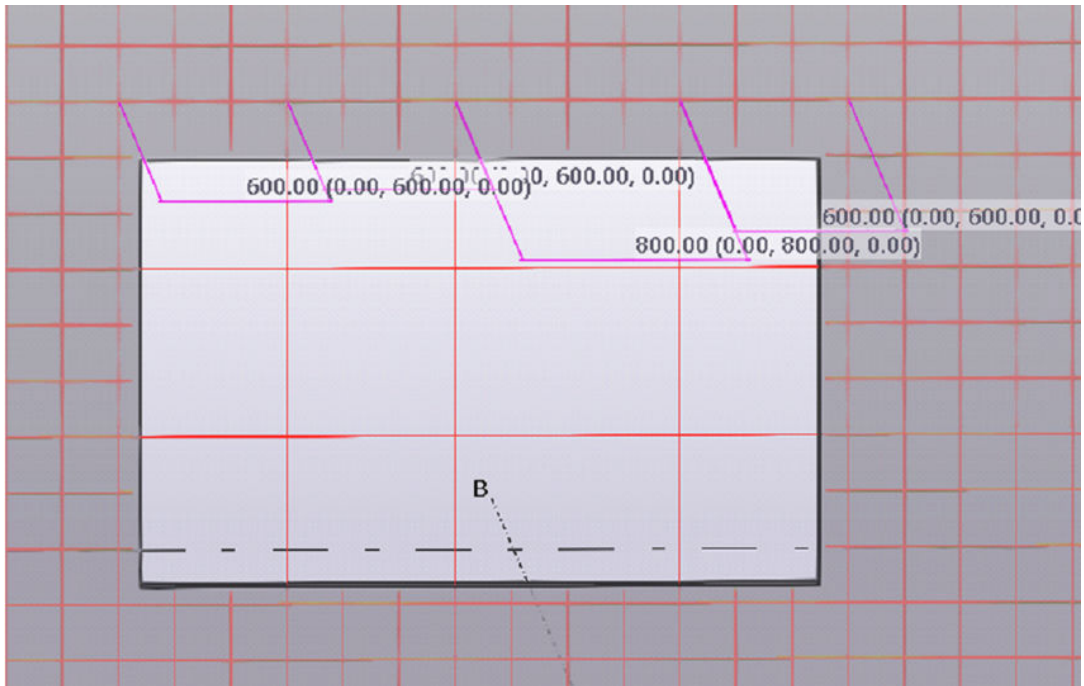
- The second step is to identify the minimum and maximum points of the mesh wires along the horizontal and vertical directions. The two most distant wires in both directions are extended to the full mesh length. In other words, the first two and last two wires are extended to the full length in both directions.

The image below shows this process:



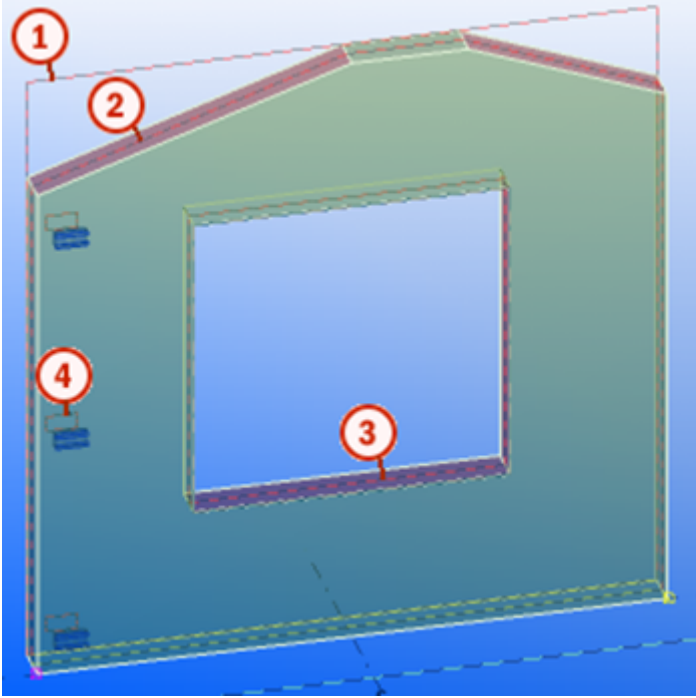
- The third step is to manage the wires at the openings. Maximum spacing is used here. The algorithm determines whether the opening is on the left, middle, or right side of the horizontal or vertical wires. Next, it calculates the width or height of the opening. This depends on whether you are managing the vertical or horizontal wires. The width (or height) is calculated from the last wire that is not cut by the opening to the next wire that is also not cut by the opening. To be clear, we take the wires before and after the cut. The ideal spacing is calculated by dividing the width (height) by the maximum spacing. The ideal spacing will always be the same as or smaller than the maximum spacing, depending on the width (height).

The image below illustrates the result.



Unitechnik export: Validation tab

Option	Description
Draw scanned geometry	The exported geometry can be shown with Draw scanned geometry. Select whether you want to check if the geometry of the exported parts is correct. It shows the lines representing the exported rectangle of the basic shape, the exported geometry of parts, cuts, embeds, and reinforcement. Embeds are projected to the plane of the basic shape. The reinforcement lines are positioned inside each reinforcing bar in bent or in unfolded state depending on the option selected for the setting Bent reinf. as unfolded on the Reinforcement tab.

Option	Description
	 1. Projected area on the pallet 2. Geometry of the main element and the position of the scanning planes 3. Cut geometry 4. Embed geometry and the reference insertion point with the rotation direction Note that this setting might have significant effect on export processing speed.
Draw pallet axis	Select whether to show the coordinate system. The axes are displayed with dotted lines.
Wall to pallet checking	Select whether the export checks the wall size against the pallet size. If you select the Yes, if exceeded, do not export option, the Pallet width , Pallet length , and Max. cast unit thickness options cannot be empty.
Max. cast unit thickness	Define the maximum cast unit thickness. To avoid collision with the drying chamber, the maximum thickness of a cast unit should be smaller than the maximum opening of the drying chamber.
Rebar diameter limitation	Minimum and maximum diameter for the reinforcing bars to be exported.

Option	Description
Rebar length limitation	Minimum and maximum length for the reinforcing bars to be exported.
Rebar leg length limitation	Minimum and maximum length for individual leg section within a bent rebar to be exported.
Mesh wire length limitation (Long)	Minimum and maximum diameter for longitudinal reinforcing bars to be exported.
Mesh wire length limitation (Cross)	Minimum and maximum length for cross reinforcing bars inside a mesh to be exported.
Mesh wire leg length limitation	Minimum and maximum length for individual leg section within a bent mesh wire to be exported.
Mesh wire overhang limitation	Minimum and maximum length for mesh wire overhang section before the first cross-wire welding point and after the last cross-wire welding point to be exported.
Mesh wire spacing limitation	Allowed spacing values for mesh wires separated by blank space to be exported. If no value added, there is no limitation for spacing.
Export others	These operations are intended for objects that fail the validation: • Remove invalid mesh wires: Only exclude invalid mesh wires and not the whole mesh when some of the mesh wires fail the validation. • Yes, as loose (type 4 or 8): Export invalid rebars as loose rebars of type 4 or 8. • Yes, ignore limitation: The diameter and length limitations are ignored. • Yes, as non-automated: Export non-valid rebars as non-automated. • Prevent export • Exclude all: Exclude the whole mesh from the export if any of the wires fail the validation. When a rebar fails the validation, you are notified by a log message.

Unitechnik export: Reinforcement data tab

In the column on the right, enter the custom or UDA string when applicable. On this tab, you can add data attributes only, no geometric attributes. The information you add controls the reinforcement unit data (single reinforcement, mesh, braced girder, or cage). The attributes are either optional

or obligatory. The length of some of the fields may be limited in the UT format, so keep the strings short.

Depending on the setting, the following attributes can be added: **Name, Grade, Class, Rebar ID, Mesh ID, Mesh position, UDA, UDA (main part), UDA (rebar), Part UDA, Main part UDA, Phase, User-defined text, User-defined text + class, Template, and Text[Template]#Counter.**

Text[Template]#Counter:

- Text can be any text including punctuation marks.
- Write templates in brackets [].
- # adds a running number if the data content is the same in several entries.
- To remove the # symbol from the output, enclose the # symbol in parenthesis (#) in the string that you enter.
- You can enter several templates and use text delimiters, for example, [ASSEMBLY_POS]-[REBAR_POS].
- If you start the **Text[Template]#Counter** with a template, add a space as the first character before the bracket.
- Template attributes are read from the single reinforcement, mesh, braced girder, or cage.
- You can also use attributes that refer to another hierarchy level, for example, the assembly UDA of the rebar.
- You can use <VALUE> to inquire a part UDA and {VALUE} to inquire an assembly UDA. This makes it possible to use a shorter string instead of having to use a template property to designate UDAs.
- Data field and file name options with #Counter logic keep the counter series separate from each other when necessary. Only objects with the same object type and matching data string as a base are put into the same counter series. For data fields other than HEADER block fields, these counter series are also distinct within each export file and data section.

Option	Description
Rebars: Article number rebar	Select which property you want to export as a reinforcing bar article number for rebars.
Rebars: Article number mesh	Select which property you want to export as a mesh article number for rebars.
Meshes: Article number rebar	Select which property you want to export as a reinforcing bar article number for meshes.
Meshes: Article number mesh	Select which property you want to export as a mesh article number for meshes.
Meshes: Meshes designation	Select the information that you want to export about the meshes.

Option	Description
Mesher: Info 1 text (UT 6.0)	Information field is filled with the selected data.
Mesher: Info 2 text (UT 6.0)	Information field is filled with the selected data.
Welded leg designation	Designate the welded leg in bent mesh bars if there is only one leg that is welded to cross-wires.. When you select Yes , information about welded leg designation is exported.
Strands (UT 6.0): Pull force (KN)	You can now use main part UDA (UDA (main part)) or rebar UDA (UDA (rebar)) to include strand pull force information in the Unitechnik export. Selecting Empty does not export the strand pull force information. This setting only works for rebars that are set to type 9 in the Unitechnik reinforcement type box on the Unitechnik tab in the user-defined properties of the rebars.
BRGIRDER block: Braced girder type	Select the string value of girder type field in the BRGIRDER block in the exported file. • Empty No string is exported. • Name The name of the braced girder type is exported. If the name of the top part of a braced girder is empty, the names of the rods are checked. • UDA You can export the user-defined attribute values for a braced girder type (<i>type</i>), braced girder article number (<i>art_number</i>), or braced girder fabricator name (<i>fabricator</i>). The UDAs can be added to the braced girder if the parts have been created using the system component Braced girder (88) or Braced girder (89) and you have entered the needed values on the dialogs of the components. • User defined text The value you enter in the box next to this option is exported.
CAGE BLOCK: Cage designation	Select the information that you want to export about the the cage in the CAGE block (UT 6.1).

Option	Description
CAGE BLOCK: Base cage shape	Select the information that you want to show as base cage shape.
CAGE BLOCK: Info 1 text	Information field is filled with the selected data.
CAGE BLOCK: Info 2 text	Information field is filled with the selected data.
Definition file	Use an external definition file to overwrite type and designation information, which is usually determined automatically from model objects. The definition file is a .csv file, with a fixed structure. The definition file can also be read from folders defined for XS_FIRM and XS_PROJECT. An example of the UT_rebar_info.csv definition file is provided below.

Example of UT_rebar_info.csv

```
// Definition file to control exported reinforcement information.;;;
// The first rows have priority over subsequent ones.;;;
// The first field will be used to search model objects using name,
// class or material, and the other fields will write the field content to
// exported data fields.;;;
// Use []for searching class, and {} for material.;;;
// Use * for wild card within the searched string.;;;
// Leave data field value blank, if it should not be overwritten.;;;
;;;
#MESH;Mesh type;Mesh designation;Automatic production;
[11];0;Custom mesh;1;
[15];8;Stock mesh;0;
;;;
#BARS;Rebar type;Article number;Automatic production;
[14];2;;;
[13];1;;;
;;;
#GIRDERS;Girder type;Description;Automatic production;Height
[100];1;;;
```

Unitechnik export: HEADER block data tab

In the column on the right, enter the custom or UDA string, when applicable. On this tab, you can add data attributes only, no geometric attributes. The attributes are either optional or obligatory. The length of some of the fields may be limited in the UT format, so keep the strings short.

Depending on the setting, the following attributes can be added:

Project number, Project name, Cast unit position, Cast unit position code, Assembly control number (ACN), Cast unit ID, Cast unit prefix (2 digits), Cast unit drawing revision mark, Project properties - name, Project properties - address, File name with extension, File name without extension, Tekla Structures version, Main part ID, Project UDA, Main part

UDA, Main part UDA (UT_product_code), Phase, User-defined text, User name, Main part template, Template and Text[Template]#Counter.

Text[Template]#Counter:

- Text can be any text including punctuation marks.
- Write templates in brackets [].
- # adds a running number if the data content is the same in several entries.
- To remove the # symbol from the output, enclose the # symbol in parenthesis (#) in the string that you enter.
- You can enter several templates and use text delimiters.
- If you start the **Text[Template]#Counter** with a template, add a space as the first character before the bracket.
- Template attributes are read from the main part.
- You can also use attributes that refer to another hierarchy level.
- You can use <VALUE> to inquire a part UDA and {VALUE} to inquire an assembly UDA. This makes it possible to use a shorter string instead of having to use a template property to designate UDAs.
- Data field and file name options with #Counter logic keep the counter series separate from each other when necessary. Only objects with the same object type and matching data string as a base are put into the same counter series. For data fields other than HEADER block fields, these counter series are also distinct within each export file and data section.

Option	Description
Name of order	Order fields in the HEADER block are filled with the selected data. File name sections: Specify a string consisting of numbers referring to the 6 sections of the exported file name mask that are specified on the Main tab. You can type numbers 1 to 6, and delimiters , . _ and - in the free input field to export any combination of strings used in the file name, in any order. For example, 1-2-3, or 2_5_6.
Name of component	Component fields in the HEADER block are filled with the selected data.
Drawing number	Drawing number fields in the HEADER block are filled with the selected data. File name sections: Specify a string consisting of numbers referring to the 6 sections of the exported file name mask that are specified on the Main tab. You can type numbers 1 to 6, and delimiters , . _ and - in the free input field to export

Option	Description
	any combination of strings used in the file name, in any order. For example, 1-2-3, or 2_5_6.
Drawing revision	Drawing revision fields in the HEADER block are filled with the selected data and drawing revision mark is exported.
Product code	Product code fields in the HEADER block are filled with the selected data.
Project line1 text - Project line4 text	Project information fields (3rd line) in the HEADER block are filled with the selected data.
File creator (UT 6.0)	You can select to export the Tekla Structures version information, use name or user-defined text in the HEADER block.
Free field (UT 5.2)	Only for Unitechnik 5.2. You can select to export the following information to the HEADER block: user name, user-defined text, file name with extension, file name without extension, or model name.
Building site - name	Name of the building site.
Building site - street	Street address of the building site.
Building site - post code	Postal code of the building site.
Building site - place	City or town where the building site is located.
Building owner - name	Name of the building owner.
Building owner - street	Street address of the building owner.
Building owner - post code	Postal code of the building owner.
Building owner - place	City or town where the building owner street address is located.
Data field template units: No. of digits after decimal point	Specify the number of decimals after the decimal separator in data field template units.

Unitechnik export: SLABDATE block data tab

In the column on the right, enter the custom or UDA string, when applicable. On this tab, you can add data attributes only, no geometric attributes. The attributes are either optional or obligatory. The length of some of the fields may be limited in the UT format, so keep the strings short.

Depending on the setting, the following attributes can be added: **Counter, Cast unit number, Cast unit position, Part position, Part number, Part name, Cast unit position code, Cast unit name, Cast unit GUID, Assembly control number (ACN), Cast unit ID, Cast unit prefix, Cast unit thickness, Concrete part thickness, Cast unit width, Concrete part width, Main part**

thickness, Main part ID, Main part GUID, Main part UDA, Material, Name, UDA, User-defined text, Phase, Total quantity of part, Main part template, Part weight, Unit weight, Cast unit weight, Template, Template (shell main part), and Text[Template]#Counter.

Template (shell main part): Reads data from the respective double wall shell.

Main part template: Reads data from the double wall level 1 main part.

Text[Template]#Counter:

- Text can be any text including punctuation marks.
- Write templates in brackets [].
- # adds a running number if the data content is the same in several entries.
- To remove the # symbol from the output, enclose the # symbol in parenthesis (#) in the string that you enter.
- You can enter several templates and use text delimiters.
- If you start the **Text[Template]#Counter** with a template, add a space as the first character before the bracket.
- Template attributes are read from the main part.
- You can also use attributes that refer to another hierarchy level.
- You can use <VALUE> to inquire a part UDA and {VALUE} to inquire an assembly UDA. This makes it possible to use a shorter string instead of having to use a template property to designate UDAs.
- Data field and file name options with #Counter logic keep the counter series separate from each other when necessary. Only objects with the same object type and matching data string as a base are put into the same counter series. For data fields other than HEADER block fields, these counter series are also distinct within each export file and data section.

Option	Description
Slab number	Slab number field in the <code>SLABDATE</code> blocks is filled with the selected data. File name sections: Specify a string consisting of numbers referring to the 6 sections of the exported file name mask that are specified on the Main tab. You can type numbers 1 to 6, and delimiters , . _ and - in the free input field to export any combination of strings used in the file name, in any order. For example, 1-2-3, or 2_5_6.
Unloading type	Specify the unloading type. The options are: • Lying • Tilting table

Option	Description
	• Main part UDA You can override this setting on the Unitechnik tab for precast concrete parts, which overrides the export dialog box setting.
Transport type	Export the means of transportation information. You can override this setting on the Unitechnik tab for precast concrete parts, which overrides the export dialog box setting.
Transport unit number, Transport sequence number	Define a value for the transport unit and sequence numbers in the <code>SLABDATE</code> blocks. This can be defined in the part UDAs.
Transport pile level number	Specify the transport pile level number in the <code>SLABDATE</code> blocks. If there are elements in the stack that need to be layered on the same level, then the pile level is used. For example, you may have a pile of 6 slabs, and they each have sequential pile level numbers 1, 2, 3.. 6. This can be defined in the part UDAs.
Exposure class	Export exposition class. You can select to read from part UDAs or use another option.
Total thickness	Select which value will be exported as total thickness. The options are Cast unit thickness, Concrete part thickness, Main part thickness, Template, and Double wall width. Double wall width is the same as the Cast unit thickness but it is always inquired from the main cast unit, regardless of how it is modeled. Then the 2nd shell will also receive total cast unit width.
Production thickness	Calculates the production thickness in <code>SLABDATE</code> block based on cast unit width, concrete part width or double wall width. Double wall width is the same as the Cast unit width but it is always inquired from the main cast unit, regardless of how it is modeled. Then the 2nd shell will also receive total cast unit width. When you export double walls: With the option Cast unit width the cast unit thickness is exported for both shells.

