Aveva E3D and Tekla Structures Interoperability

E3D Extension/Add-In, (Export To Aveva extension)

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Introduction

Interoperability, exchanging model information, understanding design intent and identification of changes has long been problematic during the design phases of industrial process plant projects. This is especially true when exchanging information between the Piping and the Structural disciplines. Trimble has developed an interoperability link between Aveva E3D and Tekla Structures. This link is based on the extended format of IFC standard and uses the .tcZip file format. This application enables customers to export and import 3D model objects and their associated user defined attributes between Aveva E3D and Tekla Structures. Structural elements such as Steel and Concrete (and if necessary timber) as well as Piping and Equipment can be exchanged between Aveva E3D and Tekla Structures. This capability works with workflows from Aveva E3D to Tekla Structures as well as from Tekla Structures to Aveva E3D. Changes between the different models are identified and highlighted enabling superior levels of revision control between the Piping and Structural disciplines.

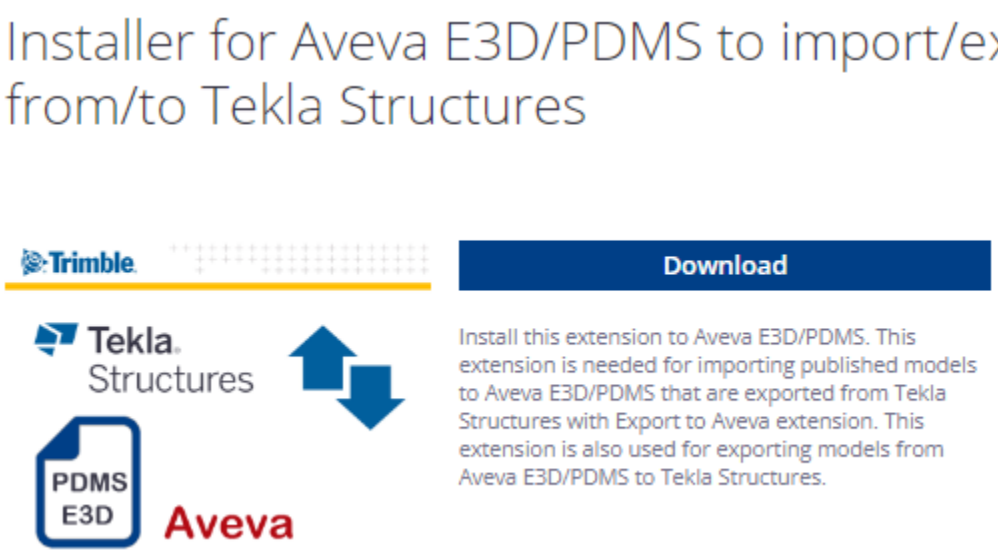
From Tekla Structures, the Export to Aveva application is launched from within the Application & Component Catalogue. Trimble has developed an Add-in for Aveva E3D which can be launched from within Aveva E3D. This Add-in supports the hierarchy concept in E3D so the hierarchies of SITE, ZONE, STRU, FRMW, SBFR etc. are supported when exporting from Aveva E3D to Tekla Structures. The same Add-in for Aveva E3D is used to import files created by Tekla Structures. Hierarchies of SITE, ZONE, STRU, FRMW, SBFR are also supported when exporting from Tekla Structures and importing to Aveva E3D.

Revision handling and change management is supported in the workflow between Tekla Structures and Aveva E3D. Aveva E3D objects will include unique identification numbers which are used in revision handling - for example in the next export from Tekla Structures, members in Aveva E3D will be updated and so keep related links. Objects can also be shown graphically in a separate view (both Aveva E3D side and Tekla Structures side) where changed, new, deleted, unchanged members are shown in different colours. This means two exported situations (tcZip files) from Tekla Structures can easily be compared and even User Defined Attributes examined. So Aveva E3D user can easily see what has happened on the Tekla side. Tekla Structures reference model handling is used in Tekla Structures for handling revisions (exports) from Aveva E3D.

This document describes the features and capabilities of the Aveva E3D Add-in for exporting and importing models in Aveva E3D. There is a separate document describing the features and capabilities of the Tekla Structures Aveva E3D Application (called Export To Aveva) which after installation is launched from the Application & Component Catalogue. Instructions can be found from Tekla Warehouse under the Versions tab of the Installer for Tekla Structures to export to Aveva E3D/PDMS page located here.

Additionally, it is recommended to watch a technical video Tekla_Aveva_Interoperability_Video (from 2017) on located on Tekla Warehouse under the Versions tab of the Installer for Aveva E3D/PDMS import/export from/to Tekla Structures page located here.

This video shows how the Tekla Structures Export To Aveva application and the Aveva E3D/PDMS import from Tekla Structures and export to Tekla Structures are used.



Tekla Warehouse also contains a Questions & Answers page where many of the common questions and answers are documented. This Q&A can be located at <Aveva E3D/PDMS and Tekla Structures Interoperability: Questions & Answers>

The release notes are updated for every updated version of the Aveva E3D Add-in and the Tekla Structures Export to Aveva Application. The latest version of the Release Notes for the Aveva E3D Add-in can be found on Tekla Warehouse under the Versions tab of the Installer for Aveva E3D import/export from/to Tekla Structures page located here.

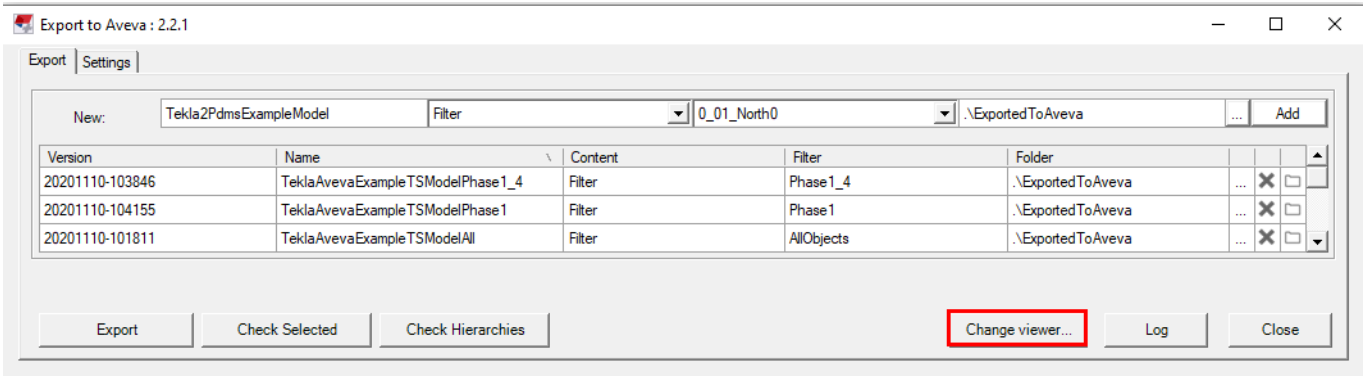
The latest version of the Release Notes for the Tekla Structures Export to Aveva Application can be on Tekla Warehouse under the Details tab of the Installer for Tekla Structures export to Aveva E3D/PDMS page located here.