Option	Description
Export shell gap width	Controls or disables the export of the gap width value. The options are: • No: No gap is exported. • Double walls only: The gap is exported only for double walls. This is the default option, as the value should only be used with double walls in most control systems. • Layered panels: The gap is exported for all panels with multiple concrete layers, such as double walls and sandwich walls.
Production weight	Set the type of the SLABDATE weight. The options are Part weight , Unit weight , Cast unit weight , and Template .
Concrete volume	Set the type of the volume. You can select concrete part or specify a user-defined concrete volume template property.
Maximum dimensions	Specify how the SLABDATE maximum part length and width are exported. The options are: • Main part bounding box (default): Checks the main part geometry • Cast unit bounding box: Checks the entire cast unit geometry, including all protruding embeds • Scanned contour: Checks all contour polygons • Scanned all parts: Checks all contour and embed polygons
Iron protection	Export iron projection data. The values are automatically determined from the reinforcement length that extends outside the element.
Quality of layer	Set the quality of the slabdate. The options are name, template, material and UDA.
Item designation	Designate data about the exported element.
Info 1 text (UT 6.0) - Info 4 text (UT 6.0)	Information fields (1 - 4) in the SLABDATE and MOUNPART blocks are filled with the selected data.
Export project coordinates	Select how you want to export project coordinates. The options are: No Yes, model origin: Use model origin. Yes, with swapped X-axis and Y-axis: Swap X-axis and Y-axis.

Option	Description
	Yes, special variant A (version 5.2b): Export Unitechnik files that are compatible with the IDAT stacker software. This is only available for the 5.2b version of Unitechnik. Yes, project base point: Use project base point. Yes, current base point: Use the base point currently selected in the model.
Export quantity	You can export element quantity in the SLABDATE block. If the exported sets have multiple cast units, they will have their quantity marked in the SLABDATE reference number field. The export sets are defined by the file name definition or cast unit position. The options are: • No: 000 written in the field (default) • Always 1: 001 written in the field regardless if the files names are unique or not • From selection: If the cast units in the export selection would have identical file names, they will be exported with only 1 file, and the total quantity of the set is written in the field • From total in model: The total quantity of the cast units with identical position anywhere in the model is written in the field

Unitechnik export: MOUNPART block data tab

On this tab, you can add data attributes only, no geometric attributes. The attributes are either optional or obligatory. The length of some of the fields may be limited in the UT format, so keep the strings short.

How to use **Text[Template]#Counter**:

- Text can be any text including punctuation marks.
- Write templates in brackets [].
- # adds a running number if the data content is the same in several entries.
- To remove the # symbol from the output, enclose the # symbol in parenthesis (#) in the string that you enter.
- You can enter several templates and use text delimiters.
- If you start the **Text[Template]#Counter** with a template, add a space as the first character before the bracket.
- Template attributes are read from the main part of the embed assembly.
- You can also use attributes that refer to another hierarchy level.

- You can use <VALUE> to inquire a part UDA and {VALUE} to inquire an assembly UDA. This makes it possible to use a shorter string instead of having to use a template property to designate UDAs.
- Data field and file name options with #Counter logic keep the counter series separate from each other when necessary. Only objects with the same object type and matching data string as a base are put into the same counter series. For data fields other than HEADER block fields, these counter series are also distinct within each export file and data section.

NOTE Steel parts have a tab **Unitechnik Mountpart**, where you can specify data which then overwrites the settings defined on the **MOUNTPART block data** tab.

When specifying object names: If names consist of several words, enclose those in quotation marks and use spaces between words, for example, "WORD1 WORD2".

For several options, you need to specify the related value in the **Custom UDA or string** field.

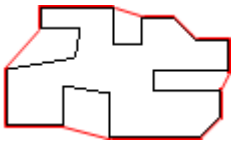
Option	Description
Type of mounting part	You can define the type of mounting part in the MOUNTPART block by UDA, class or name.
Installation type	Specify the installation type of the embed by defining a UDA, class, name or user-defined text.
Reference number	You can define the reference number of a mounting part in the MOUNTPART block by UDA.
Mountpart name	Define the MOUNTPART name using one of the available options.
Insulation name	Specify a different mountpart name source for the insulation.
Cut mountpart name	Specify a different mountpart name source for the cut part mountparts.
Info 1 text (UT 6.0)	Information field is filled with the selected data.
Info 2 text (UT 6.0)	Information field is filled with the selected data.

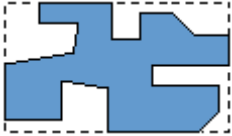
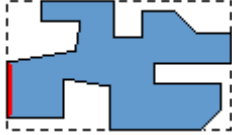
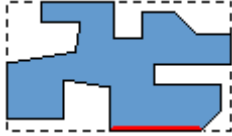
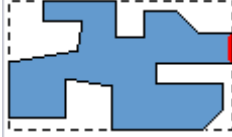
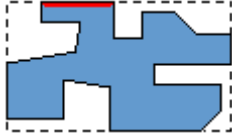
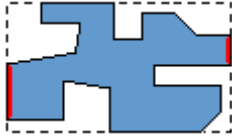
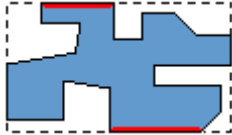
Unitechnik export: Line attributes tab

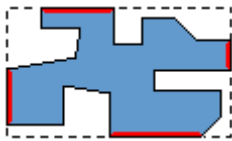
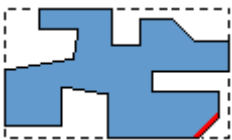
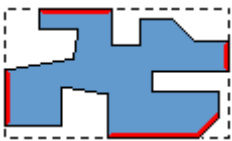
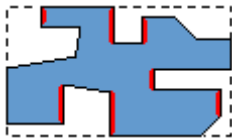
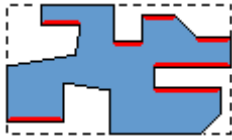
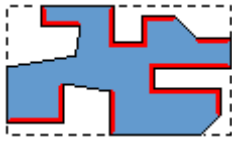
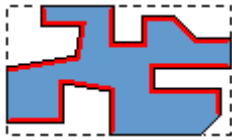
Line attributes are exported automatically according to the element and opening edge shape. If the factory does not use Unitechnik standard line attribute codes, you can override these exported codes. Sometimes line

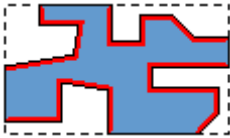
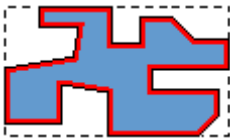
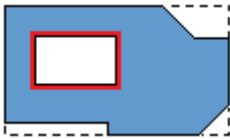
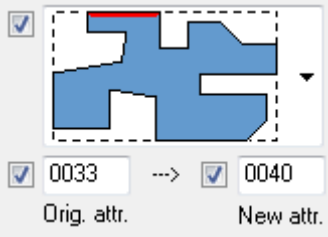
attribute values that are exported in the Unitechnik files are not suitable for the particular situation. For example, to preserve lightness in the model or extensive product standardization, you might have fewer chamfers in the model than there will be in the actual structure. For this reason, you might want to override some line attributes in the export so that the model remains light, but the exported Unitechnik files are correct. You can do this by using the options on the **Line attributes** tab.

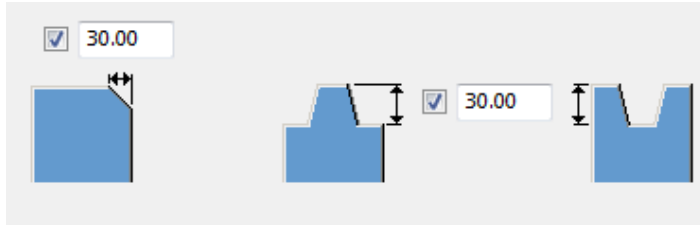
NOTE When specifying object names: If names consist of several words, enclose those in quotation marks and use spaces between words, for example, "WORD1 WORD2".

Option	Description
Export line attributes for contour	Select whether the line attribute values are used for contours (Export line attributes for contour) or for holes (Export line attributes for cutouts) in the export. • None Line attribute values are not used. • All lines Line attribute values are used for all lines. • Outmost lines only Line attribute values are used only for the outermost lines in the part:  This option is available only for contours.
Override scanned line attributes	Limit the override to specific cases. The options are All, Rotated, Not rotated, First shell and Second shell. The first option affects the 3 override settings above, and the second option affects the 3 settings below. Rotated and Not rotated apply to all rotations in XY direction, manual and automatic.
Border line overriding	You can enter up to six border line modifications in the line attribute export.

Option	Description
	 No border lines are overridden.
	 Vertical outermost border lines at the start are overridden.
	 Horizontal outermost border lines at the bottom are overridden.
	 Vertical outermost border lines at the end are overridden.
	 Horizontal outermost border lines at the top are overridden.
	 Vertical outermost border lines are overridden.
	 Horizontal outermost border lines are overridden.

Option	Description
	 Horizontal and vertical outermost border lines are overridden.
	 All inclined outermost border lines are overridden.
	 All outermost border lines are overridden.
	 All vertical border lines, except the outermost border lines are overridden.
	 All horizontal border lines, except the outermost border lines are overridden.
	 All vertical and horizontal border lines except the outermost border lines are overridden.
	 All border lines except outermost border lines are overridden.

Option	Description
	 All border lines except the horizontal and vertical outermost border lines are overridden.
	 All border lines are overridden.
	 Scanned <code>CUTOUT</code> line attributes are overridden. This affects window openings, for example.
Orig. attr. , New attr.	Define the original attribute (Orig. attr.) and the attribute that will be used in the export (New attr.). In the example below the horizontal outermost border line at the top would get a line attribute value <code>0033</code> originally, but the value will be overridden, and the line attribute value in the Unitechnik file will be <code>0040</code>. 
Special formwork for object (classes or names)	Specify a special formwork object using a class or a name. The edge of the exported contour with this specified object will then be exported with code <code>0002</code> by default. This setting also works for reinforcement. In Attribute code, you can specify a custom line attribute code for special formwork for an object.
Export line attributes for cutouts	Select whether all line attributes are exported for openings.

Option	Description
Max, Min	The width of the chamfer is max 30 mm and the depth of the tongue and groove max 30 mm. If not within the tolerance, they are handled as special formwork 0002. 
Export angle of 1st and last vertical border	Select whether you want to export the angle of cut at the first and last vertical border.
Edge chamfer splits line	Split the edge of the exported contour to have more line attributes exported for one edge.

Unitechnik export: Pallet tab

Option	Description
Pallet width Pallet length	Define the pallet width and length. On the basis of the pallet width and length, the Wall to pallet checking option on the Validation tab is able to check if a wall element is too big to fit to a pallet. If the wall element does not fit to a pallet, the wall element is turned.
Cast unit dimensions	Specify how the overall dimensions of the cast unit are calculated. The options are: All elements: All elements are considered when calculating the overall dimensions. Only concrete elements: Only concrete elements are considered when calculating the overall dimensions.
Placing on pallet	Define if the placing is checked from the start or end of the pallet.
X offset at start or end	Define if the X offset at start or end of the pallet is checked.
Align in Y axis	Align elements in Y direction. You can select whether to align • element upper edge to pallet upper edge • element upper edge to pallet center line • element center line to pallet center line

Option	Description
	• element lower edge to pallet center line • element lower edge to pallet lower edge • element to the center of the pallet in Y direction
Y offset from alignment	Specify the Y offset of elements on the pallet.
Clearance between cast units	Define the clearance between the cast units.
Same cast unit thickness needed	Define whether the cast unit thickness is checked.
Sequence in pallet Sequence order	When you have selected Combined, n slabdate, 1 part as the output file structure on the Main tab, you can select the logic of sequencing panels on pallet using main part or cast unit ACN or number, main part UDA or main part template, or Unitechnik transport UDAs. You can set the sequence as Ascending or Descending .

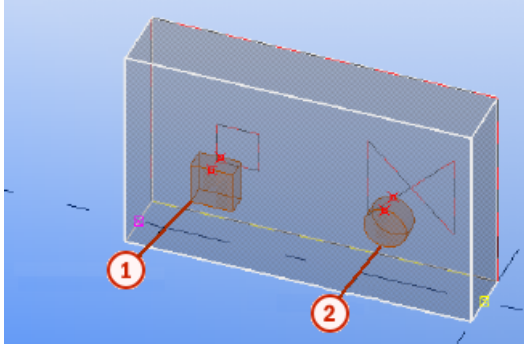
Unitechnik export: Symbols tab

Configure the details of mountpart symbols and symbols for braced girders used in the export.

Setting	Description
Special assemblies export Special export assembly file name	The options are No, Yes, (spec_assemblies_def.txt), and Yes, no rotation on pallet. The options affect the exported geometry of the embeds. The real geometry is replaced by the geometry defined in text files. Each embed is defined as a symbol consisting of a set of lines, a set of arcs, or a circle. The default name of the text file is <code>spec_assemblies_def.txt</code>, and is searched for in the model folder. Use Special export assembly file name to define the name and the location of the text file. The special export assembly file name can also be read from folders defined for XS_FIRM and XS_PROJECT. Special assembly symbol definition file supports embed template properties and its values or embed

Setting	Description
	names that have blank spaces. Embed template property values or embed names have to be enclosed in quotation marks. By default, the symbol definitions are mapped according to the exported embed designations. Designation can be any part property, which is controlled on the MOUNPART block data tab with the Mountpart name setting. The required structure of the text file is written in distinct rows, and the first row has to have the number of subsequent lines defining the geometry: • Designation(text) Number_of_lines_defined(number) • S(representing single line) Start_coors-X,Y (number number) End_coors-X,Y(number number) • S(representing single line) Start_coors-X,Y(number number) End_coors-X,Y(number number) Example of the file: <pre> Quicky 4 S -100 100 100 -100 S 100 100 -100 -100 S -100 -100 100 -100 S -100 100 100 100 QuickyS 2 S -50 0 50 0 S 0 -50 0 50 E-Doze 2 S -100 100 100 100 S 0 -100 0 0 </pre> You can use S for a line, K for a circle, and B for an arc, and the coordinates

Setting	Description
	are related to the embed insertion point. A line is defined with 4 coordinates, start (X,Y), end (X,Y). Example: S -50 -50 50 50 A circle is defined with one radius value around the insertion coordinate. Example: K 100 An arc is defined with a radius value and relative start and end angles, with 0 angle pointing towards positive X direction, and increases counter-clockwise. Embeds in special assembly symbol definition file can also be designated by template property and its value in format [TEMPLATE:VALUE] instead of the exported embed designation. Example of using template property: <pre> [CLASS_ATTR:101] 2 S -50 -50 -50 50 S 50 0 150 0 [CLASS_ATTR:102] 2 S -50 -50 -50 50 S -50 0 -150 0 [CLASS_ATTR:103] 3 S -50 -50 -50 50 S 50 0 150 0 S -50 0 -150 0 [ASSEMBLY_PREFIX:JV] 2 S -75 -50 -75 50 S 75 0 175 0 </pre> The geometry of all embeds (from example with designations Quicky, QuickyS, E-Doze) are replaced by geometry defined in the text file. In the following example, the part number 1 (the name is Beam) was not found in the text file so the geometry is exported according to default settings from export dialog. On the opposite side the part number 2 (the name is Quicky) was found, so the geometry is replaced.

Setting	Description
	 You can also define the def export code, insertion point logic and embed z-positioning on the first definition row: <pre> Designation(text) Number_of_lines_defined(number) Def_export_code(number, see above) Insertion_position(number 1-5) z-position (PALLET / BOTTOM / MIDDLE) </pre> To specify the insertion point position of embeds in using the <code>spec_assemblies_def.txt</code> file: 1 = Subassembly center of gravity 2 = Subassembly bounding box center of gravity 3 = Main part center of gravity 4 = Extended main part center of gravity 5 = Main part bounding box center of gravity If you select Yes, no rotation on pallet, the embed symbols are placed according to the panel rotation, but the symbols themselves are not rotated.
Special embeds	Class or name list When defining special embeds as names, and object names consist of several words, enclose those in quotation marks and use

Setting	Description
	spaces between words, for example, "WORD1 WORD2".
Opening with corner symbols	Specify classes or names of parts or cut parts for openings that will be exported with corner symbols instead of mountpart representation.
All cutouts as corner symbols	Export rectangular cutouts as 4 corner symbol mount parts by defining the classes or names. You can define the size of the symbol in the dialog box.
Cutpart former	Specify a representation for the exported cutpart formers. The options are Default , As corner symbols and As centerline .
Draw girder width symbol	Specify if the braced girders exported with end symbol mountpart should also have a line representing the girder width.
Draw girder in second shell	Specify if the braced girders should be exported in the second shell of the double wall. You can also specify the length of the longitudinal line.

Unitechnik export: Log files tab

Option	Description
Log file directory path	Define the path for a log file. If the path is empty, then the log file is saved in the same location as the export files.
Create main Log file	Select whether to create a one main log file.
Create Log file for each file	Select whether a log file is created separately for each export file.
Write history to log file and UDA	Create a log file containing the history of the exported parts. You can also select to write the information to the UDA <code>UT_export_history</code> of the main part. The following data is gathered: export time, part information, export path and file, and who has performed the export.
Show error dialogs	Select whether an error message is shown, for example, when exported parts are not numbered correctly or when the embedded parts have no parent part.