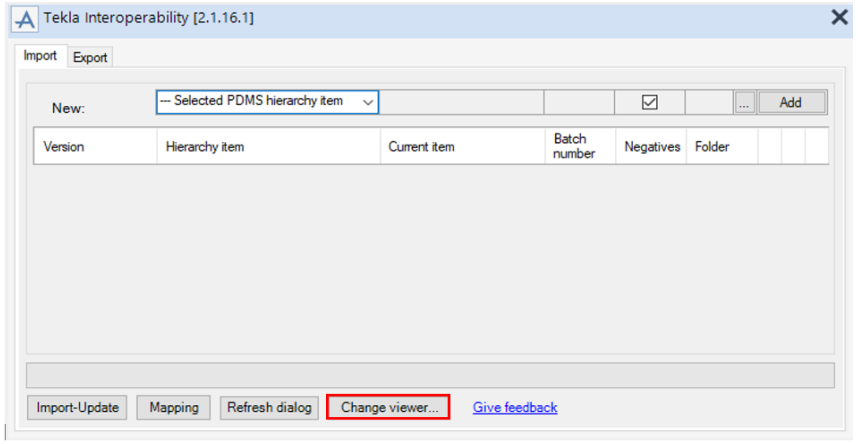
Limitations

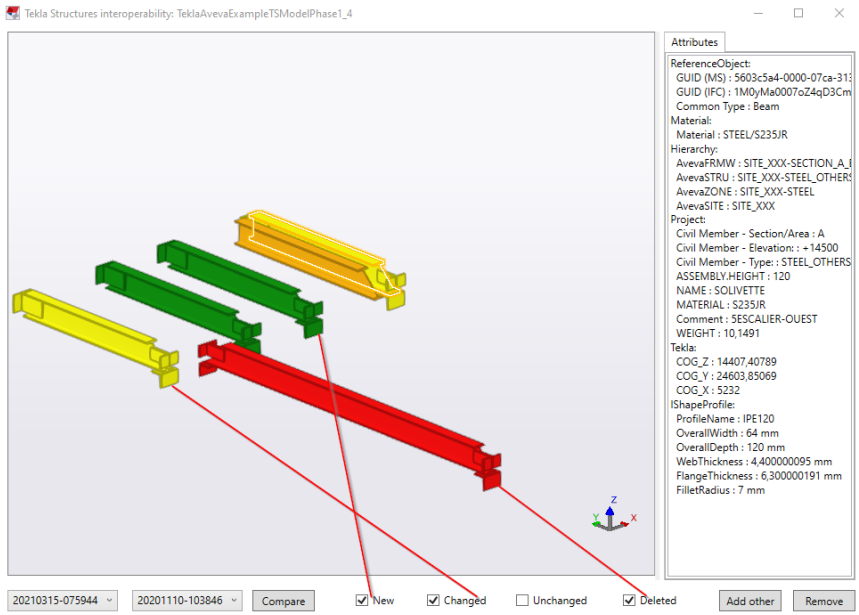
Add-in for Aveva E3D does not transfer/import the following objects

- Bolts, nuts, washers
- Welds
- Reinforcements
- Surface treatments

Even bolts, reinforcements etc. are not imported to Aveva E3D it is possible to see them in a separate view when using Change viewer (change management) functionality in both Tekla Structures side and on Aveva E3D side. Bolts and reinforcements can be exported from Tekla Structures using normal ifc export command and then using Change viewer functionality shown in below pictures and select “Add other …” button. So Aveva E3D user can see them but not in native Aveva E3D view.







System requirements

Add-in works with:

- Tekla Structures 2017 and later versions. Older versions are also available, but major improvements have been done to TS2017 and later versions.

- AVEVA E3D 2.1, AVEVA E3D 3.1
- These instructions are for Aveva E3D but similar Add-in and functionalities are also available for PDMS (AVEVA PDMS 12.1 SP2/SP4, 12.1 SP5 and 12.0 SP6. AVEVA PDMS 12.1 SP4 uses the same Add-in application as Aveva PDMS 12.1 SP2). See separate install guide for Aveva PDMS on the Tekla Warehouse site. This Install guide is located on Tekla Warehouse under the Versions tab of the Installer for Aveva E3D/PDMS to import/export from/to Tekla Structures page located here.

Installing Aveva E3D Add-in (see install guide)

For installation instructions please see the Aveva E3D/PDMS to import/export from/to Tekla Structures Add-in install guide called Install Guide Tekla Structures and Aveva E3D_2020-12-18. This Install guide is located on Tekla Warehouse under the Versions tab of the Installer for Aveva E3D/PDMS to import/export from/to Tekla Structures page located here.

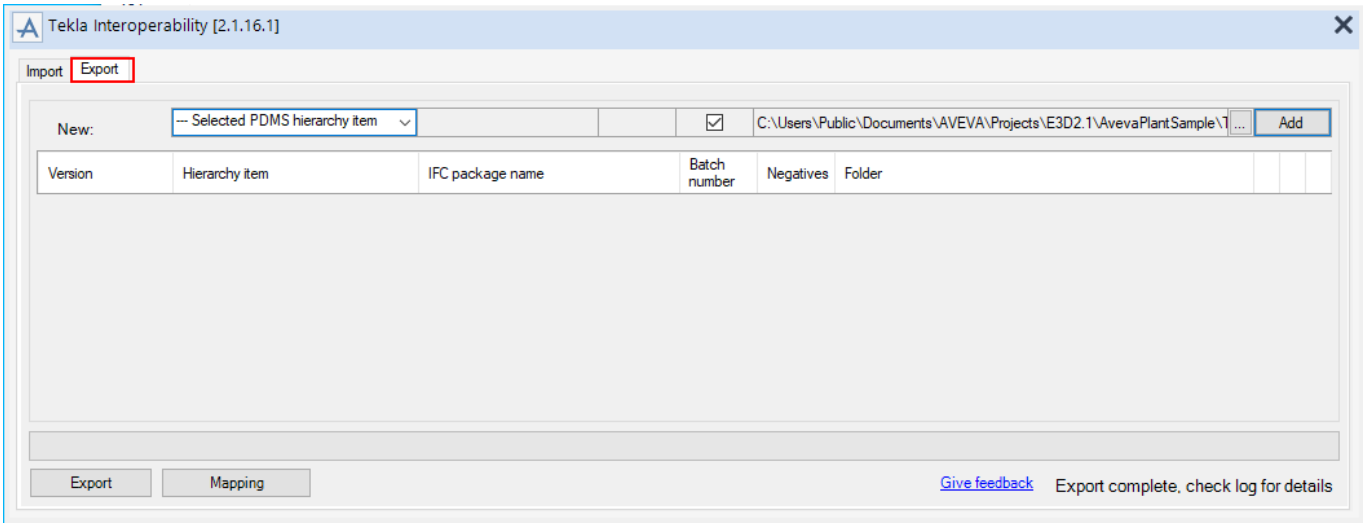
Note: - There is a separate install guide for Aveva PDMS on the Tekla Warehouse site called Install Guide Tekla Structures and Aveva PDMS_2020-12-18. This Install guide is located at the same place on Tekla Warehouse under the Versions tab of the Installer for Aveva E3D/PDMS to import/export from/to Tekla Structures page located here.