Option	Description
Write file name to UDA	Select to write the full export file name (File name with extension) or the export file name without the file name extension (File name without extension) to hidden main part UDA UT_FILE_NAME.

Best practices in modeling, validating and exporting for Unitechnik

The following guidance helps you to ensure the best possible result from the BVBS export.

For exact instructions on the Unitechnik export, export settings, and on other related topics, see [Unitechnik \(page 448\)](#).

Pre-research

Before you start modeling, find out the following:

- What are the fabrication requirements and constraints?
- What is the complexity level of the products?
- What information is desired from the model?
 - Production geometry for reinforcement mesh, loose rebars, embeds
 - Project and product attributes
- What Unitechnik versions does the CAM system support?

Before your first project:

- Model a test model with each of the typical products.
- Choose your modeling components and modeling settings.
- Test the Unitechnik export with each of the typical products and draft suitable settings.
- Draft a company modeling guideline for collecting the information about modeling, drawing creation, export and other practices in one place.

Modeling

General

Designers should aim to model with good precision taking into account the fabrication requirements of the products. The required level of accuracy varies from product to product, and some details need to have exactly correct geometry whereas others can be included as attributes that will be sufficient for production purposes.

As production only needs certain amount of information, some data needs to be in drawings that will not be used within the export files and vice versa. The goal is to have an error free model, which is modeled in a disciplined and

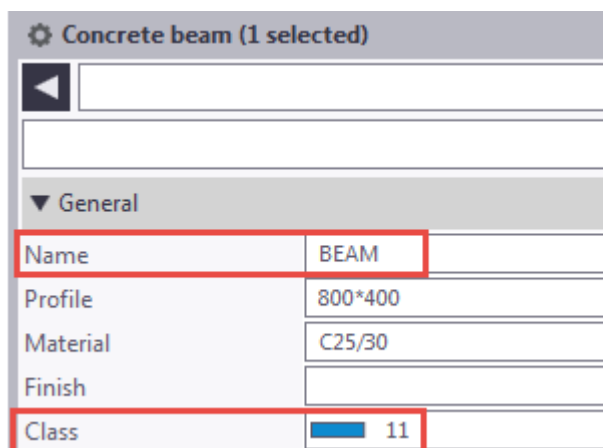
structured fashion so that it will be easy to include or exclude information in both drawing and export file creation. All information will be used by production, and therefore it is very important to have correct information, because also export might be prevented if data is missing (such as material data or other). Any mistakes are hard to notice until the actual production stage.

Additional information can be brought to both the drawing and production file using user-defined attributes (UDAs), which can be within each object, or on the project level. UDAs are defined on the **HEADER block data specification**, **SLABDATE block data specification**, **Mounting part data specification** and **Reinf. data specification** tabs in the export dialog. Some mandatory fields have to be filled as agreed, such as project number, product type and drawing number, otherwise import is prevented. For more information about the different tabs, see [Unitechnik \(page 448\)](#).

The best practice is to:

1. Finalize the detailing of a product.
2. Do a test export of the product with ready-made setting (for that product type) and inspect the resulting file and make any adjustments if necessary.
3. Create the drawing and edit it.
4. Finalize the drawing and send the drawing and a production file to a team member for approval.
5. Later on a designated person will send the production files in suitable sets.
6. Control the design status on object-level within the model to keep track of design, approval and changes, as well as the export files sets.

Object geometry will be used for plotting and shuttering as well as fabricating the mesh, and cutting and bending the reinforcement. Each object type should have a distinct NAME and CLASS setting, to later control the export content.



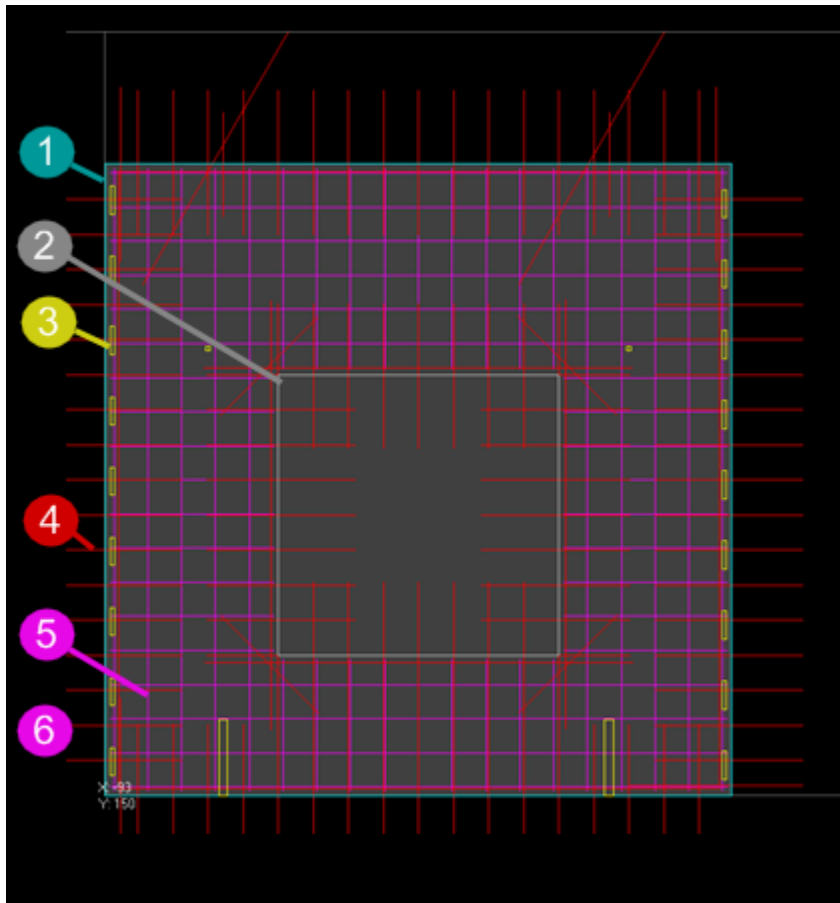
Concrete beam (1 selected)	
▼ General	
Name	BEAM
Profile	800*400
Material	C25/30
Finish	
Class	 11

In the model objects are represented hierarchically. This means that the object to be exported is a cast unit and within the cast unit there is the concrete main part. Other parts or reinforcement can be attached to the main part directly,

or by first formulating a sub-assembly, which will have its own hierarchy and main part.

Unitechnik geometric objects

The 3D Tekla Structures objects are translated to suit the Unitechnik format.



(1) Contour

(2) Cutout

(3) Mountpart (embed)

(4) Rodstock (rebar)

(5) Steelmat (mesh)

(6) BGrinder (braced girder)

Contour and openings

Each object should have unified contour. There may be openings through the element.

More than one contour causes problems for plotting the contour and placing the shuttering. Having more than one contour is usually unintended, and caused by either having a concrete part that has not been designated as an

embed, or the contour scanning resulting in two separate objects due to a cut or recess.

The orientation of the object and contour is controlled by the modeling direction, using the top-in-form setting within the model and the various settings within the export dialog. Setting the top-in-form in the model is important because that is how Tekla Structures understands how the object will be produced, which affects both the export file and the drawings. As a rule of thumb, slabs and panels should be laid out on their wide face, with no extending parts or rebars towards the pallet, and any embeds and gaps that require additional filler pieces against the pallet. These filler embeds should have 0 weight and should be excluded from drawings and volume calculations.

If the edge has a shape that needs to be identified for a shuttering robot, this is indicated by using line attribute codes (for chamfers, recesses or teeth). These should be modeled using ready-made components, chamfers or cuts. These will always be in the geometrical object's contour and cutout. In export, they can be mapped automatically according to the Unitechnik standard, or you can set an automatic override in the export.

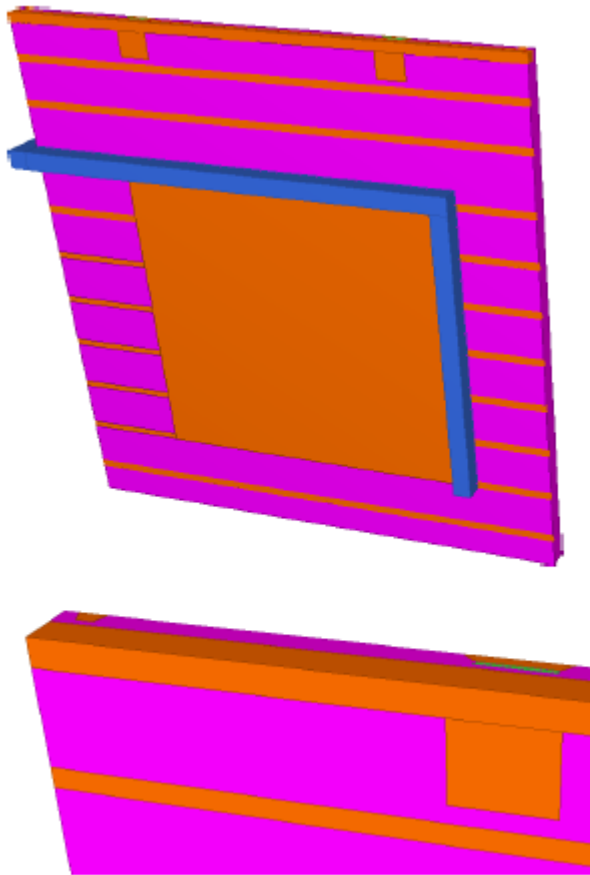
In the usual case, CUTOUT represents a full-depth opening, while recesses in the face are represented by embeds, MOUNPART.

For elements with standardized shape, such as pre-stressed slabs, the profile can be included as attribute information.

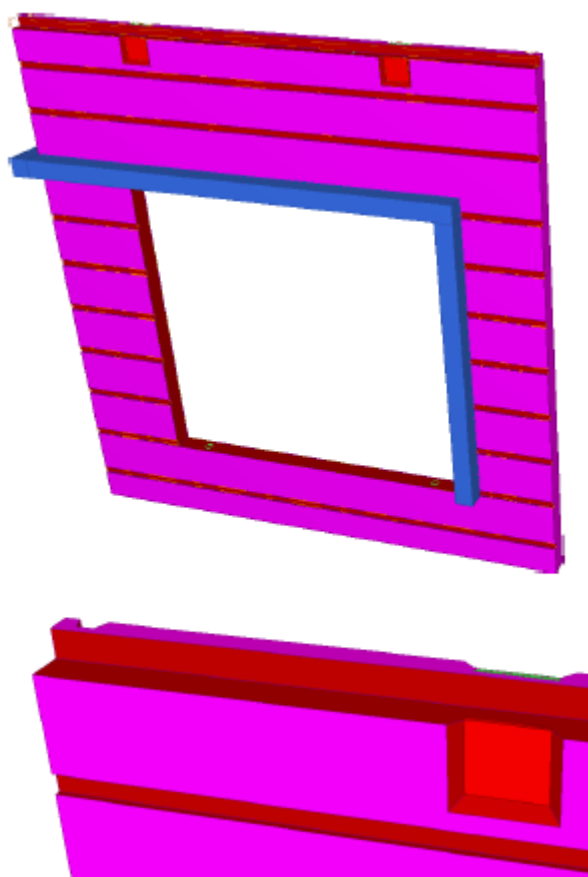
Controlling the contour in the model is done by having an object profile, which will be extruded to create the main part geometry. This basic geometry can then be adjusted by using cuts within the model. Each cut should have a distinct class or part set, so including and excluding them in export geometry can be adjusted later. We recommend that you model any cuts or filler embeds with systematic orientation, and for example, start and end handles should also be modeled in the panel length direction.

The initial cut parts are to be added to the cast unit, knowing that they will be listed on reports and shown on drawings. To exclude these purely production related elements from reports and drawings use filters and rules.

In the example below the initial cut parts were kept and added to the cast unit. The cut part name is set to "FORMWORK", the class is 111 (orange), and the material name is Zero_weight.



The following example shows exactly the same wall panel, but without the formwork parts – they have been filtered out.



Example chart of classes for modeling cuts (Cut included = as CUTOUT, mounpart included = as MOUNPART):

Type of cut	Modeled	Exported
Window opening	Cut with class 601 (component)	Cut included
Door opening	Cut with class 601 (component)	Cut included
Other opening through the element	Cut with class 601 (component)	Cut included
Rectangular recess in the middle of element	Cut with class 602, filler embed part with class	Cut excluded, filler mounpart included
Rectangular recess on the contour	Cut with class 602, filler embed part with class	Cut excluded, filler mounpart included
Non-rectangular recess	Cut with class 602, filler embed part with class	Cut excluded, filler mounpart included
Cuts around embed components	Cut with class 602	Cut excluded
Chamfer on the edge	Chamfer or cut with class 603	As line attribute

Type of cut	Modeled	Exported
Groove or tongue shape on the edge	Cut with class 603 (component)	As line attribute

Embeds

Embeds are presented as mountparts. Steel plates for connections, lifting embeds, electric boxes or grout tubes are examples of mountparts. Each embed should be added as a sub-assembly to the main cast unit. Embeds are usually modeled with ready-made components, and it is important to check that the tools have correct materials and attributes, and that the embed hierarchy is correct. Embeds should be classified by a distinct class (recommended 100 - 109 , other steel parts as 99). Steel parts can also be recognized automatically.

- There are various options available for presenting the embeds: exact geometry, a bounding box or a symbol.
- Embeds modeled as rebars can be turned into mountparts.
- Small cuts within the embed modeling components should usually be excluded, which can be done by separately identifying them with class.
- Insulation layers can be added as mountpart identified by class.
- Surface treatment can be exported as mountparts. Surface objects are not supported.
- Additional attributes can be added to each mountpart.

Remember the following:

- Apply meaningful names or identification codes to embeds, such as the component main part.
- Embed parts and sub-assemblies added to the cast unit must fully be added to the cast unit of Tekla Structures. Embeds or other connection entities not assigned to a cast unit of Tekla Structures will not be taken into account when exporting to UT file.
- Use logical hierarchical structure, and select a sensible main part for an embed sub-assembly.
- Check sub-assembly hierarchies. Only 2 levels within the sub-assembly is recommended.
- Check placing, classes, positioning, naming.
- Embed UDA tab settings for tailoring embed representation

- Keep a list of all embeds and reinforcement in the project including their names and classes.

Embeds

Embed name	Numbering prefix	Modeling Class	Embed UT designation	Embed UT representation	Quantity unit
Grout Tube	GT	102	Name+profile+length	Line	m
Lifting Hook strands x 1	LH-S	102	Name+size+length	Symbol ____	m

Cut and bent reinforcement and reinforcement mesh

Cut and bent reinforcement can be modeled by using standard rebar modeling functionalities or components. Rebars should be correctly attached to correct main parts, but this is rarely an issue if modeling carefully.

Usually the elements have a very high number of reinforcement but not necessarily all have to be brought into the export file, only the ones that need to be produced according to correct geometry or need to be quantified. In some cases, it is good idea to exclude the protruding rebars from cast units for better export. Bent rebar shapes will be presented as unfolded and in the xy plane in most of the viewers. 3D bent rebars are not supported by the format.

Reinforcement has automatically assigned reinforcement type to designate it in the production system. You can override this logic by manually adding reinforcement type in rebar UDAs for desired groups.

The mesh bars are automatically assigned to reinforcement types 1 and 2 or 5 and 6. The types 1, 2, 5 and 6 represent the installation layer in the form. 1 and 2 for mesh in bottom face, 5 and 6 on the top face.

Rebars can also be grouped and classified as cage objects by using rebar UDAs. It is very important to ensure that rebars are not accidentally grouped into mesh or cage.

The screenshot shows the 'Tekla Structures Reinforcing bar (2)' dialog box with the 'Unitechnik' tab selected. The dialog has several tabs: Parameters, Unitechnik, Workflow, Rebar set, BVBS, and Couplers. Under the 'Unitechnik' tab, there are five settings, each with a checked checkbox and a dropdown menu:

- Unitechnik reinforcement type: dropdown menu
- Cage group number: dropdown menu with '1' selected
- Cage type: dropdown menu with 'Individual' selected
- Cage shape: dropdown menu
- Mesh type: dropdown menu

Additional attributes can be added to each bar group as well as to each bar.

Unitechnik supports both *planar mesh* and *bent mesh*. Mesh can be modeled as mesh objects or as crossing bar groups. If modeled as bar groups, the bars need to be identified using class (recommended a double digit class, e.g. 13 - 19) or name in the export dialog. If there are no bar groups to be designated as mesh, it is important to not use this setting

The modeled cuts are also used for cutting meshes and bars within the Tekla Structures object.

Tekla Structures has several tools for creating mesh for precast objects, such as Mesh Bars, Mesh Array and Wall Panel Reinforcement.

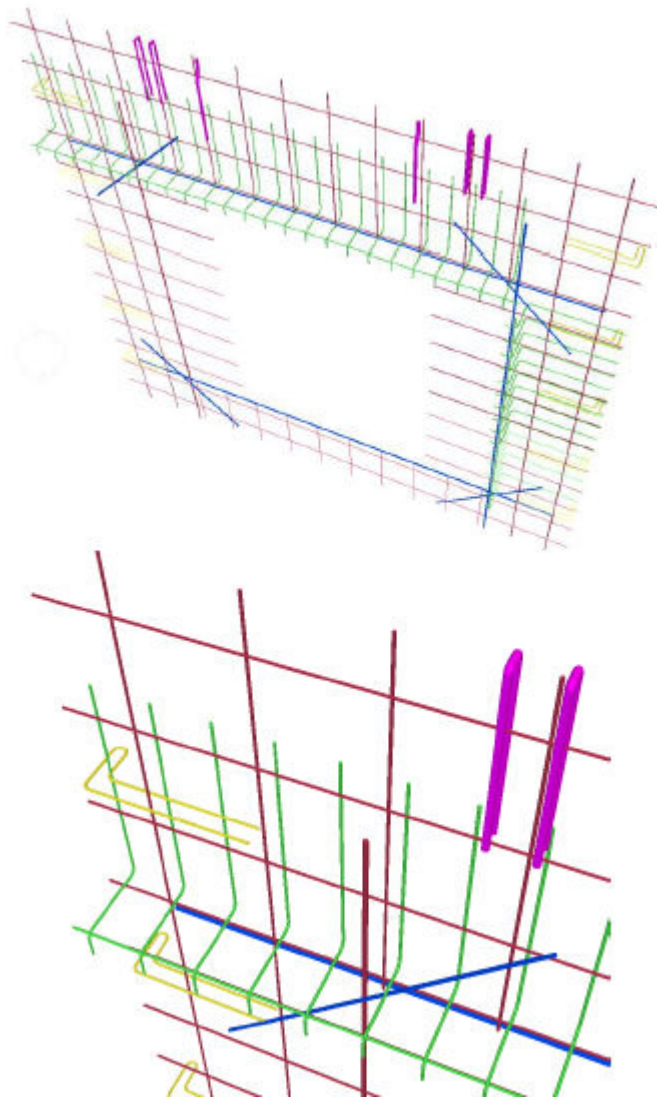
Additional attributes can be added to each mesh object as well as to each bar within the mesh.