Using the Aveva E3D Add-in

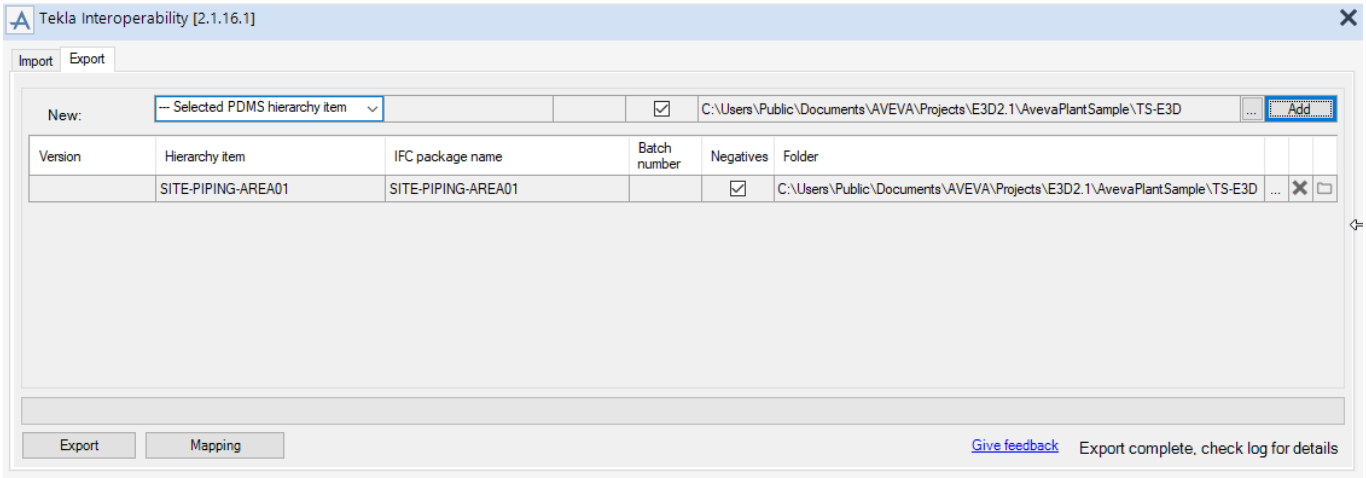
Export from E3D application

Create an export instance with the selected hierarchy items

- Open the Aveva E3D model you wish to Export to Tekla Structures.
- Click the menu button Tekla Interoperability (Ribbon Tekla -> button Tekla Interoperability in AVEVA E3D) When the Dialog box opens, select the Export tab:

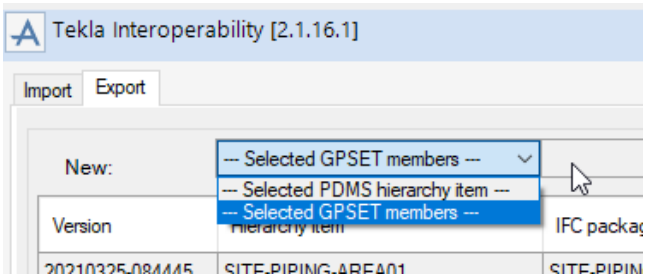


- Click the (**…**) button to select the directory you wish to store the exported model
- Select the relevant Hierarchy item in the Design Explorer/Model Explorer in Aveva E3D. You can select any object hierarchy in the Design Explorer/Model Explorer
- Pipes, equipment etc. (Mechanical disciplines) can also be exported from Aveva E3D
- Press the **Add** button to load export settings into data grid



Create export instance with selected GPSET members

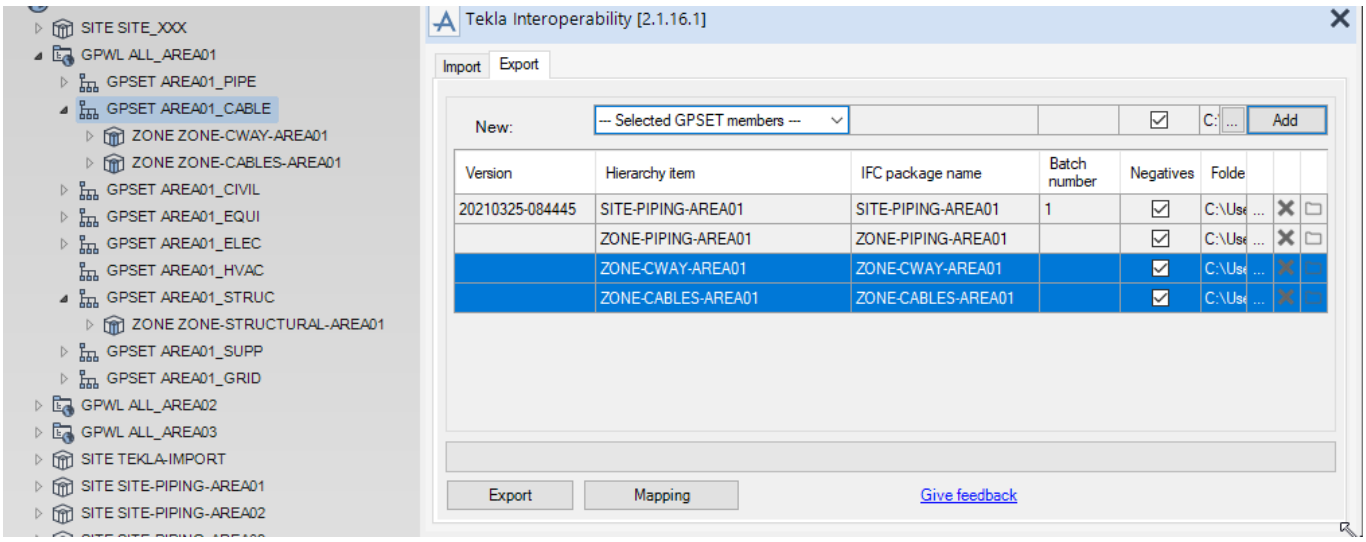
If there a lot of objects listed in the dialog box it is recommended to group them for batch exporting. This is achieved by predefined Groups i.e. GPSET's. Using batch export (see instructions later in this document) it is also possible to write/edit exported hierarchy names to macro files (text format) without adding them to the interoperability dialog first. If there are a lot of separate hierarchies exported from Aveva E3D this batch export is a fast way to define the exports.



From the Dropdown menu on the Export Tab, select **Selected GPSET members** to collect the Aveva E3D hierarchy members to be exported to Tekla Structures.

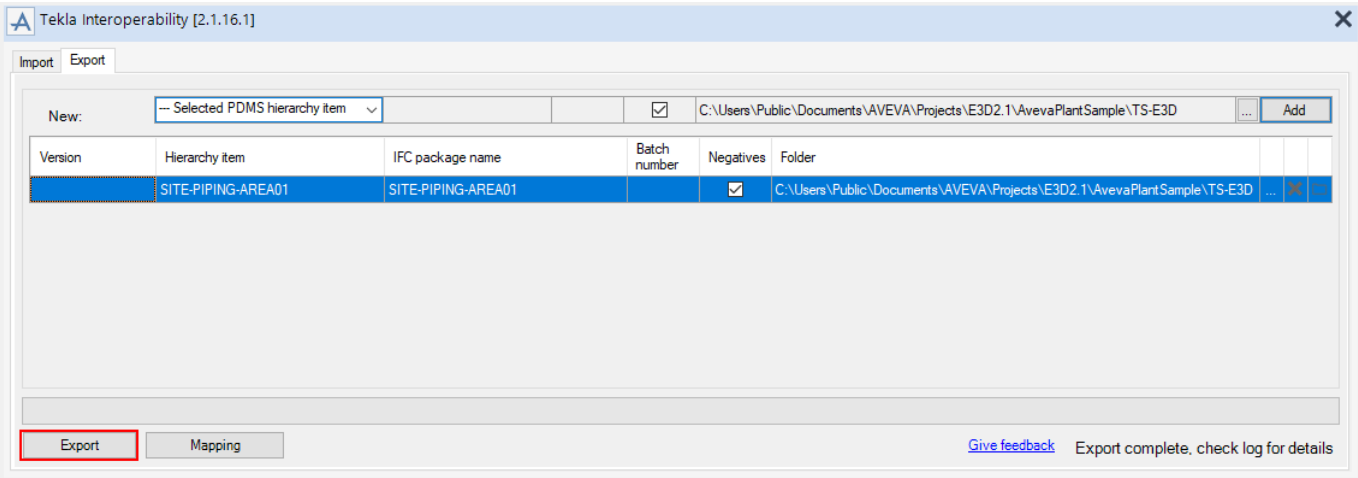
Select the desired GPSET from the hierarchy
Specify the Batch number for each GPSET collection and press the **Add** button
The data in the Dialog is updated and the user has a choice of using a manual exporting method or a batch exporting method when exporting Aveva E3D objects to Tekla Structures

NOTE: Using File based batch export/import routines it is possible to list the exported hierarchies in a text definition file (.mac). When exporting/importing the Aveva E3D to Tekla Structures Add-in, the Add-in will read the hierarchies from the text definition file and add them to the dialog for further use. This way users do not need to manually add exported hierarchies to the dialog. For additional information on using Batching routines please see the Aveva E3D to Tekla Structures Add-in - Batch routine usage chapter on page 41 of this document.



Export

- Select the instance or instances from the rows in the datagrid and press the **Export** button



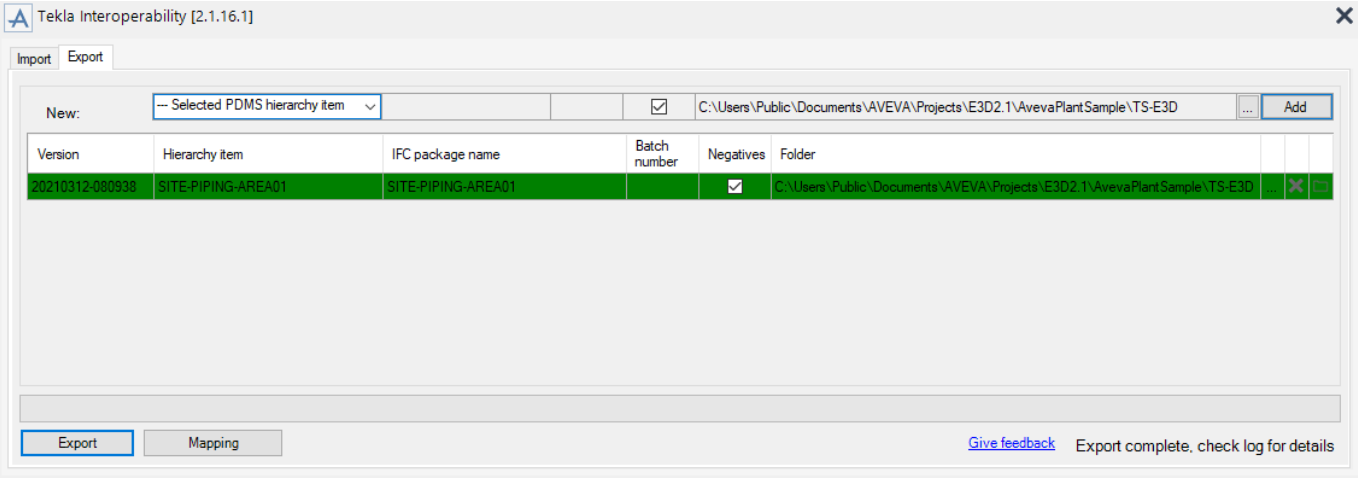
The IFC package(s) (file extension .tcZip) will be created in the defined folder with the IFC package name in addition to the Coordinated Universal Time or UTC (date and time information). A log file will be created in same folder with same name and extension (.log). Also, a package file without the appended UTC details will be created. This will make it easier to update the relevant file in Tekla Structures as the name is the same.

SITE-PIPING-AREA01#20210312-080938.log

SITE-PIPING-AREA01#20210312-080938.tcZip

SITE-PIPING-AREA01.tcZip

When the export is complete the export instance record in the datagrid will be coloured green.



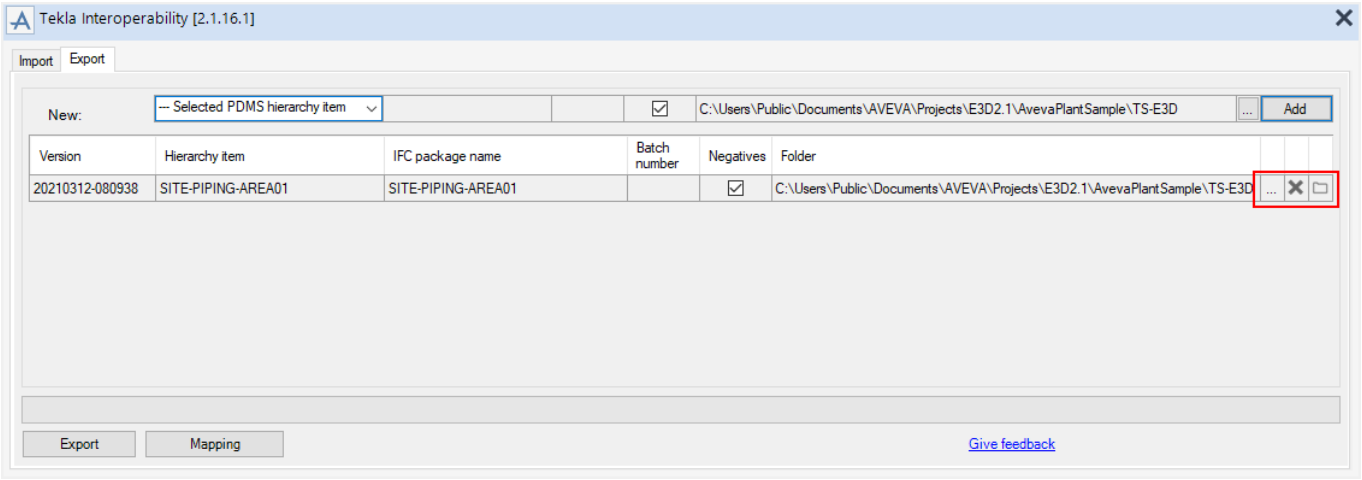
The exported model (file) can be opened in Tekla Structures as a reference model. Native Tekla Structures members can be created and also user defined attributes can be added by using the IFC object conversion. The Aveva E3D unique identification numbers (GUIDs) are stored with their corresponding newly created native Tekla Structures members. This is to assist with the identification of changes when Aveva E3D is importing models from Tekla Structures. After importing Tekla Structures models back into Aveva E3D, the relevant members are