Remember the following:

- Model according to production constraints.
- Check placing, classes, positioning, naming.
- A mesh can be designed or created in the Tekla Structures model with mesh objects but also using bar groups. If mesh is bent in two directions, it can only be modeled as bar groups. The UT file export has several options to influence the mesh creation towards the end result.
- A mesh in the Tekla Structures cast unit, consisting of longitudinal and cross wire, should be defined either by
 - the same class (color)
 - the same name
- Do a differentiation of name and class per mesh having for instance bottom and top mesh within one wall shell.
- Furthermore, it is a good practice to apply loose or additional rebar to a dedicated class. Depending on the factory equipment and the processes involved it might be necessary to exclude certain rebars from a cast unit when exporting to the UT file. This can easily be achieved by excluding such rebars by class in question from the export. Class can also be used to distinguish rebars for non-automated production.
- There are advanced functions to validate mesh, or to add additional wires for stabilizing if the mesh has openings. Check the dialog settings on the [Reinforcement \(page 448\)](#) tab.

In the example below the wall panel reinforcement rebar and mesh are created based on the suggested logic.

The mesh color has been set to red, class 79, its additional reinforcement to blue, class 88. Other reinforcement, also being added to the mesh manually later on in the production process, is set to yellow, class 6, and green, class 87. Reinforcement belonging to embeds are set to purple, class 7. With such a structure it is very easy to exclude rebar from automated mesh production and declare the UT file content as per factory or MC requirement.



Braced girders

Braced girders for half-cast or layered structures are identified by having a sub-assembly consisting of rebar groups and designating them with a specific class that is defined in export dialog (recommended class 105). The top chord should be the main part of the sub-assembly.

Girders modeled from steel parts or rebars are both supported but rebars are recommended.

The best way to model braced girders is using modeling components such as the [Braced Girders](#) tool from Tekla Warehouse.

Strands

Strands should be modeled as rebar groups. Strand rebar groups are typically reinforcement type 9. The best way to model strands is the Hollow Core Reinforcement Strands tool.

Strands should be quite standard so in the production file they can be represented with an identifier within the main part such as a Strand Code and quantity of strands. With the Hollow Core Reinforcement Strands tool this strand code can be automatically included in the slabdate data, otherwise it has to be manually controlled using UDAs.

Product information

Product information besides the geometry can be added as textual or numerical information. This data can be on any level of the hierarchy, but most important product information will be included in the HEADER and SLABDATE.

The following is automatically added:

- Names of the order and the element (but these have to be set in the export dialog)
- Product maximum dimensions, length, width in slab-block and thickness in product-block
- Total weight in the slabdate block
- Product material in the slabdate block in the layer data. Many layers can be exported but in most cases using only 1 layer provides best results.
- Product coordinates within the project (model) in the header block
- Product type (this needs to be set within the main part UDA) in the header block
- Reinforcement type in the rodstock block
- Reinforcement cage group numbers
- Transport information

Other recommended manual information:

- The name of the modeler
- The design status
- Bar and mountpart labeling
- The quantity of the strands (if applicable)
- Erection sequence (if applicable)

Other optional manual information:

- Project information
- Mountpart special instructions

- Concreting special instructions

In addition, any UDA or manual text can be added to info fields.

Product type

As a mandatory setting, the UT product type must be set for each main part of a cast unit.

The product type is not set by default. Select a product type for the element selected from the model from the predefined list of option.

We recommend that you save the UT product type in modeling settings and components.

The most commonly used types are:

- Solid wall
- Element slab
- Sandwich Element
- Double wall (1st stage)
- Double wall (2nd stage)
- Solid floor

Note that it is very important to define the double wall and sandwich wall correctly for both shells.

You can also define product types of your own in addition to the predefined types.

We also recommend that you systematically gather information about the product and keep it up to date.

Products

Product Name	Modeling component	Reinforcement component	Embed component	Dimensions	Automation
Hollow Core	Floor layout:	Hollow Core Reinforcement Strands	Hollow core lifting loops:	Length 12000. 10000 8000	Manual input

Company-specific modeling guidelines

- Use classes to control element geometry and part/rebar filtering.
 - Included/excluded, automated/non-automated, mesh/loose bars
- Define UDA content to define the product
 - Project UDAs

- Unitechnik product types, location, additional info
- What to do with different types of element openings and recesses
 - Shuttered, plotted or excluded
- Use standard edge shuttering shapes
- Define standard meshes, rebars and embeds according to factory requirements
 - Wire sizes, spacings, bendings, overhangs, maximum dimensions, cutting
- Define top-in-form face for pallet orientation
- Create export settings for each product, and tailor them for each project

Attribute information

Project attributes

To streamline and obtain best possible results it is highly recommended to have the Tekla Structures cast units to be exported and processed by the Unitechnik file well structured. The modeling technique has a direct impact on the outcome of the UT file.

The following instructions give a guideline on the mandatory and the most needed settings to be set in the Tekla Structures model.

The UT file contains a dedicated header block with general information about the project where the cast unit to be manufactured belongs to.

Within the UT file export dialog the content of the UT file header block can be defined by using the project settings of the Tekla Structures Structures model. All relevant information should be set in the beginning of the project in

Project properties.

Project properties

General

Project number

Name

Builder

Object

Address

Designer

Start date 19

End date 19

Info 1

Info 2

Description

GUID: 3045459f-7589-4c9e-b7a1-c8121448c869

☒ Apply ☒ Cancel

User-defined attributes (UDAs)

Each main part of a cast unit in Tekla Structures to be exported to an UT file requires additional information to be stored in the model. You can use user-defined attributes (UDAs) for this purpose. The UDAs are defined in the Tekla Structures `objects.inp` file which is present for each configuration but its content can differ per Tekla Structures user role. In the Precast configuration this file can be found in the `..\ProgramData\Tekla Structures\<version>\environments\common` folder.

In UT file export the **Unitechnik** tab must be available for precast elements.

Element naming

The UT file contains geometric information of the cast unit to be manufactured as well as its properties such as names and materials.

We recommend that you apply a meaningful naming to all elements of a cast unit (main part, embed part, rebar), as this will improve the readability of a UT file when being reviewed on the precast production control system. In most systems, the PDF drawing name should match the Unitechnik export file name.

Element numbering

Unique numbering is usually needed. ACN numbering is very handy for making sure that the export separates each piece into its traceable own export file and PDF drawing, rebar positions can be included into bar objects using a logic that suits the production.

Element color coding

Tekla Structures elements, such as parts and reinforcements, can easily be filtered by its class.

Self-validating the export file

- Validate after the export.
- Go through the geometrical objects within the slab-blocks and visualize them one by one.
- Investigate possible errors in notifications, logs and viewer.
- Check the date modified and naming of the files.
- Check the main attributes for HEADER and SLABDATE.
- Check orientation on pallet.
- Check contour and line attributes.
- Check the quantity of exported objects.
- Smoke test the rebar and mesh geometry. Check that the mesh production constraints have been taken into account, and translated correctly.
- Check the resulting embed plotting.
- If there are any issues, fix those in Tekla Structures, re-export and re-validate.
- Do not import to CAM unless you have checked the export files properly.
- Keep in separate folders (to be checked / faulty / checked and ready for import).

BVBS

You can export reinforcement geometry in the Bundesvereinigung Baustoftware (BVBS) format. The result is a text file in the ASCII format with a file name extension `.abs`.

The supported version of the BVBS format is 2.0 from 2000.

Tekla Structures versions from 2021 onwards support BVBS 3.0 from 2018. The syntax of the BVBS 3.0 file format follows otherwise the BVBS 2.0 file format specification, but a support for coupler and thread data has been added.

You can export bent reinforcing bars, reinforcing bar groups and reinforcement meshes, which can be rectangular, polygonal, non-bent or bent, and may include cuts. The export of hooks is also supported.

Reinforcing bars that have bendings with two or more variable radius values are exported fully conforming with the BVBS specification so that radius element and leg elements are written separately. If this causes compatibility issues within your own environment and other tools using the BVBS files, you

can still go back to the older way of exporting by setting the advanced option `XS_BVBS_EXPORT_ARC_COMPATIBLE_TO_OLDER_METHOD` to `TRUE` in an `.ini` file, for example, in `user.ini`.

To ensure the best possible export result, see [Best practices in BVBS export \(page 546\)](#).

Export in BVBS format

1. Ensure that numbering is up to date.
2. Go to the properties of the cast units and reinforcement that you plan to export, and edit the user-defined attributes on the **BVBS** tab as required. The user-defined attributes are environment specific.
3. Select the cast units with the desired reinforcement content, or select the reinforcement.
4. On the **File** menu, click **Export --> BVBS**.

The **Export BVBS** dialog is displayed.

5. Define the BVBS export settings:
 - a. On the **Parameters** tab:
 - select which reinforcement to export
 - define how and where to export the BVBS file or files, and include the revision into the file name
 - select which BVBS elements to export
 - define class numbers for girders

You can use saved selection filters to exclude reinforcement bars or meshes matching with the selected filter.

- b. On the **Data content** tab:
 - define how to export drawing data
 - give the reinforcement position source
 - give the project number
 - select whether you want to export the private data block and select the data items for this additional block
 - c. On the **Advanced** tab:
 - round rebar lengths for 2D bent bars
 - define which bending radius is used to calculate the arc length
 - make meshes out of rebars, and give UDA name for grouping
 - include detailed data of mesh bars in the export

- export tapered reinforcing bar groups as multiple separate reinforcing bar items
- define the order of the items in the output file
- define the export of reinforcement coupler data
- define whether to combine single rebars or rebar groups by their position number, with the total bar quantity, or handle each single rebar or rebar group individually

BVBS export uses arc geometry in two cases:

- For circular rebars such as spirals or hoops.
 - When bent rebar has more than 1 bending radius, the bends with the larger radius are exported as arc sections.
- d. On the **Checking** tab, select whether you want to run additional checks for the reinforcing bars.
 - e. On the **UDAs** tab, define the UDA fields to be used, and the content to write into reinforcement, part, cast unit and pour object UDAs.

6. Click **Export**.

The BVBS file or files in the `.abs` format are exported to the folder specified in the **Output file** area. You can check the export report by clicking the report link that appears at the bottom of the dialog.

BVBS export settings

Use the **Export BVBS** dialog to control the BVBS export settings.

Parameters tab

Setting	Description
Model objects to be exported	Select which reinforcing bars or meshes are exported. • Reinforcement of all cast units in the model: Exports reinforcing bars or meshes in all cast units in the model. If there are cast units that do not have reinforcing bars or meshes, no empty files are created. • Reinforcement of selected cast units: Exports reinforcing bars or meshes in the cast units you have selected in the model. • Selected reinforcement only: Exports the reinforcing bars or meshes you have selected in the model or in the drawing. This option also exports selected rebar assemblies. When you select this option, you can export only to a single file.

Setting	Description
	• Reinforcement of selected cast units (totals by all positions): Exports reinforcing bars or meshes in all the cast units that have the same cast unit position as any of the selected cast unit positions. For example, if a cast unit with the cast unit position <code>W-120</code> is selected, the reinforcing bars or meshes in all the cast units that have position <code>W-120</code> are exported even though not all of them were selected. • Reinforcement of selected pours: Exports a set of reinforcement in the selected pour. Select the pour in the pour view. Ensure that you have used the Calculate pour units command to include the rebars in the pour.
Excluding reinforcement by filter	Exclude reinforcing bars or meshes by selecting any of the selection filters. Reinforcing bars or meshes that match the filter are excluded.
Output file - Single file	Export all BVBS information into one <code>.abs</code> file. Enter the file name in the box or click the <code>...</code> button to browse for the file. If you do not enter a path, the file is saved in the model folder.
Output file - One file per each cast unit	Export each cast unit reinforcement content to its own file. The files are created under the folder that you define in the Folder name box, or you can browse for the folder using the <code>...</code> button. Use the File naming template list to select how the created files are automatically named. You can use multiple assembly template properties in the file name. Type the template properties in the box and separate them with spaces. The combination will be separated by underscores in the exported file name.
Include revision into file name	Select to include revision into file name. Select one of the following options to include it in the output file name: • Revision mark: <code>REVISION.MARK</code>, default value • Revision number: <code>REVISION.NUMBER</code> • Rev<Revision mark>: same as Revision mark but the text Rev comes first

Setting	Description
	• Rev<Revision number>: same as Revision number but the text Rev comes first
Mapping file	Define the mapping file used in mapping the name of the reinforcement material or grade to another name. This allows you to match the requirements of the software processing of the BVBS data if there are different reinforcement materials or grades to be used. By default, the mapping file <code>bvbs_export.dat</code> is located in the model folder, but it can also be used from the folders defined by the advanced options <code>XS_SYSTEM</code>, <code>XS_PROJECT</code>, and <code>XS_FIRM</code>. See "Reinforcement material and grade mapping file example" below for an example of the <code>bvbs_export.dat</code> mapping file.
BVBS elements to be exported	Select which item types are exported. The options are: • 2D reinforcement bars (BF2D) • 3D reinforcement bars (BF3D) • Spiral reinforcement coils (BFWE) • Reinforcement meshes (BFMA) • Lattice girders (BFGT) If you select Lattice girders (BFGT), enter the class numbers used in the model for the lattice girder bars in the Class numbers for girder box. The lattice girder may contain two or three chord bars and one or two diagonal zig-zag bars. The lattice girder length and other attributes are taken from the main chord (usually top chord). Any such lattice girders should be modeled with a distinct class from other reinforcement to ensure that other rebars will not be processed by the function. Braced girders are recognized automatically by the <code>GIRDER_TOP_GUID</code> UDA, added by the Braced Girder modeling components. If the Lattice girders (BFGT) option is not enabled, braced girders are exported as normal rebars, unless excluded.

Setting	Description
Class numbers for girder	Enter the class attribute for recognizing lattice girders. The class should be same for all rebars within a girder.

Data content tab

Setting	Description
Drawing name source	In BVBS file each row/rebar has a data field for Drawing number of the respective drawing (drawing name) and Index of the respective drawing (drawing revision). With the option Drawing name source you can control how the values for these data fields will be set. Cast unit position Drawing Name Drawing Mark Drawing Title1 Drawing Title2 Drawing Title3 Fixed text: If you select this, enter the text in User-defined drawing name. Reinforcement UDA Reinforcement template Cast unit template Assembly template By selecting the option Fixed text you can enter the values in the dialog and same ("fixed") values will be written for every exported rebar. If any of the other options is selected, the drawing name and revision will be taken from the cast unit or cast unit drawing of the rebar. When you use the option Assembly template and a rebar assembly exists, the rebar assembly is always read. Otherwise, the cast unit is read.

Setting	Description
	The option Assembly template takes data from the closest assembly hierarchy level and Cast unit template from the top cast unit. Note that it depends on the receiving system of the BVBS file how important and for what purpose this data will be used. From Tekla Structures perspective, using this data field is not obligatory.
User-defined drawing name	Enter a text string to be used for the drawing in the export. This option is available only when you have selected the Fixed text option in Drawing name source.
Rev	Drawing revision (index). This option is available only when you have selected the option Fixed text in Drawing name source.
Position source	Define the source of the position. The options are Reinforcement position, Reinforcement UDA, Reinforcement template, and Fixed text. For Reinforcement template, enter the name of an attribute. For example, to obtain the reinforcement shape code, enter SHAPE, or to obtain the reinforcement position number, enter POS. For Reinforcement template, you also enter multiple template attributes and use empty space as a separator. For example, enter SHAPE POS.
User-defined reinforcement position	Define the reinforcement UDA position number. Exported item with the same position number but different UDA position number will be exported to different rows.

Setting	Description
Project number	Define the project number. The options are: Project Properties: The export fetches the project number information from the project properties set in Tekla Structures. Project properties UDA: The export uses the UDA name entered in the User-defined project number box. Fixed text: The export uses the text entered in the User-defined project number box.
User-defined project number	Define the UDA project number or a text string to be used as the project number.
Private data block	With Private data block you can control whether the private data block is exported (Export private data block) and select the data items for this additional block. The following data types are available: - Reinforcement report property (integer, float or text) - User-defined attribute (integer, float or text) - Open API object property - Assembly report property (integer, float or text) Click the New... button to add new predefined private data fields to the list. Enter information about the data item. • Name in list The text shown in the Private data block list. • Field identifier (one lower case letter) The field code which separates the individual data fields in the private data block. It can be any lower case letter. Typically, it is a

Setting	Description
	good practice to use a different value for each data item but this is not required. The receiving system may also be able to read only certain data fields. • Property or UDA name The value defines which data will be inquired from the reinforcement object. Note that a non-existing property will be not exported. • Property data type The value has to match the actual selected property. The options are: • Reinforcement report property Integer/Reinforcement report property Float/Reinforcement report property Text • User defined attribute - Integer/User defined attribute - Float/User defined attribute - Text • Open API object property • Assembly report property Integer/Assembly report property Float/Assembly report property Text You can also edit and remove data fields, and change their order. Select Export tagging to report the rebar intersection tagging in the Private data block.