updated (not deleted or recreated). Usually, structural members (beams, columns etc.) from Aveva E3D are converted to native Tekla Structures members/objects. Pipes, equipment from Aveva E3D will be ~~usually~~ handled as reference models (similar to DGN files) in Tekla Structures because native Tekla Structures members/objects are not needed. It is also possible to convert pipes and equipment to native Tekla Structures members/objects if e.g. pipes used for creating real cuts to plate, slab members in Tekla Structures.

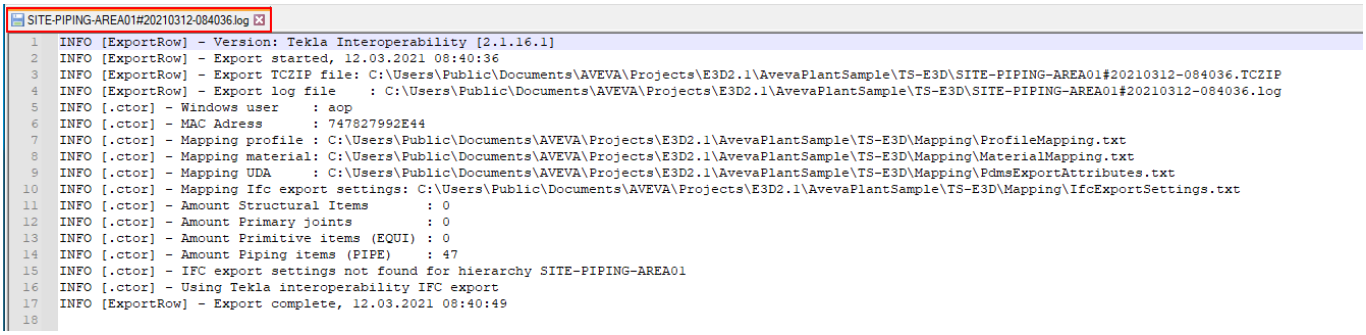
NOTE: UDAs for mechanical objects (pipes, equipment) can be exported only in PDMS 12.1 or E3D version (not in PDMS 12.0)

Edit export instance
Prerequisite **Create export instance**

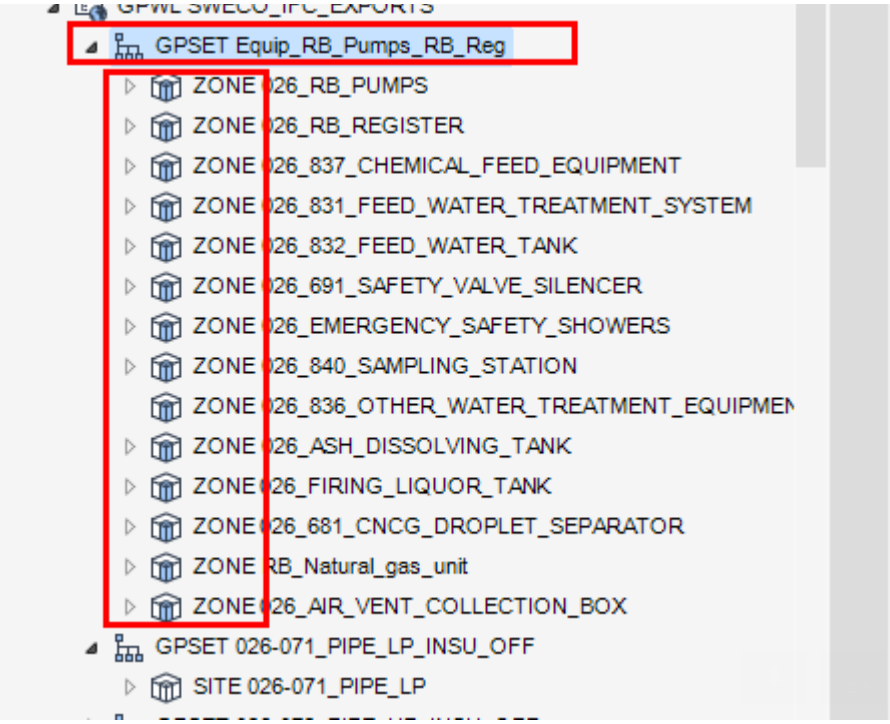
- Change export folder by picking 
- Open export folder by picking 
- Remove instance by clicking 

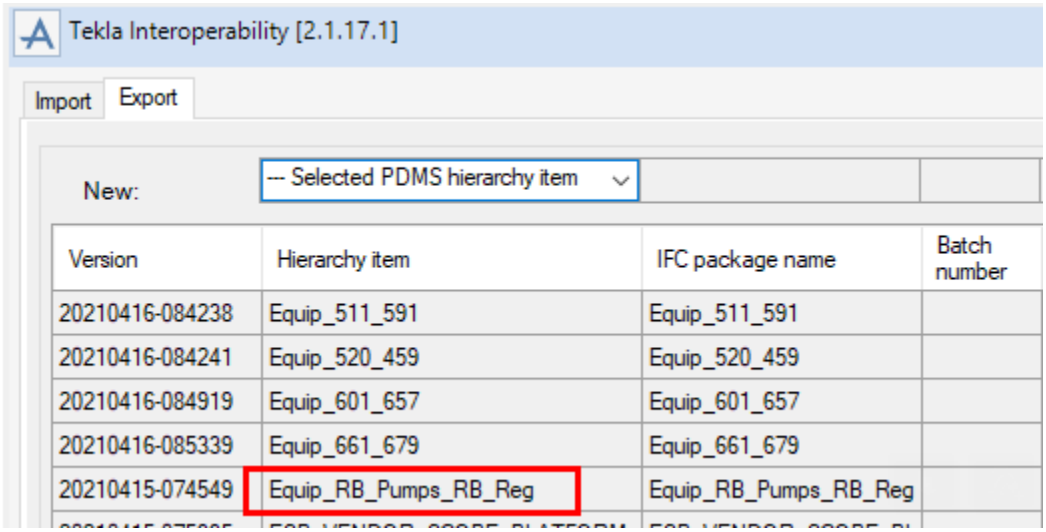


When an Export file has been created from Aveva E3D, it is possible to check the log file for detail information about the export.