Advanced tab

Setting	Description
Rounding	

Setting	Description
Round Round lengths to Round leg lengths to	Round rebar lengths for 2D bent bars. Mesh and 3D rebars are not affected. To round the lengths, first select an option for the Round setting. The options are: Yes - Uses the nearest rounding value. Up - Rounds the lengths up. Down - Rounds the lengths down. For the Round options Up and Down, there is a preliminary tolerance for small length differences up to 0.2 mm before performing the rounding. This ensures that values very close to exact increment are not rounded when it is not necessary. Round lengths to rounds the total rebar lengths in the corresponding BVBS field in the header block, and the available values are 1 (default), 5, 10, and 25. Round leg lengths to rounds the leg lengths in the geometry block, and the available values are 1 (default), 5, and 10.
Bending	
Bent leg arc radius	This setting defines which bending radius is used to calculate the arc length: Bending radius to the rebar center line (Center line), which is the default for most interfaces, or to the rebar inner edge (Inner edge). If you select Inner edge, the bending radius is shortened with half of the rebar nominal diameter. The BVBS export uses arc geometry in two cases: • For circular rebars such as spirals or hoops. • When bent rebar has more than 1 bending radius, the bends with the

Setting	Description
	larger radius are exported as arc sections.
Reinforcement geometry	
Geometry type	The options are Default and Fabrication geometry . Both options convert segmented arcs into true arcs. In addition to that, the Fabrication geometry option takes into account the user-defined attribute Recognize as straight and the Max curve radius requiring bending setting.
Meshes	
Try to make meshes of rebars	Select whether the export tries to automatically form meshes of a single reinforcing bar or of a group reinforcing bars and export them as a mesh instead of separate 2D bars. The options are: Yes, group rebars by class Yes, group rebars by name Yes, group rebars by grade Yes, group rebars by UDA Yes, group rebar assemblies To form a mesh, the reinforcing bars need to belong to the same part, be straight, be on the same plane, and have equal filtering attribute values. All grouping methods can handle rebar assemblies.
UDA name for grouping	If you selected the value Yes, group rebars by UDA for Try to make meshes of rebars , enter the UDA name for grouping.
Exporting of mesh bar data (@X..@Y..)	Use this setting to control whether the detailed data on mesh bars is included in the exported data of the mesh. The appropriate option depends on the needs and capabilities of the receiving system.

Setting	Description
	The data is needed if it will be used, for example, for mesh fabrication. • Custom and cut catalog meshes only: Detailed bar data is included only for custom meshes and catalog meshes that have additional cuts, openings or skewed edges. • All meshes: Detailed bar data is written for all meshes. • None meshes: Detailed bar data is not written to any of the meshes.
Tapered reinforcement groups: Tapered rebar groups need to have linear spacing.	
Export stepped bars as separate items	By default, a stepped group is exported as a single string with the stepping length defined in a certain data block. If you select the value Yes for Export stepped bars as separate items, all tapered reinforcing bar groups are exported as multiple separate reinforcing bar items even if they have regular spacing and could be exported as one single stepped reinforcing bar item. If all the tapered bars within the group have the same geometry and length, they will be exported within a single BVBS string as a regular group would, regardless of this setting.
Sorting	
Sort items	Use this setting to define the order of the items in the output files. The options are: No sorting By diameter, smaller size first By diameter, bigger size first By position number
Totaling	

Setting	Description
Single rebar and rebar groups	Select either of the following options: • Yes: Single rebars or rebar groups are combined by their position number, with the total bar quantity. This is the default option. • No: Each single rebar or rebar group is handled individually and exported. This leads to a larger BVBS file, but the advantage is that each single rebar and rebar group can be identified and handled by its own GUID, and the BVBS file will reflect the model objects or IFC exported rebars.

Mechanical connections tab

Setting	Description
Coupler	
Export reinforcement coupler data	You can export coupler and thread data. Set Export reinforcement coupler data to Yes to export coupler or thread data. Enter the UDAs for the connection method, product, and product code for the rebar start and rebar end separately, for example METHOD_START, METHOD_END, PRODUCT_START, PRODUCT_END, CODE_START, and CODE_END. Note that the UDAs depend on the creation tool and may differ from the examples. The UDA representing the method must be of type INTEGER, and the UDAs representing product and code must be of type STRING.

Checking tab

Option	Description
Check reinforcement	Select whether you want to run additional checks for the following: Reinforcement diameters (separated with spaces) Minimum cutting length of reinforcing bars Maximum cutting length of the reinforcing bars Minimum leg length for straight sections between the bends Maximum weight of individual bars When you select the Check reinforcement checkbox, and the values of the exported reinforcing bar are less than the minimum or greater than the maximum, a warning is written to the export log file. The log file entry contains the ID of the reinforcing bar. You can locate the reinforcing bar in the model by selecting the appropriate row in the log file. Note that the reinforcing bar is still exported normally and only the additional warning is given. Note that when the check is activated, the length of lattice girders is also checked. A warning is added in the log when the check fails. The length of the main chord defines the exported length of the lattice girder.

UDAs tab

On this tab you can define the UDA fields to be used (**UDA**), and the content to write into reinforcement, part, cast unit and pour object UDAs (**UDA content**). You can tag UDAs based on release code, release status, release date and released by information. You can also select whether existing UDAs are checked and handled by using the setting **Check existing UDAs**. The options are **No**, **Prevent export**, **Report to log**, **Report to log and overwrite**, and **Overwrite only**.

BVBS export file description (.abs)

The content of the BVBS export file `.abs` is described below. The example data structure represents a 2D bar, which is either straight, or bent on one plane at most. Section H is the header section (identification and general information), and section G is the geometry section (production geometry).

For detailed BVBS interface description, see [BVBS-Guideline Data exchange of reinforcement data](#) on the official site of the BVBS organization.

```
BF2D@Hj96100@rs/24@i@pFBPB/13@12300@n19@e2.04@d12@gUndefined@s0@a0@t0@G12300@w0@c68@
BF2D@Hj96100@rs/24@i@pFBSB/5@13500@n13@e3.11@d12@gUndefined@s0@a0@t0@G13500@w0@c81@
BF2D@Hj96100@rs/24@i@pFTPB/11@12300@n19@e2.04@d12@gUndefined@s0@a0@t0@G12300@w0@c84@
BF2D@Hj96100@rs/24@i@pFTSB/1@13500@n13@e3.11@d12@gUndefined@s0@a0@t0@G13500@w0@c67@
```



- (1) BVBS element (product type)
- (2) Project number
- (3) Drawing number (in this example, cast unit position number)
- (4) Drawing revision number (not in use in this example)
- (5) Rebar position number
- (6) Single rebar length
- (7) Product quantity
- (8) Single rebar weight
- (9) Rebar diameter
- (10) Material grade
- (11) Bending pin diameter (in this example, value '0' as it is a straight bar)
- (12) Rebar layer (not in use the BVBS export)
- (13) Step tapering for a tapered rebar series if grouping tapered enabled in export settings (no tapering in this example)
- (14) Leg length (only 1 leg in this example)
- (15) Bending angle after the leg
- (16) Checksum for correct data transfer. Checksum is a sum operation based on the converted numerical values of the ASCII characters on a BVBS row.

Reinforcement material and grade mapping file example

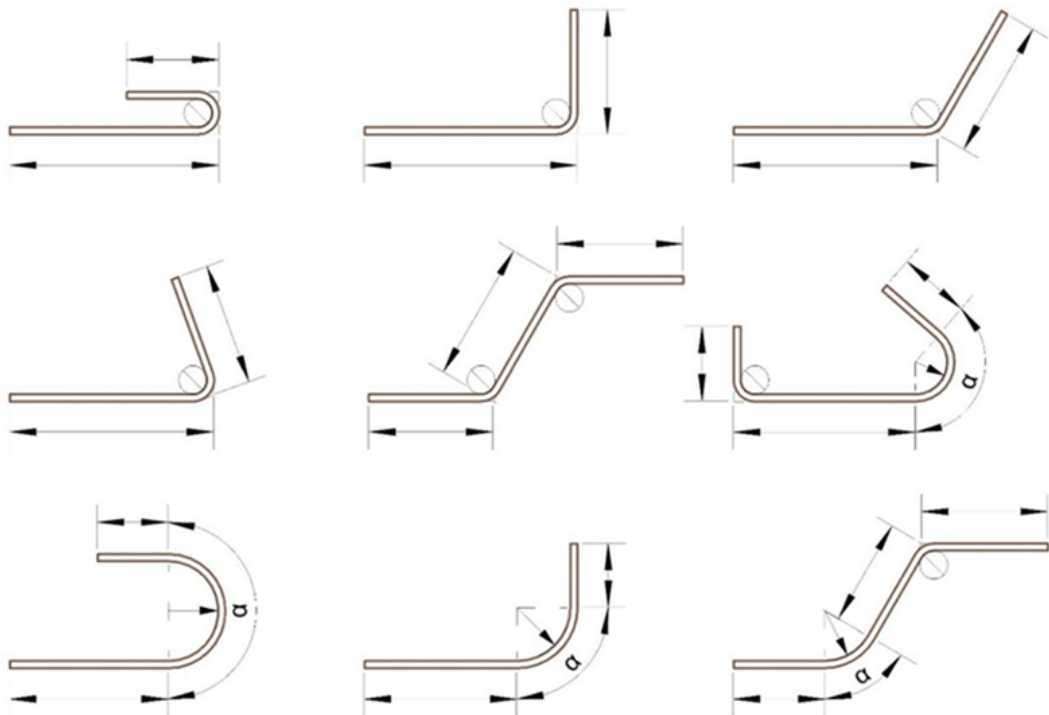
Example of the mapping file `bvbs_export.dat`:

```
// ++++++
// Grade/Material mapping
```

```
// Tekla Structures grade <tab> Alternative material name/
code
// ++++++
//
#GRADE
H 500E
RB 500E
HR 500E
R 300E
D 300E
```

Reinforcing bar length calculation in BVBS export

The length of the reinforcing bar is calculated according to the BVBS specification. The length also depends on the bending angle. Lengths L1 and L2 are exported.



A basic distinction is made between bends (with standard diameter of mandrel $4 \cdot d_s$) and arches (with specification of angle and radius). Bends are marked with the bending pin symbol in the image. For further explanation of segment lengths see the current version of EN ISO 3766.

If you set the advanced option `XS_USE_USER_DEFINED_REBAR_LENGTH_AND_WEIGHT` to `TRUE`, the user-defined length value is exported as the overall length for the reinforcing bar.

Note that the BVBS format specifications define that the overall length of the bar is ignored if the data contains actual geometry data. Some other software applications may still use the overall length values in the BVBS file for calculating quantities. The exported overall length in Tekla Structures is the same length as shown in reports.

Best practices in BVBS export

The following guidance helps you to ensure the best possible result from the BVBS export.

For exact instructions on the BVBS export, export settings, export file description, and the reinforcing bar length calculation in the BVBS export, see [BVBS \(page 530\)](#).

- Export only those reinforcement types that the production control system and machinery support.
 - Ensure that the rebar sizes, bending roll sizes, leg lengths and angles, spacings, and overhangs are within the machinery constraints.
- Model your parts and reinforcement with systematic naming and classes.
 - Create and maintain clear selection filters to exclude undesired rebar content.
- Use a file naming logic that results in unique file names, which can be traced back to the export set.
 - Export in larger sets that can be systematically traced into a specific building section or a drawing.
 - Using the default option for cast unit position will export the total amount of rebars in all relevant cast units to be combined into the same file. There might be problems with the quantities if the amount of cast units changes later on. Instead, you can use **Assembly template** as the **File naming template**, and a unique identifier to ensure that only rebars from one cast unit are within one export file.
- Keep track of the export sets in the model using part/pour UDAs.
 - After the first export, it is easy to lose track which rebars have been exported already.
 - Using rebar UDAs is heavier for the model database.
- Use private block to transfer extra information - Note that some import interfaces do not support private block.

ELiPLAN

Elematic ELiPLAN is a software for resource planning, scheduling, and management for precast concrete fabricators. ELiPLAN import and export automate the data transfer between Tekla Structures and ELiPLAN.

The data transfer between Tekla Structures and ELiPLAN consists of four parts:

1. Exporting ELiPLAN data file from Tekla Structures.
2. Importing ELiPLAN data file into ELiPLAN.
3. Exporting ELiPLAN status data file from ELiPLAN.
4. Importing ELiPLAN status data file into Tekla Structures.

The import of an ELiPLAN data file into ELiPLAN supports the incremental approach, which means that ELiPLAN is able to create, update, and delete parts in its database. This means that precast detailers can export the most up-to-date data files whenever the Tekla Structures model has been changed.

Similar incremental support is included in the import of an ELiPLAN status data file to Tekla Structures. To keep the status and schedule data up to date in a Tekla Structures model, we recommend you update the status data regularly.

In the ELiPLAN export, the part geometry (profile, cuts, openings, and notches) is always automatically exported. You need to define the plotter data and the necessary attributes. Every time you export, you need to export all the parts that have been exported before to ensure proper change management in ELiPLAN. Same applies to the import. The export is based on part GUIDs, and the import is based on the project name/number and part GUIDs.

NOTE The format and contents of the ELiPLAN status data file imported to Tekla Structures differs from the data file that is exported from Tekla Structures to ELiPLAN.

For more information about the best practices in ELiPLAN export, see [Best practices in ELiPLAN export \(page 567\)](#).

Export an ELiPLAN data file

You need to export everything that is ready. If you are using a shared model, first check the situation by checking the drawings, for example.

1. Add ELiPLAN information to ELiPLAN user-defined attributes of the parts.

This is optional, the product types and product codes are defined automatically. There are numerous ways to alter these for the export besides the manual UDA handling. See later sections.

For more information about the UDAs, see ELiPLAN user-defined attributes in this same article.

2. On the **File** menu, click **Export --> ELiPLAN**.

The **Export ELiPLAN file** dialog is displayed.

3. Define the ELiPLAN export properties on the **Parameters**, **Plotter data**, **Weep holes**, **Data content** **Data settings**, and **EliX content** tabs. For more information about the export properties on different tabs, see further down in this same article. There is no setting for controlling the export of element corner cuts created by line cuts in the model. These are exported with a dedicated type code to the ELiPLAN file.
4. On the **Parameters** tab, set **Scope of export** to **All** or **Selected**.
 You should always bring every element that is ready to ELiPLAN with every round to ensure that any design changes are taken into the system as well. The model might have some non-relevant or not-ready cast units, which is why it is recommended to use **Selected** to control which ones are being exported. Conceptual cast units can be taken, but then you need to keep track of these elements, for example, by using a UDA. You also need to ensure their GUID stays the same in the later export rounds.
5. Click **Create**.
 By default, the export file `eliplan.eli` is created in the current model folder, in a `.\EP_files` subfolder. The export file is written with UTF-8 encoding. For an example of the contents of the export file, see section "ELiPLAN export file (.eli)".

ELiPLAN export settings

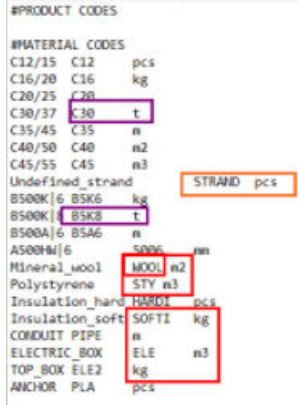
Use the **Export ELiPLAN file** dialog to control the ELiPLAN export properties.

Parameters tab

Setting	Description
Scope of export	Select whether all parts or only selected parts are exported. Because of the incremental import of ELiPLAN, you need to select the same parts, and some additional parts again, if needed, when exporting the next time, to make sure that any design changes are taken in to the system as well. Otherwise ELiPLAN assumes that the parts missing from the subsequent file have been deleted in the Tekla Structures model. We recommend you to always use the All option. Use the Selected option when you are exporting parts for the first time, if you are exporting from unfinished model or in special cases. Use the filtering option to control the product or phase scope.
Export using filter	Specify a selection filter. The parts to export are selected on the basis of the specified selection filter.