With the GPSET grouping method you can combine several ZONEs to one GPSET group and so significantly decrease the number of records in the Tekla Interoperability export tab.





Please ensure that there are no more than about 800 rows or records in the interoperability dialog export tab. Our testing indicated that there seems to be a limitation of the maximum number of rows (about 800) used in the Tekla interoperability dialog when Aveva Open API used. It is also easier to manage exported hierarchies/rows if larger quantities of objects are selected for export so that there are not a lot of export files with a small number of objects in each file.

Import to Aveva E3D

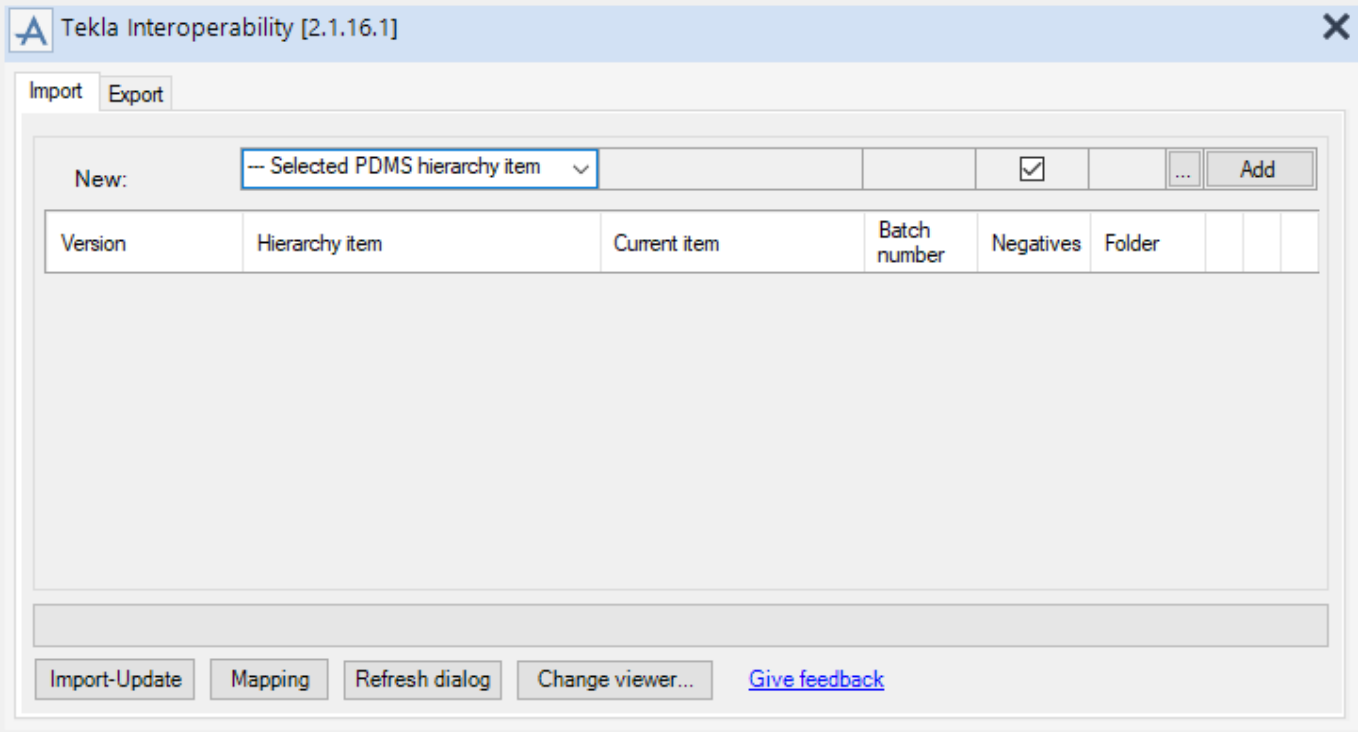
Using hierarchies is the recommended way when exporting/importing between Aveva E3D and Tekla Structures. When hierarchies are used one export file can contain all of the hierarchy definitions such as SITE, ZONE, STRU, FRMW, SBFR etc.

If hierarchies are not used, a separate file is needed for each STRU or FRMW. For a STRU selection a FRMW with a specified name is created below the FRMW hierarchy level and the imported structure is added. For a FRMW selection a SBFR with a specified name is created below the FRMW hierarchy and the imported structure is added. In cases where hierarchies are not used there needs to be a separate file for each FRMW definition. With this method several files are likely to be needed.

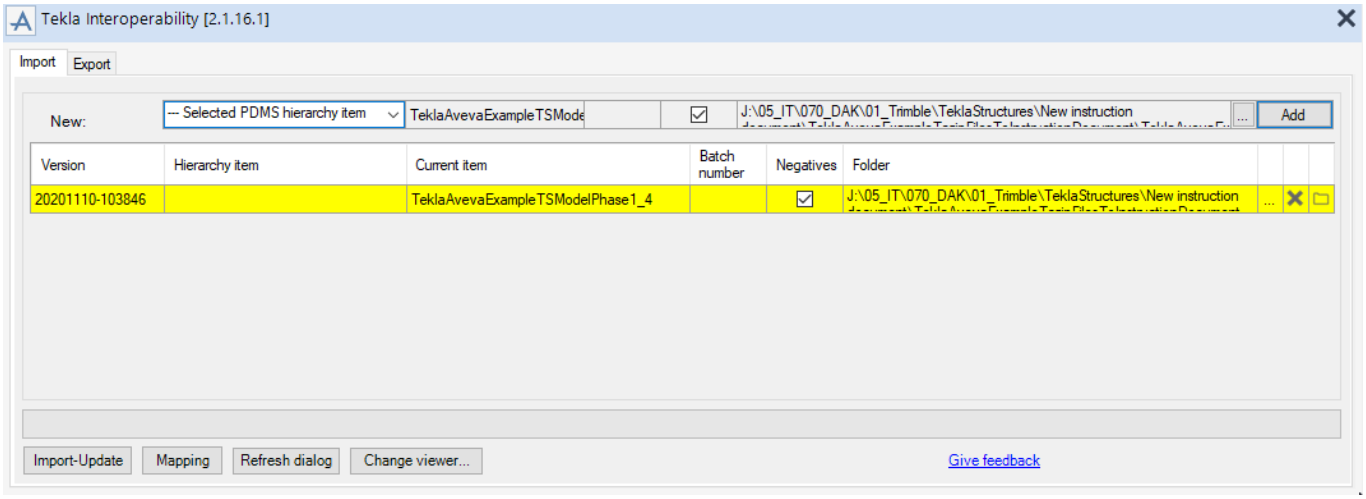
If the model contains hierarchy object that have the same name as the imported model, the structure will be updated. If you do not wish to update the existing structure then a new name must be specified.