Setting	Description
Numbering must be up to date to export	Set this setting to Yes to prevent export when the numbering is not up to date. This prevents the export of unfinished cast units.
Export version number	The elements need to have a unique identifier. The options are GUID, ID, ACN and FloorMES. 1.01 (ID) should only be used when the export is done only once, because of the changing IDs. Use 2.00 (GUID), because IDs will change when reopening the model, resulting in duplicates in export. Select 2.00 (ACN) to export elements with ACN. The 3.0 (Plant Control) version file format is intended for interfacing with newer Elematic FloorMES versions, and is also based on GUID. The file format has been extended with additional data fields, and therefore it is not backwards compatible. Version 3.0 of the export supports the export of accessory code to plotter data, and the export of accessory code for openings. Furthermore, with the export version 3.0, a plotter record of type BL is exported for the hollow core elements to define the side that has been cut. The border line record is exported as a line parallel with the longer side of the hollow core element.
Export version type	Select the type of the export version. The options are Eli and EliX. The Eli option only exports the production data file with the file extension <code>.eli</code>. The EliX option creates a package with a special file extension <code>.elix</code>. The package contains the production data file together with the drawing PDFs from the folder path that has been specified on the EliX content tab. Information about files included in the EliX package are written in the export log file. The EliX option is applicable for the release version number 3.0 and newer only.
Output file name	The name and location of the export file created. The default name is <code>eliplan.eli</code> . You can import

Setting	Description
	this file into ELiPLAN. Use the ... button to select another location. The <code>eliplan.eli</code> file includes, among other things, material information. The accessory code, which is the material description, is in the <code>#Materials</code> block. The accessory code is based on the material type as follows: • For concrete material the default accessory code is same as the material name. • For mesh, reinforcing bars, or strands the default accessory code is <code>grade size</code>. • For embedded material the default accessory code is <code>name size material</code>. The export file is written with UTF-8 encoding.
Open exported file after processing	Open the exported file in the associated application after the processing has been completed.
Data conversion file	With this file you can convert the parametric profile names into the ELiPLAN product codes, and the material descriptions into the ELiPLAN accessory codes. You need to create the file yourself when necessary. The default file name is <code>eliplan_export.dat</code>, and this file can be located in any folder. Use the ... button to select another location. The data conversion file can also be read from folders defined for <code>XS_FIRM</code> and <code>XS_PROJECT</code>. The data conversion file <code>eliplan_export.dat</code> contains string pairs separated with one or more tabs. The string on the left side is the profile name or Tekla Structures material description and the string on the right side is the corresponding ELiPLAN data. Data conversion supports case insensitive text, which means that it does not distinguish between uppercase and lowercase letters when looking for strings to be replaced. The data conversion file supports the use of the wildcard asterisk (*) in regular expressions in the first column for finding strings from Tekla

Setting	Description
	Structures objects. For example, you can type L*FT to find LØFT or LIFT or LOFT. Accessories, such as steel embeds and insulation blocks, can be quantified as piece count or with custom measurement units.  Note that the ELiPLAN codes depend on the fabricator, and the codes that are valid for one fabricator are likely to be not valid for other fabricators. You can disable/enable the usage of the data conversion file by clearing the Enabled/Disabled check box next to the Data conversion file setting. For an example of data conversion file contents, see section "ELiPLAN data conversion file".
Filter by part: Element data	Enter a list of classes or to be excluded from or included in the export. This contains the class numbers or names used for concrete parts. Separate the classes or names with a space. You can also specify a selection filter for filtering element data, materials or secondary concrete elements.
Filter by part: Material quantities	Enter a list of classes or to be excluded from or included in the export. This contains the class numbers or names used for materials. Separate the classes or names with a space. You can also specify a selection filter for filtering materials.
Filter by part: Secondary concrete	Enter a list of classes or names to be excluded from or included in the export. This contains the class numbers or names used for secondary

Setting	Description
	concrete parts. Separate the classes or names with a space. You can also specify a selection filter for filtering secondary concrete elements.
Create log file	Select whether a log file is created. Creating a log file is recommended to ensure that the exported file is correct. The log will notify you about the number of exported cast units and, for example, if: • Export failed because numbering not done. • Some cast units could not be exported. • Some cast units were ignored by filters, or they are CIP. • Embeds or cuts to be plotted are completely outside the parts. • Some of the material or product type data conversion mapping is not recognized.
Log file name	The name and location of the created log file. Use the ... button to select another location.

Plotter data tab

Setting	Description
Hollowcore and slab products	
Export of cutout data	Select how to export cutout data. The options are: • All: Exports all data. • Full depth cuts only: Exports data only on the cuts that go through the whole part. Does not export recess data. • None: Does not export any cutout data. It is recommended to use Full depth cuts only , because otherwise small recesses are included in the plotting on both faces. Overlapping cutouts are combined in the export file. This setting exists for hollowcore and slab products, and for wall and sandwich wall products separately.

Setting	Description
Export of embed data	Select whether to export data of embeds. The options are: • Yes: Exports data on embeds. • No: Does not export any data on embeds. This setting exists for hollowcore and slab products, and for wall and sandwich wall products separately.
Export of filled cores	Select whether to export the geometry of filled slab cores. The options are: • Yes: Exports the geometry of filled slab cores. • No: Does not export the geometry of filled slab cores. Note that the position in Z is exported for filled cores. The export of the Z coordinate for all items in the PLOTTER block is controlled the Export embed Z position on the Data content tab.
Export of inner cores	Select whether to export the geometry of the inner cores of the hollow cores. The options are: • Yes: Exports the geometry of the inner cores of the hollow cores. • No: Does not export the geometry of inner cores of the hollow cores.
Export of weep holes	Select whether to export data of weep holes. Yes exports the weep holes according to the settings defined on the Weep holes tab. No (default) does not export any data on weep.
Wall and sandwich wall products: See the descriptions for Export of cutout data and Export of embed data above.	
Plot additional reinforcement	Plot additional reinforcement as bounding box. The options are: • None • Class • Name • Grade
Plot cutout/embed as lines	Export cutouts and embeds as lines. The options are: • None • Class

Setting	Description
	• Name • Material/Grade Automatically - Automatic accessory recognition based on shape
Plot irregular cutout/recess	The As lines option exports as lines the bounding box cutouts and recesses that overlap a diagonal edge. By default, they are exported as box. Note that we recommend you to use the default setting if the factory uses an Elematic Modifier machine to ensure correct data processing.
Plot lifters	Specify how the lifter geometry should be plotted - as outline or as center point.
Exclude cut parts by	Use to exclude cut parts from export based on the cut part properties. The options are: • None • Class • Name • Material This setting is a handy filter for reducing amount of extra cuts in plotting.
Exclude embeds by	Use to exclude embeds from exported plotting data embeds by: • None • Class • Name • Material You can define one or more values for the selected property.
Exclude above z position	Select whether to exclude from exported plotting data embeds or cuts that are above the specified Z position. The Z position is the depth of the element on the pallet, that is how many millimeters the lowest point of the embed is above the pallet surface. You can define one or more values for the selected property. The options are:

Setting	Description
	• None • Embeds • Cuts • Embeds and cuts

Weep holes tab

Setting	Description
Weep holes offset	Specify the weep hole offsets: • At end zones: Provides weep holes at the slab end zones of the hollowcore. • At end zones recess/ opening: Provides weep holes at recesses or openings for the end zones of hollowcore. • At filled cores: Provides weep holes around filled cores. Filled core parts can be specified by class or by name. • At lifting loops: Provides weep holes at lifting loops. • At middle only, length less than: Export weep holes only at the middle of elements with a length less than the specified length. • At notch: Provides weep holes at notches. • At side recess/opening: Provides weep holes at side pockets. • No (default): Does not export any data on weep. Merge weep holes, closer than: Merge weep holes if they are within the specified distance.

Data content tab

Setting	Description
Project name, Project number	Use these settings to specify the project name and project number written in the exported file. The options are Project UDA, Project template, and User-defined text. The maximum length of the project number is 12 characters (usually digits), and the maximum length of the project name 37 characters (string).

Setting	Description
	This is the maximum number of characters that the export file accepts. Note that the ELiPLAN file must have a valid project number that needs to match the project number in the ELiPLAN database, otherwise the ELiPLAN file import will not succeed.
Comment 1 - 3	In the comment fields you can provide extra information to be included at the start of the export file. The options are: No comment Tekla Structures version Model name User name User-defined text The comments are only for viewing the export file and will not be read in to ELiPLAN.
Product code	Select the default product code mapping, which then should correspond with any data conversion strings. Any content in the ELiPLAN Product Code (EP_PRODUCT_CODE) UDA field always overwrites the Product code string determined by the export settings. You can specify multiple UDAs by separating them with a blank space. In output, the content of UDAs will be written in the same order, separated by blank spaces.
Accessory code	Specify the accessory code for standard embeds such as steel parts. This is the code written to each embed in the #Plotter (if applicable) and #Materials blocks, and the chosen option should be used as a base for further data conversion mapping. The default option is NAME PROFILE-LENGTH MATERIALGRADE. You can specify multiple UDAs by separating them with a blank space. In output, the content of UDAs will be written in the same order, separated by blank spaces.
Material code	Specify the material code for other materials besides accessories. This will be the code written

Setting	Description
	to each non-embed material in the #Materials block, and the chosen option should be used as a base for further data conversion mapping. The default option sets a varying logic specific for each material type, such as concrete or reinforcement. You can specify multiple UDAs by separating them with a blank space. In output, the content of UDAs will be written in the same order, separated by blank spaces.
Erection section	Read the erection section from a user-defined attribute (UDA) or from a custom property (Template).
Erection sequence	Read the erection sequence from a user-defined attribute (UDA) or from a custom property (Template).
Export material data	Select whether to include or exclude the detailed material data (receipt) of parts. If you have no use for material data in ELiPLAN (you have no material handling module in ELiPLAN), select No to exclude the data from the file and to reduce the file size. Note that once you have transferred the file with the material data (Yes) you should never switch off (No) the export of material data in subsequent exports. If you do this, the receipt is also cleared in the ELiPLAN database and all modifications are lost.
Export rebar bending data	Select whether to include or exclude the detailed rebar bending information. If you do not need this data in ELiPLAN, select No to exclude the data from the file and to reduce the file size. Note that once you have transferred the file with the rebar bending data (Yes) you should never switch off (No) the export of rebar bending data in subsequent exports.
Export embed Z position	Select whether to include or exclude the Z level of embeds.

Setting	Description
Notes	Use UDA or template attribute to add extra information to be viewed at the factory, such as design status, change status or general comment. Select what type of notes you want to export: UDA, a template attribute or your own text. Then enter the UDA, template attribute, or text.
Stack, Pile number, Pile level	The export of stack results is supported starting from ELiPLAN export version 3.0. You can select if the UDA is read from the main part or from the cast unit. The UDAs are pre-filled, but you can change them manually.

Data settings tab

Setting	Description
UDA for unit conversion	Specify a UDA for unit conversion. When a valid unit is specified in this UDA, then the specified unit is used for the unit conversion instead of the default unit, or the unit defined in the conversion file.
Unit for element dimensions	Select the unit to be used for the element dimensions. Information about the unit selected for element dimensions is written in the header in version 3.0 of the ELiPLAN export.
Unit for rebar length	Select the unit for the length of reinforcing bars. Information about the unit selected for rebar lengths is written in the header in version 3.0 of the ELiPLAN export.
No. of digits after decimal point	Select the number of digits after the decimal separator (0 - 3). The default is 1 digit after the decimal separator.
Tag for lifters	Use to identify lifting loops by their name or class (default). Also rebar objects can be specified as lifters using a class or a name. It is also possible to specify multiple classes or names. If the name consists of multiple words then it has to be enclosed in quotation marks. Additionally, a user-defined attribute (UDA), or a template attribute (Template) can be specified to

Setting	Description
	use a specific property with a specific value to recognize lifters. When lifting loops are identified, the plotter instruction type is changed from <code>WPL</code> to <code>LL</code>.
Tag for filled cores	You can enter either a single string (the name) or multiple strings. Tekla Structures will then use the entered name or names as filter criteria to determine filled cores from the model. Depending on the selected option, the placement of the weep holes will be calculated and written to the export file.
Prefix for ID	Enter a prefix (letter) to use with the ID number.
Position number type	Select whether to export the cast unit position number, assigned control number (ACN), cast unit position number and ACN, or a template attribute specifying any property you want to be returned for the position code.
Remove numbering separator	Select whether a position number separator is used in numbering. The default is No .
Tag special elements	Set this option to Yes to set a special tag for elements that have notch cuts. This option marks hollow-cores with notches with SK denominator (N for uncut slabs).
Strand code	Specify a UDA or a template attribute to read the strand code. Default reads the value from the UDA <code>TS_STRAND_CODE</code> . You can also specify a custom property using the option Template .
Net area calculation	Select Exclude all cuts to exclude all cuts, or Exclude full depth cuts only to exclude full depth cuts only from the net area calculation, or Gross area to export gross area as net area. You can also specify a custom property using the option Template. The whole assembly is checked. You are now notified via log when the net area calculation fails.
Weight calculation	Select which weight will be exported. The options are: • Default: reports the weight defined by the attribute <code>CAST_UNIT.WEIGHT_NET</code>. • WEIGHT: reports the weight defined by the attribute <code>WEIGHT</code>.

Setting	Description
	• WEIGHT NET: reports the weight defined by the attribute <code>WEIGHT_NET</code>. • CAST UNIT WEIGHT: reports the weight defined by the attribute <code>CAST_UNIT.WEIGHT</code>. • MAIN PART WEIGHT: reports the weight defined by the attribute <code>WEIGHT</code>. • Template: reports the weight defined by a specified template attribute or custom property. • User-defined density: reports the result of the user-defined density value * object volume.
Include sub-materials	Export sub-materials of concrete material. Sub-materials are exported in the <code>#SUBMATERIAL</code> section of data conversion file.
Decimal mark	Set period (.) or comma (,) as the decimal mark depending on ELiPLAN settings.

ELiX content tab

Setting	Description
Cast unit drawings	Specify the folder path that you want to read for any cast unit drawing PDFs. The content of this folder will be included in the exported <code>.elix</code> zip file in ELiX export.
Unitechnik files	Specify the folder path that you want to read for any Unitechnik files. The content of this folder will be included in the exported <code>.elix</code> zip file in ELiX export.

ELiPLAN data conversion file

The data conversion file (.dat) contains string pairs separated with one or more tabs. The string on left side is the profile name or Tekla Structures material description and the string on right side is the corresponding ELiPLAN data. The mapping can also contain the unit for quantity for material codes.

You can combine several mappings in one, because the product and material code conversion is based on tags separated with the pipe character ("|"). A matching conversion is used when any tags are found in the source file.

Note that the ELiPLAN codes depend on the fabricator and the codes which are valid for one fabricator are most probably not valid for other fabricators.

The product code and the material code can be defined separately: mappings following the line `#PRODUCT CODES` are used for product code conversion

and mappings following the line #MATERIAL CODES are used for material conversion.

Example of a data conversion file:

```
#PRODUCT CODES
//
// Hollow-core slabs
//
265X1200      HCS27
320X1200      HCS32
400X1200      HCS40
//
// Beams
//
BEAM|RCDL      B_LP2P
BEAM|RCL       B_LP
BEAM           B_SK

#MATERIAL CODES
//
// reinforcement
//
A500HW|6       TW6      kg
A500HW|8       TW8      kg
A500HW|10      TW10     kg
A500HW|12      TW12     kg
A500HW|16      TW16     kg
A500HW|20      TW20     kg
A500HW|25      TW25     kg
A500HW|32      TW32     kg
//
// Strands
//
1570/1770      1570/1770      m
//
// Meshes
//
B500K|8/8-200/200      B500K8-200      m2
B500K|10/10-250/400    B500K10-250/400    m2
//
// Embeds
//
HPKM39|50*110-110      HPKM39      pcs
Neoprene                NEO_10      m2
//
// Concrete materials
//
C35/45      C35      m3
C40/50      C40      m3
C45/55      C45      m3
```

You can combine several mappings in one, because the product and material code conversion is based on tags separated with the pipe character ("|"). Ensure that you use matching case.

ELiPLAN export file (.eli)

The .eli file contents are described below.

Header data for file info

The geometry of the elements is reported in the #Pieces and #Plotter blocks:

#Pieces:

- Contains a unique data row for each slab.
- Has a unique data row for each slab.
- For hollowcore slabs, the outer measurements are reported in the #Pieces block based on the min (x, y) and max (x, y) values of the slab. These measurements describe a rectangle, parallelogram or trapezium. The thickness, profile and additional information of the slab is reported.
- In the #Pieces block you can separately flag slabs that have cuts in the edges.

#Plotter:

- Contains data for individual plotting operations by element, such as embeds, recesses, and through-cuts.
- The #Plotter block also contains geometrical data that is arranged by the slab position. The operations are performed on each slab on the basis of the position number.
- Each plotting operation is on its own row (formwork accessories, recesses, cross sections).
- In the export settings you can define the plotting data scope included in the export.
- The shapes can be lines, rectangles or circles.
- The order of the rows is not important, they will be reorganized in ELiPLAN.
- If the geometry cannot be presented as a rectangle or a circle inside the slab boundaries, it will be presented as a line.
- Overlapping plotting with the outer boundaries defined by the #Pieces data has been minimized, and crossing the edges is prevented.

#Materials:

- Contains data for material quantities by element.

#Bars:

- Contains data for rebar shapes by element.

Example of an export file:

```
2.00;1;;04.06.2019 11:49:15
# Pieces
56a109f8-562c-4aa5-882a-a45cc7be9b95;B LP2P;B/
1;7200.00;0.00;0.00;500.00;600.00;0.00;3628.80;1.51;4.32;1.08;;;PHASE
1;;N;0;
3dbe09b6-1b35-44e7-a18f-0c492a71b6a6;HCS32;HC/
1;6000.00;6000.00;0.00;700.00;0.00;320.00;1655.09;0.69;4.20;4.06;;;PHASE
1;;N;0;
1d2c4018-daa3-4b5d-801a-4a1e491db41f;HCS32;HC/
2;6000.00;6000.00;0.00;1200.00;0.00;320.00;2765.20;1.15;7.20;6.93;;;PHASE
1;;N;0;
```



```

0b003ef7-2c79-4e4d-844f-51616ad0584d;HCS32;HC/
3;6000.00;6000.00;0.00;1200.00;0.00;320.00;2747.86;1.14;7.20;6.89;;;PHASE
1;;N;0;
e670a8ac-c034-4fa9-b5e3-0a17461502fb;HCS32;HC/
4;5750.00;4875.00;0.00;1200.00;0.00;320.00;2446.78;1.02;6.89;6.13;;;PHASE
1;;N;0;
868229bf-36ed-4b87-9d2e-e7c36962b181;HCS32;HC/
5;4875.00;4000.00;0.00;1200.00;0.00;320.00;2044.57;0.85;5.85;5.12;;;PHASE
1;;N;0;
# Plotter
HCS32;HC/3;LI;LI;5750.00;1200.00;6000.00;850.00;0.00;0.00;
# Materials
B_LP2P;B/1;C35;1.51;
HCS32;HC/1;C40;0.69;
HCS32;HC/1;1570/1770;18.00;
HCS32;HC/2;C40;1.15;
HCS32;HC/2;1570/1770;36.00;
HCS32;HC/3;C40;1.14;
HCS32;HC/3;1570/1770;34.69;
HCS32;HC/4;C40;1.02;
HCS32;HC/4;1570/1770;29.45;
HCS32;HC/5;C40;0.85;
HCS32;HC/5;1570/1770;24.22;
# Bars

```

Import an ELiPLAN status data file

If you have a status data file that has been created in ELiPLAN, you can import the status and scheduling information to your Tekla Structures model.

1. On the **File** menu, click **Import --> ELiPLAN**.

The **Import ELiPLAN status data** dialog opens.

2. Click the ... button next to the **Import file name** box to browse for the file to be imported.
3. Click **Create**.

Tekla Structures updates the status and schedule data for parts in the Tekla Structures model. When the data is read, a log file is displayed.