Create import instance

- Open an Aveva E3D model
- Click on the button Tekla Interoperability (Ribbon Tekla -> button Tekla Interoperability in Aveva E3D). Select the **Import** tab on the Tekla Interoperability dialog box



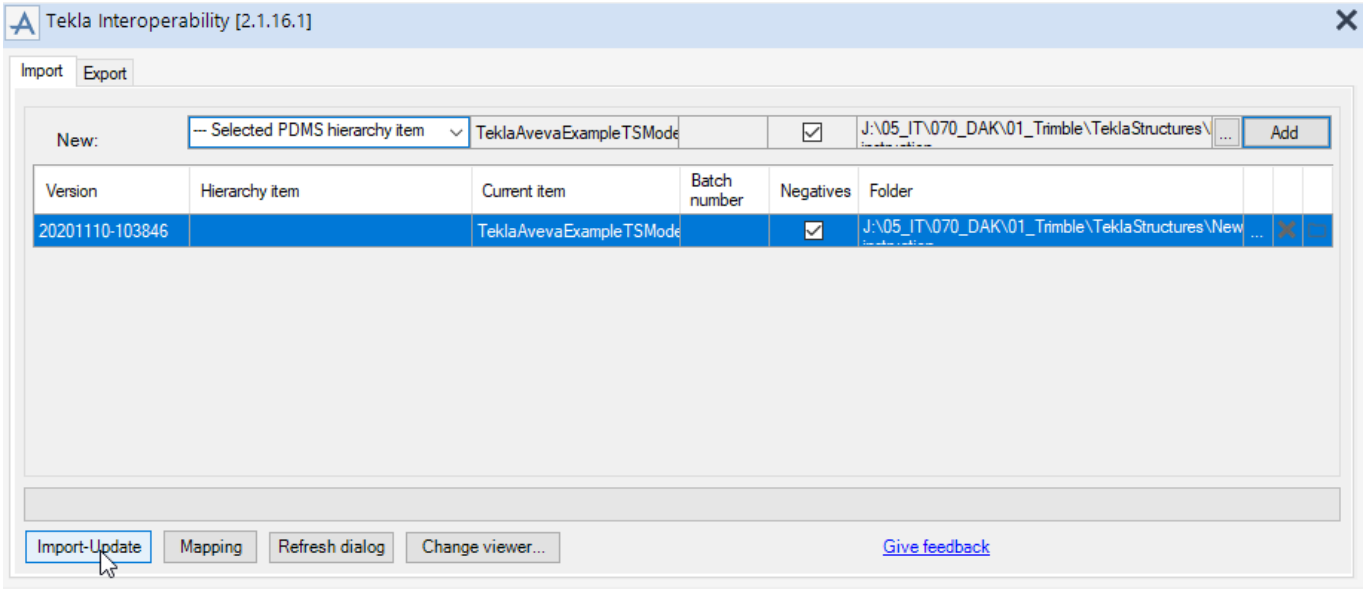
- Click the (**…**) button and browse to the location of the file(s) created by Tekla Structures and select the .tcZip file you wish to import
- Click Add to load the model to the datagrid.



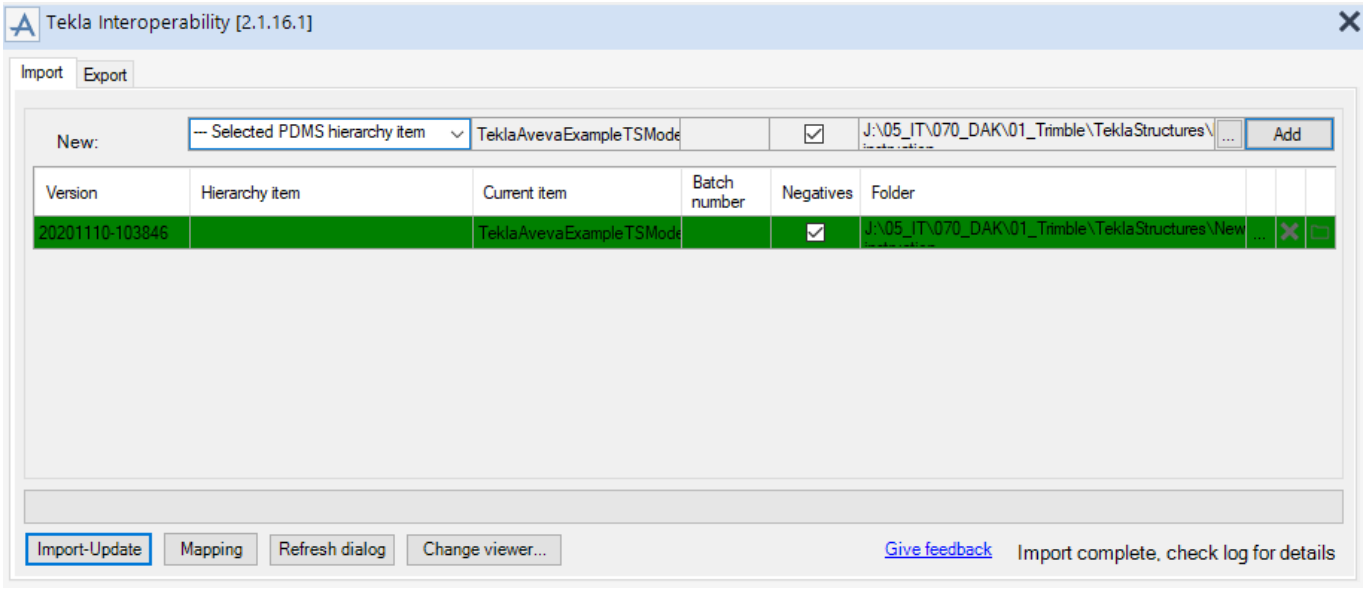
Import instance

Prerequisite: **Create import instance**

- Select an instance or instances in the data grid and click **Import-Update**.



The selected record will turn Green when the Importing is ready to proceed.



The optimum way to export and import models between Tekla Structures and Aveva E3D is to utilise hierarchy definitions in both systems. This significantly reduces the number of files which needs to be exchanged between the systems and so reduces the amount of administration which is needed. The amount of administration is reduced when the export file from Tekla Structures contains the SITE, ZONE, STRU, FRMW and SBFR hierarchies which are in Aveva E3D. Recommended way is to use only one SITE definition in one export file from Tekla Structures (which also checked and informed in Tekla Structures export log file).

Then in Aveva E3D import members under SITE will be checked and modified if needed by Tekla Structures export update files.