Example of status data file contents:

```

Project12345;3dbe09b6-1b35-44e7-a18f-0c492a71b6a6;HC/
1;Ready;11.11.2016;15.11.2016;14.11.2016;inspected;;

```

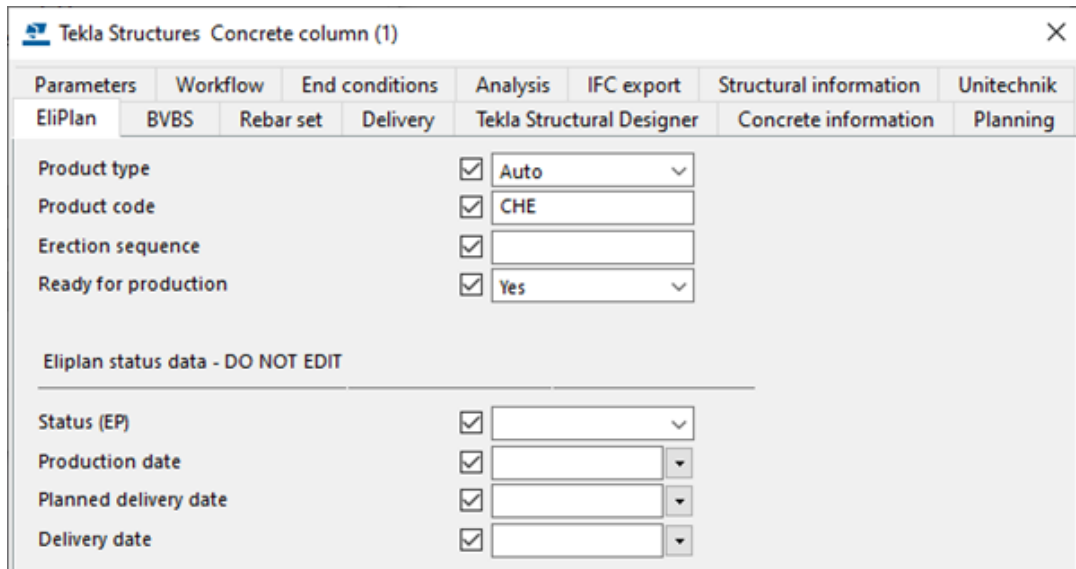
The log file shows the parts whose data is updated correctly. It also provides information on possible problems that may have occurred. When you select a row in the log file, Tekla Structures automatically selects the corresponding part in the model. The overall status information is shown at the end of the log file.

Tekla Structures stores the actual status data in the user-defined attributes of the parts. To view the data, open the part properties, click the **User-defined attributes** button and go to the **ELiPLAN** tab.

ELiPLAN user-defined attributes

In addition to normal model data, you can add additional information in the user-defined attributes of the parts. The additional information can be transferred from Tekla Structures and used in ELiPLAN.

The product type and product code user-defined attributes override the automatic product type and product code. Other user-defined attributes are reserved for ELiPLAN import.



Product type

The product type affects how ELiPLAN considers the part dimensions length, length2, deltaL, width, height, and thickness.

The product type user-defined attribute overrides the product type defined in the ELiPLAN export dialog.

To set the product type, select a suitable product type option from the list. Normally you should be able to use the default **Auto**, but in some cases you may need to override the default.

If needed, you can override the product type value set in the dialog in the following way:

- You can enter a value for the user-defined attribute `EP_TYPE` in the `objects.inp` file.
- You can enter a value for the user attribute `EP_TYPE` in the **Profile catalog**.

In the **Profile catalog**, the attribute value is given as a number. The values are as follows:

- Slab = 1
- Beam = 2
- Column = 3

- Wall = 4
- Sandwich wall = 5
- Stair = 6

Product code

The product code user-defined attribute overrides the product code defined in the ELiPLAN export dialog.

You have alternative ways to give the product code. The ELiPLAN export tries to define the product code in the following order:

1. You can enter a value for the product code in the ELiPLAN user-defined attributes dialog.
2. You can enter a value for the user-defined attribute `EP_CODE` of the cast unit main part in the `objects.inp` file.
3. You can enter a value for user attribute `EP_CODE` in the **Profile catalog**.
4. You can use the data conversion file to convert parametric profile names to a product code.
5. The main part name is exported as the main part name if none of the previous methods succeeded.

Erection sequence

Precast parts are erected in a certain sequence. Use the sequence to help the scheduling of the production in ELiPLAN. You can give the estimated erection sequence by giving the sequence number for parts.

Ready for production

Set this option to **Yes** when the designer or detailer has finished the part and the part is ready for production. The default is **No**, which means that the data is transferred to ELiPLAN for preliminary planning only, and the part is not sent for production until the attribute is set to **Yes** and a new file is transferred to ELiPLAN.

ELiPLAN status data

The **ELiPLAN status data** is meant to be read-only information and used to visualize the data in a Tekla Structures model.

Set up your UDAs in the model or profile catalog for mapping object types, profiles and materials

For more information on how to set up your UDAs in the model or profile catalog for mapping object types, profiles and materials to suit the ELiPLAN export, see [ELiPLAN/ELiPOS export guide](#).

Handling sub-materials in ELiPLAN export

NOTE To enable the calculations as well as the transfer to the ELiPLAN file, the option **Include sub-materials** must be set to **Yes** on the **Data settings** tab in the **Export to ELiPLAN file (68)** dialog.

The ELiPLAN export serves the purpose of providing production-related data for precast units. Quantities are provided as well as other relevant information. From a material point of view, the amount of concrete as well as the quantities of pieces (ref, embeds, reinforcement, etc.), is transferred.

Referring to the main material concrete, the ELiPLAN export does not provide information on the concrete mixture - the concrete recipes are handled by the fabrication or production system. However, the including the sub-materials allows the calculation of the sub-materials, such as water, sand, and gravel, which are required for the composition of the concrete type.

To enable the calculations and the export of the sub-materials, additional information must be added to the ELiPLAN mapping file, usually named `eliplan_export.dat`. Below is an example with explanations:

```
#SUBMATERIAL
C35/45 SUBMATERIAL_1 0.2
C35/45 SUBMATERIAL_2 0.8
C35/45 SUBMATERIAL_3 0.1
```

Essential is the block identifier `#SUBMATERIAL` where the actual sub-material definitions are made. The logic of entering data follows the same logic as the other blocks and records in the mapping file, use the tabulator key to separate the entries.

- The first record in the block represents the material used in the Tekla Structures model, chosen from the Tekla Structures material catalog, C35/40 in the above example.
- The second record represents a sub-material, `SUBMATERIAL_1` in the above example.
- The third record represents the calculation factor for the sub-material, `0.2` in the above example.

About factors

The example factors are only used to explain the functionality. When you start to use the functionality, we recommend that you refer to the official concrete type recipes to determine the correct factors.

- Concrete density (as per catalog definition) = example 2450 kg/m³
- `SUBMATERIAL_1` should be used to report the amount of cement = example 0.2
- The calculation of the amount of cement per m³ = 2450 x `SUBMATERIAL_1` factor = 490 kg

- SUBMATERIAL_2 should be used to report the amount of sand, gravel, and crushed stones = example 0.8
- The calculation of the amount of cement per m3 = $2450 \times \text{SUBMATERIAL\_2}$
factor = 1960 kg
- SUBMATERIAL_3 should be used to report the amount of water = example 0.1
- The calculation of the amount of cement per m3 = $2450 \times \text{SUBMATERIAL\_3}$
factor = 490 kg

If there is a need to modify the sub-materials further, for example, if the name needs to be mapped or the type of unit needs to be changed, the existing ELiPLAN export mapping functionality takes care of that. As with other entities, the mapping is done within the #MATERIAL CODES block. Here is an example:

```
#MATERIAL CODES
SUBMATERIAL_1 CEMENT t
SUBMATERIAL_2 SAND t
SUBMATERIAL_3 WATER t
```

Best practices in ELiPLAN export

The following guidance helps you to ensure the best possible result from the ELiPLAN export.

For exact instructions on the ELiPLAN export, export settings, and on other related topics, see [ELiPLAN \(page 546\)](#).

Pre-research

Before you start, find out the following:

- Which elements are produced?
- What are the bed sizes and other fabrication requirements?
- What should be plotted?
- Are embed and rebar quantities desired?
- What kind of product and material codes are being used?
- What additional information is desired from the model?
- Is it needed to bring process information back to the model?

Before you start a project:

- Collect product codes and material article numbers.
- Create the data conversion file, include any necessary codes, and test with sample products that the data conversion table works as intended.
- Use automatic settings or choose the most suitable input method.

- Numbering logic:
 - For ELiPLAN, every element should be unique and traceable.
- Data scope: Geometry, attribute, materials
 - Which products and materials to include?
 - Which plotter data to include?
 - Draft a modeling guideline to categorize model objects with specific class/name/other attribute
- Fabrication requirements: dimensions, profiles, maximum weight
 - Document everything in the modeling guideline

Best practices in ELiPLAN export

The following guidance helps you to ensure the best possible result from the ELiPLAN export.

For exact instructions on the ELiPLAN export, export settings, and on other related topics, see [ELiPLAN \(page 546\)](#).

Workflow

- Model according to modeling guideline, depending on fabrication requirements.
- Model precast objects with their embedded content.
- If hollow-core geometry is used for plotting within ELiPOS, ensure that recesses and embed positions are accurate.
- Set up profile and material catalogs according to fabrication requirements.
- Adjust the profile catalog and modeling settings so that the mapping to the ELiPLAN system is done correctly.
- Ensure that you use the materials and profiles that you have mapped.
- Define standard export settings in line with the modeling guideline.
- In newer Tekla Structures versions, always use GUID or ACN as the element identifier.
- Number the model. Use Tekla Structures numbering for creating drawings, and assembly control numbering (ACN) to track unique elements.
- Use automatic data conversion and product types.
- Add design status information to precast objects and import the status to ELiPLAN using additional UDAs to communicate the design status. Also mark the objects that have been sent to production.
- Always check the resulting file and the export log:
 - Ensure that there is no strange mapping in the product or material codes.

- Validate the export files in the production software, as there is no viewer available.

HMS

You can export model data of hollow core slabs in the HMS format. The result is a `.sot` file.

HMS stands for Hollowcore Manufacturing System and it is developed in the Netherlands. You can export data of hollow core slabs from Tekla Structures to HMS. HMS uses the data in manufacturing processes.

Export in HMS format

1. Select the model objects that you want to include in the export.
2. On the **File** menu, click **Export --> HMS**.
The **Export HMS** dialog opens.
3. Define the export properties as required. For more information, see the HMS export settings section below.
4. Click the ... button to browse for the folder where you want to save the file.

The `\HMS` folder under the model folder is the default.

5. Enter a name for the file.
The file name extension is `.sot`.
6. Click **Save**.
7. Select the **Add revision to file name** checkbox and select the revision number if required.
The revision number is added to the HMS export file as follows:
`hms_export_file<revision>.sot`
8. Select the **Open log file after export** checkbox if you want to see the log after export.
HMS Export creates the log file in the file export folder.
9. Click **Export** to create the HMS export file.

HMS Export settings

You can include project data, slab data, and steel part information in the HMS export.

Project data tab

Option	Description
Customer Name Customer Number Contractor Name Site Address Site City Section Name Project Status Remark 1 Remark 2 Remark 3	You can include project data, such as customer name and site address, in the HMS export file. The boxes have the following values available: • Empty The item is not included in the HMS export file. • Text Enter the text in the box next to the item. • Project UDA The data comes from the project's user-defined attributes. • Project Object, Project Address, Project Info 1 - 2 The data comes from the project information.
Export file	Define a name and location for the export file. The file name extension is <code>.sot</code> . By default, the export file goes to the <code>\HMS</code> folder under model folder.
Add revision to file name	Add the revision number to the HMS export file: <code>hms_export_file<revision>.sot.</code>
Open log file after export	Open the log file after export. The HMS export creates the log file in the file export folder.

Slab data tab

Option	Description
Position Number	Assigned Control Number (ACN) is the only option.
Slab Remarks Element Type End Label	The options are: • Empty The item is not included in the HMS export file.

Option	Description
	• Text Enter the text in the box next to the item. • UDA The data comes from the project's user-defined attributes
Slab Name	The options are: • Profile Select to export the whole profile name. • Thickness Select to export only the profile height.
Slab Mark	The options are: • Assembly position Select to export the complete cast unit position. • Assembly serial number Select to export the cast unit serial number only.
Bay number	Select the default UDA or UDA of your choice. The value type of the default UDA is integer, and it must be type integer for any other chosen UDA as well.
Slab Weight Units	Select the weight unit.
Live/dead load	Enter the default live/dead load to be exported. For hollow core slab calculation, you can define a default live load/ dead load (KN/m2) for slabs. If you do not define this data here, you must enter the default values for each slab in HMS software later.

Slab scope tab

Option	Description
Exclude parts	Enter the class or the name of the model object, text, UDA or a template attribute to exclude the data.
Hook Points Electric boxes Weld plate Solid fill Filled area	Select the data that is exported. • Empty The item is not included in the HMS export file. • Name Select to include the name. • Text Enter the text in the box next to the item to include the text. • Class Enter the class of the model object in the box to include the class. • UDA The data comes from the user-defined attributes. • Template The data comes from a template attribute.
Hook point name	Select to include hook point name in export. • Name Select to include the name. • Text Enter the text in the box next to the item to include the text. • UDA The data comes from the user-defined attributes. • Template The data comes from a template attribute.

Option	Description
Weld plate name	Select to include weld plate name in export. • Name Select to include the name. • Text Enter the text in the box next to the item to include the text. • UDA The data comes from the user-defined attributes. • Template The data comes from a template attribute.

Reinforcement tab

Option	Description
Export strand code	Select to include strand code in export.
Export strand pull force	Select to export pull force data.
Custom top strands Custom bottom strands	Enter the quantity, diameter, distance and pull force for custom strands. The custom strand settings are meant to be used if no strands are modeled. If there are modeled strands, the custom strands will be included in addition.
Additional strands	Additional strands can be used to designate any other specific rebar object to be exported as strand, as only strand objects are included in the export by default. • Name Enter the strand name. • Class Enter the class in the box next to the item to include the class.

Option	Description
	• UDA The data comes from the user-defined attributes. Enter the name and value of the UDA. • Template The data comes from a template attribute. Enter the template attribute and the value.
Reinforcement	Reinforcement can be included in the export as cross bars by specifying them in the Reinforcement setting. • Name Enter the reinforcement name. • Class Enter the class in the box next to the item to include the class. • UDA The data comes from the user-defined attributes. Enter the name and value of the UDA. • Template The data comes from a template attribute. Enter the template attribute and the value.

Options tab

Option	Description
Boundary line	Export the boundary line Along cut side of the slab or Along uncut side of the slab .
Export Hook Box	Select to include hook data.
Export HP name	Select to export hook point names. If you do not select this option, only the XY coordinates are exported.
Export inner cores	Select to include detailed information on hollow cores in export.
Include full cut to contour	Select to include in export full cut in the contour block (CO). If not selected,

Option	Description
	the full cut is written as an individual cut (SEP).
Generate drain/weep holes	Select to include drain holes and weep holes in export. You can also specify the offset.

3.16 CAD

The CAD import and export tools support several model formats. You can import a maximum of 10,000 parts. If the number of parts exceeds this, Tekla Structures displays a warning message, and does not import the model.

CAD import and export formats

The table below lists the supported import and export file types.

Option	Import	Export	Imports from/Exports to
SDNF	✓	✓	SDNF (Steel Detailing Neutral File) is used in importing to and exporting from several different CAD systems.
HLI	✓	✓	HLI (High Level Interface). IEZ AG Speedikon software
Plantview	✓		Plantview design system
SDNF (PDMS)	✓	✓	Plant Design Management System. Aveva 3D plant design software. Data is exported as PDMS via SDNF link. Tekla Structures writes the information of finish field in the member class attribute, whereas in SDNF export it omits the class information.
XML	✓	✓	ArchiCAD modeling system. There are some limitations in the export:

Option	Import	Export	Imports from/Exports to
			• Conversion files are not used. • Holes, bolts and welds are not exported.

In addition to the CAD import tool, also FEM import is available in the **New Import Model** dialog. For more information, see [FEM import \(page 357\)](#)

Import a CAD model

NOTE Before you start an SDNF export, check that the advanced option has been set to `FALSE` in the **Export** category of the **Advanced options** dialog. This does not convert plate profiles to contour plates, but handles the profiles as beams in the import.

1. On the **File** menu, click **Import --> CAD**.
2. In the **New Import Model** dialog, select the import type **Import CAD**.
3. Enter a new name for the import file.
4. Click the **Properties...** button to define the import settings, which depend on the selected import type.
For more information about the import-type-specific settings, see the settings and their descriptions the "CAD import settings" section below.
5. Click **OK** to apply the changed properties.
6. In the **New Import Model** dialog, click **OK**.
7. In the **Import Models** dialog, select the import model name from the list and click **Import**.
8. In the **Import model info** dialog, select which version of the objects to import.
9. Click **Accept all**.
The **Accept all** option is used if you are importing a new model over an existing one. If you have changed the model and want to re-import it, you can also reject all changes by clicking **Reject all**, or accept or reject individual changes by clicking **Select individual....**
10. Tekla Structures displays the message **Do you want to save the import model for subsequent imports?** Click **Yes**.
Tekla Structures adds the imported model in the model view.
11. Right-click the model view and select **Fit work area to entire model** to ensure that the imported model is completely visible.

12. If parts are missing, check the **Depth up** and **Depth down** values in the **View Properties** dialog and change them if necessary.

NOTE In the SDNF import, if you want to import information that Tekla Structures parts do not have, you can use the SDNF extension line in the SDNF file to be imported, and the `REVISION_NUMBER` user-defined attribute in Tekla Structures.

For more information about the SDNF interoperability, see [SDNF](#).

CAD import settings

Setting	Description
Conversion tab	
Profile conversion file Material conversion file Twin profile conversion file	Define the conversion files you want to use. The maximum conversion file path length is 255 characters. Conversion files map Tekla Structures profile and material names with names used in other software. For more information about conversion files, see .
Parameters tab	
Input file	The file that you want to import. You can also browse for the file. The default value is <code>import.lis</code> . The maximum folder path length is 255 characters.
Type	Define the input file or model type: SDNF, HLI, Plantview, SDNF (PDMS), XML
Origin X, Origin Y, Origin Z	Define the origin coordinates to place the file in a specific location.
SDNF tab	
Pos_No	Enter a prefix and a start position number for parts. This settings relates to the Position number type setting.
SDNF version number	Set the SDNF format type to 2.0 or 3.0 . SDNF 3.0 is generally the format to select. However, with StruCAD it is better to share SDNF 2.0 files.

Setting	Description
Apply cuts and fittings	Set to Yes (default) to apply cuts and fittings in the import. These will only be included if contained within the SDNF file.
Consider offsets	Set to Yes to create offsets. In most cases you should select Yes. No (default) positions part creation points at part end points. In most cases you should select Yes. No (default) positions part creation points at part end points.
Create log file	Select Create to write a new log file and delete the previous log file each time you import the model. If the import fails, examine the log file to find out why. Check the log file even if the import seems to have succeeded. Select Append (default) to add the log file information is at the end of the existing log file. If yo do not need a log file, select No .
Display log file	Select With external viewer to display the log file in a text editor. Select On dialog to create a separate list dialog in which the file can only be viewed. If you do not want to display the file, select No .
Log file name	Enter the log file name or browse for an existing log file.
Position number type	The SDNF file contains identifiers that can be included in a part's user-defined attributes, or used as part position numbers. Select Part position if you want the identifier to become the part's position number. Do not use the Pos_No option with this option. Select Universal ID if you want the identifier to become a user-defined attribute for the part. For file imports from PDS or PDMS then the Universal ID option is the normal case. To make user-defined attributes visible in the dialogs, you need to add them to the <code>objects.inp</code> file.
Plantview tab	
Material	Select the material grade.
Report tab	

Setting	Description
Create report	Set to Yes to create a report.
Display report	Set to Yes to display the report.
Report template	Select the report template.
Report file name	Enter the report file name or browse for a report file. If you do not give the report any other name, the report is saved with the name <code>import_revision_report.rpt</code> in the model folder.
Advanced tab	
Action when objects status is (compared to)	Previous plan lists the objects in your model, compared with the objects in the file to be imported. They can be New, Modified, Deleted, or Same. Tekla Structures compares the state of imported objects with those in your model. They can be Not in model, Different, or Same. Use the options under Not in model, Different, and Same to specify the actions when importing changed objects. The options are No action, Copy, Modify, or Delete. Usually there is no need to change the defaults.

Re-import a CAD model

Sometimes you have already imported a model, but because of some changes, you need to re-import it.

The profile and material conversion files need to be the same as defined in the original model import.

1. Open Tekla Structures and a model where you have already imported an existing CAD model.
2. On the **File** menu, click **Import --> CAD**.
3. Select the import type in the **Type** list.

For CAD models, this will generally be for SDNF format files only.

4. Enter a new name for the imported model in the **Name** box.

The total path and filename cannot be longer than 80 characters. If the total path is too long, a message is displayed saying "File name and path is too long. Please, place the file into another directory." Also, if you use the same name as in the original import, Tekla Structures gives the warning message "Illegal name for import model."

5. Click the **Properties...** button and ensure that the profile material conversion files on the **Conversion** tab are the same as adopted in the original model import.
6. Go to the **Advanced** tab and define the actions Tekla Structures takes when importing changed objects:
 - The left-hand column, **Previous plan**, lists the state of the objects in your model, compared with the state of objects in the file to be imported. They can be **New**, **Modified**, **Deleted**, or **Same**.
 - The objects can be **Not in model**, **Different**, or **Same**.
 - Use the list boxes in the rows under **Not in model**, **Different**, or **Same** to specify the actions to take when importing changed objects. The options are **No action**, **Copy**, **Modify**, or **Delete**.
 You can select **Delete** only for **Deleted** objects. You can only use **Delete** to delete objects that have been deleted from your model, not from the imported model.
 - Normally, default settings would be used by most users.
7. Create reports on the **Report** tab to compare the various imports.
8. Click **OK** or **Apply**.
9. Click **Import** in the **Import Models** dialog to import the updated model.

Export a CAD model

NOTE Before you start an SDNF export, check that the advanced option has been set to `FALSE` in the **Export** category of the **Advanced options** dialog. This does not convert plate profiles to contour plates, but handles the profiles as beams in the export.

1. Open a Tekla Structures model.
2. On the **File** menu, click **Export --> CAD**.
 The **Export CAD** dialog opens.
3. Enter the paths to the required conversion files on the **Conversion** tab, enter the parameters on the **Parameters** tab, and depending on the export format, define the settings on the **SDNF** or **XML** tab.
 For more information about the export settings, see the "CAD export settings" section below.
 The PML format is no longer supported.
4. Select the parts in the model to export.
5. Click **Apply** and **Create**.
 Tekla Structures creates the export file in the current model folder.

CAD model export settings

Setting	Description
Conversion tab	
Profile conversion file	Define the conversion files you want to use.
Material conversion file	Conversion files map Tekla Structures profile and material names with names used in other software.
Twin profile conversion file	For more information about conversion files, see .
Parameters tab	
Output file	The file name of the exported file. You can also browse for the file.
Type	Select the export format: HLI, SCIA, SDNF, PDMS, SDNF (PDMS), XML
Origin X, Origin Y, Origin Z	Define the origin coordinates to place the exported model in a specific location.
PML tab: this format is no longer supported	
SDNF tab	
SDNF version number	Select the SDNF version to be used in the export. With StruCAD, use SDNF version 2.0.
Apply cuts and fittings	Select Yes (default) applies cuts and fittings in the export.
Position number type	The SDNF file contains identifiers, which can be included in a part's user-defined attributes, or as position numbers. You have the following options: • Part position The identifier becomes the part's position number. Do not use the Part Pos_No fields with this option. • Assembly position The identifier becomes the assembly's position number. • Universal ID The identifier becomes a user-defined attribute for the part. To make user-defined attributes visible, you need to add them to the <code>objects.inp</code> file.

Setting	Description
Consider offsets	To ignore the offset records during export, select No , and to take them into account, select Yes . This setting does not affect the actual start and end point information, only the offset. Tekla Structures writes the start and end points based on the actual solid object, not on the reference line.
PDMS phase offset	PDMS phase offset defines phase offset for exported parts. For example, if the first phase in Tekla Structures model is 1 and you enter 10 for phase offset, Tekla Structures parts in another software get the phase from 11 and up.
Engineering Firm	Enter the name of the engineering company.
Client	Enter the name of the client.
Structure ID	Enter a unique identification number for the exported model.
Project ID	Enter a unique identification number for the exported project.
Revision Number	Enter an optional revision number. Tekla Structures takes the revision number from the user-defined attributes (REVISION_NUMBER) of the model. If this field is blank, Tekla Structures uses a revision number from the Export CAD dialog (Revision Number).
Issue Code	Tekla Structures writes an issue code in the header section of the output file. For PDMS, this value should always be "Tekla Structures".
Design Code	Define the design code to be used in structural design.
XML tab	
Units	Specify unit conversions (MM, M, IN, FT). For example, for a Tekla Structures model created using millimeters, select IN to convert all part dimensions to inches in the output file.
XML structure ID	Unique identification number for the exported model. You must always enter the identification ID. Tekla Structures uses this value to identify the model if you re-export it.
XML structure name	The unique name of the exported model.

3.17 Import user-defined attribute values

You can import user-defined attribute (UDA) values to a model from a text file. For example, you can import a list of manufactured or checked assemblies. You can also clear existing user-defined attribute values through attribute import.

You can import attribute values to Tekla Structures model objects, drawings, and reference model objects (if configured, see Add UDAs in reference models). You define matching criteria for the attribute import in your input file, and you can additionally limit the import scope to objects you select in the model or to reference model objects.

The input file can be:

- Exported from other software.
- Created manually using any standard text editor, for example, Microsoft Notepad.
- Created from Microsoft Excel by saving the file with the **Save as** command to **Text (Tab-delimited) (*.txt)** format.
- A simple Tekla Structures report containing the part GUIDs and user-defined attributes.

NOTE There are alternative ways to import data into user-defined attributes. For example, user-defined attributes can be filled in when you import IFC objects and convert them to native Tekla Structures objects. There are also several extensions in [Tekla Warehouse](#) that allow you to modify user-defined attribute data.

Input file structure for importing values into user-defined attributes

You can import user-defined attribute (UDA) values into Tekla Structures models from input files, which are delimited text files.

Delimiters in input files

A delimiter is a character that separates different fields that are on the same line.

You can delimit fields with any ASCII character that does not appear in the names or values of the attributes that you are importing. You can use several alternative delimiters in the same input file. Common delimiter characters include the comma, tab, semicolon, and space.

Field and value definitions in input files

In the input file, the first line is a header that defines the fields for the rest of the input file. All other lines in the input file contain the values for the fields that you named on the first line.

The first line must contain at least one *key field* that identifies the model objects or drawings, and at least one user-defined attribute name that identifies a user-defined attribute field into which you want to import new values. Note that the names of many of the fields are different than the field labels that you see in the user interface. The user-defined attribute names are defined in the objects.inp files that apply to the model (see the reference about how to read the file).

The configuration file `import_macro_data_types.dat` (which is explained further ahead) defines which fields you can use in the attribute import and what is each attribute's data type. It is not possible to add or change the key fields, but you can edit the set of user-defined attributes. Values are imported as strings (text) unless a different data type is defined for the attribute in the `import_macro_data_types.dat` file.

Available key fields for input files

The key fields for model objects are:

Key field	Example	Action
GUID	ID4FEAFC88-0000-0004-3133-343038303031	Tekla Structures assigns the user-defined attributes on this line in the input file to the model object that has a GUID value of ID4FEAFC88-0000-0004-3133-343038303031.
ASSEMBLY_POS or MARK	A3	Tekla Structures assigns the user-defined attributes on this line in the input file to the assembly that has an ASSEMBLY_POS value of A3. Repeat this line for each assembly you want to include.
PHASE	2	Tekla Structures assigns the user-defined attributes on this line in the input file to the assembly that has a PHASE value of 2. You must also use ASSEMBLY_POS as a key field with this option.

The key fields for drawing objects are:

Key field	Example	Action
TYPE NAME	A D4	Tekla Structures assigns the user-defined attributes on this line in the input file to the drawing that has a TYPE value of A and a MARK value of D4. Use both key fields in the input file.
ID	134	Tekla Structures assigns the user-defined attributes in this line in the input file to

Key field	Example	Action
		the drawing object that has an ID value of 134.

Empty values in input files

Some lines in the input file might not have a value for all of the attribute fields. For example, there might be two or more consecutive delimiter characters between values.

These empty values can be either skipped during import without making any changes to user-defined attributes, or you can use these empty values to erase existing user-defined attribute values in your model. By default, empty values are skipped. To clear existing values instead, set the advanced option `XS_ERASE_UDA_VALUE_WITH_ATTRIBUTE_IMPORT_NULL_AND_BLANK` to `TRUE` in an ini file.

Reading order for input files

Tekla Structures reads the input file in order starting from the first line. If there are duplicate key fields on the following lines, only the first occurrence is imported.

Data files (`import_macro_data_types.dat`) for importing values into user-defined attributes

To import a value into a user-defined attribute, the field name and data type must be correctly defined in the `import_macro_data_types.dat` data file. You can add, edit, and remove user-defined attribute fields into which data is imported

NOTE Do not edit the key fields section of the file. It is not possible to add new key fields.

Location of data files

The default data file is located in the `system` folder in the environment folder, such as `C:\ProgramData\Trimble\Tekla Structures\<version>\environments\common\system`. There might also be a localized version of the file in the environment that you are using.

Do not make changes to the default files. Instead, create a copy of the file and store it in a different location, for example, in the `firm` folder or in the `attributes` folder in the model folder. This way, your changes are not overwritten when you reinstall or upgrade Tekla Structures. When the same file exists in multiple locations, the default folder search order is followed and only the first file that is read is used.

Content of data files

The `import_macro_data_types.dat` file is plain text. You can modify the file using any standard text editor, such as Microsoft Notepad.

Each line in the file is a field definition that can contain the following attributes in this order:

User-defined attribute name, Data type, Conversion factor, Comments

1. User-defined attribute name. Write the internal field name as defined for the field in an `objects.inp` file.

For example, in the `objects.inp` definition

```
attribute("USER_FIELD_1", "j_user_field_1", string, "%s",  
no, none, "0.0", "0.0"),
```

the user-defined attribute name is `USER_FIELD_1`.

2. Data type.

The value can be: `INT` (integer), `STRING` (text), `FLOAT` (decimal number), or `DATE` (date fields with a calendar widget). If the value is missing or incorrect, the value defaults to `STRING`.

A value type mismatch does not prevent importing data, but the results might not always be correct depending on the data and the field. For example, date fields might be set incorrectly if the data type is not `DATE`. However, you can import a number with the integer data type into a text field without problems.

Fields with option lists are defined as number fields of the `INT` value type. For example, object locks can be set to **No**, **Yes** and **Organization** with the corresponding numbers 0, 1 and 2 in the input file.

3. Conversion factor (optional, `FLOAT` only). For converting imperial values to metric values in imperial environments.

NOTE We recommend that you check the `FLOAT` values to avoid conversion factor errors.

4. Comment (optional). Any characters that follow the previous definitions are ignored and can be used for writing your comments. However, we recommend that you avoid adding comments on the same line as definitions. The file is easier to read if you write most comments on separate lines.

Tekla Structures treats lines that start with double forward slash characters (`//`) as comments and ignores the whole line when reading the file.

Examples:

```
//Regular attributes
```



```
R1_ISSUED_FOR_APPRL, STRING
R1_DATE_APPROVED, DATE
```

```
//Attribute with conversion factor and comment
```

```
shear1, FLOAT, 4448.2222, For kips
```

Examples of input files for importing values into user-defined attributes

Example input file for parts

This input file is tab delimited.

ASSEMBLY_POS and PHASE are the key fields. Tekla Structures adds several user-defined attributes to the assemblies with values that match those listed in the ASSEMBLY_POS and PHASE columns.

For example, an assembly with the ASSEMBLY_POS (assembly number) of B5 in phase 1 gets the following user-defined attributes:

STATUS: 3

USER_PHASE: 6

USER_ISSUE: 3/25/2019

	ASSEMBLY_POS	PHASE	STATUS	USER_PHASE	USER_ISSUE
B1	1	7	3		3/25/2019
B2	1	7	3		3/25/2019
B3	1	7	3		3/25/2019
B4	1	7	3		3/25/2019
B5	1	3	6		3/25/2019
B1	1	3	5		3/26/2019
B2	2	3	4		3/26/2019

The input file contains two entries for B1. In this case, Tekla Structures writes the message ">**Duplicate entry in input file.**" in the log file and only imports the first entry in the file. So in this example, B1 will have the following user-defined attributes after the attribute import:

STATUS: 7

USER_PHASE: 3

USER_ISSUE: 3/25/2019

Example input file for drawings

This input file is tab delimited.

TYPE and NAME are the key fields. Tekla Structures adds a value for the user-defined attribute User field 4 to drawings with values that match those listed in the TYPE and NAME columns.

For example, a drawing with the `TYPE A` (assembly drawing) and `NAME B.2` gets the value 4 in the `User field 4`.

```
TYPE  NAME  DRAWING_USERFIELD_4
A   B.1    3
A   B.2    4
A   C.1    1
A   C.2    2
```

Process an input file for importing values into user-defined attributes

NOTE This operation overwrites any existing attribute values for matching objects if the input file contains a value for the field.

By default, empty values are skipped. To clear existing values instead, set the advanced option `XS_ERASE_UDA_VALUE_WITH_ATTRIBUTE_IMPORT_NULL_AND_BLANK` to `TRUE` in an `.ini` file.

1. If you want to import user-defined attributes to a selected area in the Tekla Structures model, select an area in the model.
2. On the **File** menu, click **Import --> Attributes** .
The **Import Attribute** dialog opens.
3. Click the **...** button next to the **Input file** box to select the input file to be imported.
You can also enter the file path. The path length is 255 characters.
4. Select the settings for the import.

Option	Description
Input file delimiters	Select a delimiter or several alternative delimiters used in the input file. You can delimit fields with any ASCII character that does not appear in the name or value of any of the attributes that you are importing.
Input scope	• Default, Entire model Tekla Structures assigns the user-defined attribute values of objects in the input file to matching objects in the model.

Option	Description
	• Selection only Tekla Structures only assigns the user-defined attribute values of objects in the input file to matching objects in the selected area of the model. Use this option to import user-defined attributes to models. Do not use it for drawings. • Reference models Tekla Structures assigns the user-defined attribute values of objects in the input file to matching objects in reference models.
Create log file	• Create Creates a new log file named <code>attribute_import.log</code> in the current model folder each time you import the user-defined attributes. Any previous attribute import log files are overwritten. • Append Adds log entries to the <code>attribute_import.log</code> file in the current model folder each time you import the user-defined attributes. If the log file does not exist, Tekla Structures creates it. • No Does not create a log file.
Display log file	• No The log file is not shown. • On dialog The log file is shown when the import is complete.

5. Click **Create** to import the file.

If you selected the option to show the log file, Tekla Structures shows the log file in a separate window, and you can click a log entry to select the corresponding object in the model.

4 Share Tekla Structures files in Tekla Warehouse

Tekla Warehouse is a service for collaboration, and for storing and sharing Tekla Structures content.

Tekla Warehouse provides centralized access to a wide range of content that you can use in your Tekla Structures models. With Tekla Warehouse, you can also publish your content online.

Open Tekla Warehouse from Tekla Structures

To open Tekla Warehouse while using Tekla Structures, do one of the following:

- On the **File** menu, click **Extend --> Tekla Warehouse**.
- Go to **Quick Launch**, and start typing **Tekla Warehouse**.

Related information

5 Disclaimer

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