If wrong hierarchy definitions used (e.g. by accident) then a *Aveva E3D SITE name*/TEKLA-ZONE hierarchy will be created under the current Aveva E3D SITE hierarchy and members added there *Aveva E3D SITE name… FRMW*–UNPLACED. Also deleted members will be added to *Aveva E3D SITE name… FRMW*–DELETED so that E3D user can review the situation and verify deletion manually. It is also possible to delete members automatically without putting them first *Aveva E3D SITE name… FRMW*–DELETED hierarchy. There is a settings attribute (see later) to define this. Deleting members automatically could be a valid option because using previously introduced Change Viewer functionality it is possible to see modified members (new, modified, deleted, unchanged) easily.

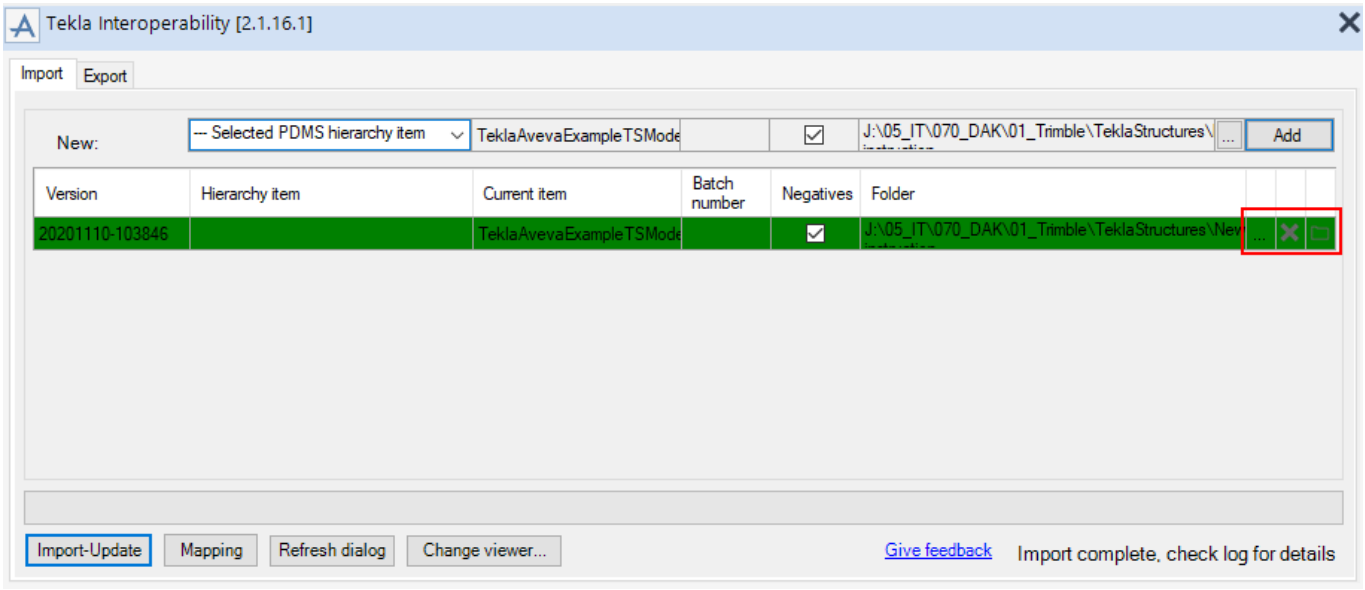
If several SITE hierarchies have been defined (which is not a recommended workflow) then a separate TEKLA-SITE hierarchy created and there needs to be administrator permissions given for creation.

When the modelling is started in Aveva E3D and then continued in Tekla Structures it is good to do first export in Tekla Structures immediately after creating native Tekla members with IFC object conversion command - without doing modifications in Tekla Structures. This means that in Aveva E3D side it is easier to recognize changes when two export files from Tekla Structures can be used.

- Objects exported from Tekla Structures as BREP (surface) format (e.g. multiplane polybeams) will be imported to Aveva E3D as polyhedron objects (POHE). Additionally, a .dgn file will be created (inside the .tcZip file) which can also be used in Aveva E3D.
- The Tekla Structures member objects which have their “IFC export type” UDA definition defined as Brep instead of Auto will also be imported to Aveva E3D as polyhedron objects (POHE). These objects will also be included in a .DGN file
- The Tekla Structures Import Application uses a profile mapping system which allows users and administrators to map a Tekla Structures profile name to its corresponding Aveva E3D profile name. If a mapping does not exist for a particular member then the member will be imported as a PANE member (cross section points plus extrusion along length). This is done to ensure that the result will look correct even without a profile map for those members. With the correct mapping the desired members and sections can be seen in Aveva E3D.

Edit import instance
Prerequisite **Create import instance**

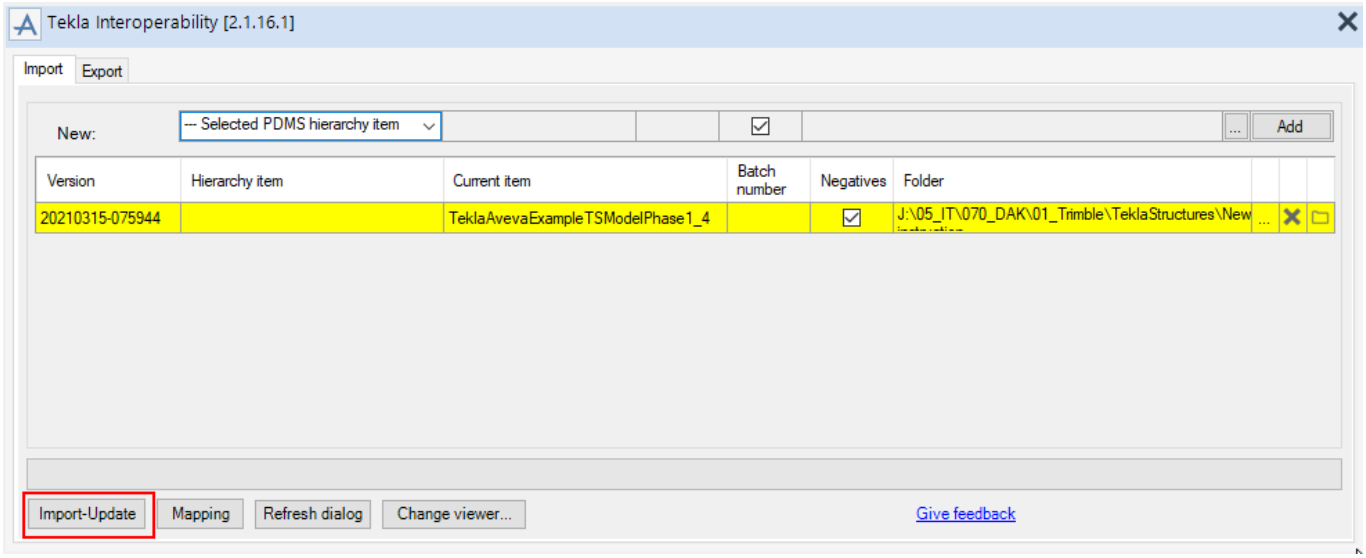
- Change import folder by picking 
- Open import folder by picking 
- Remove instance by clicking 



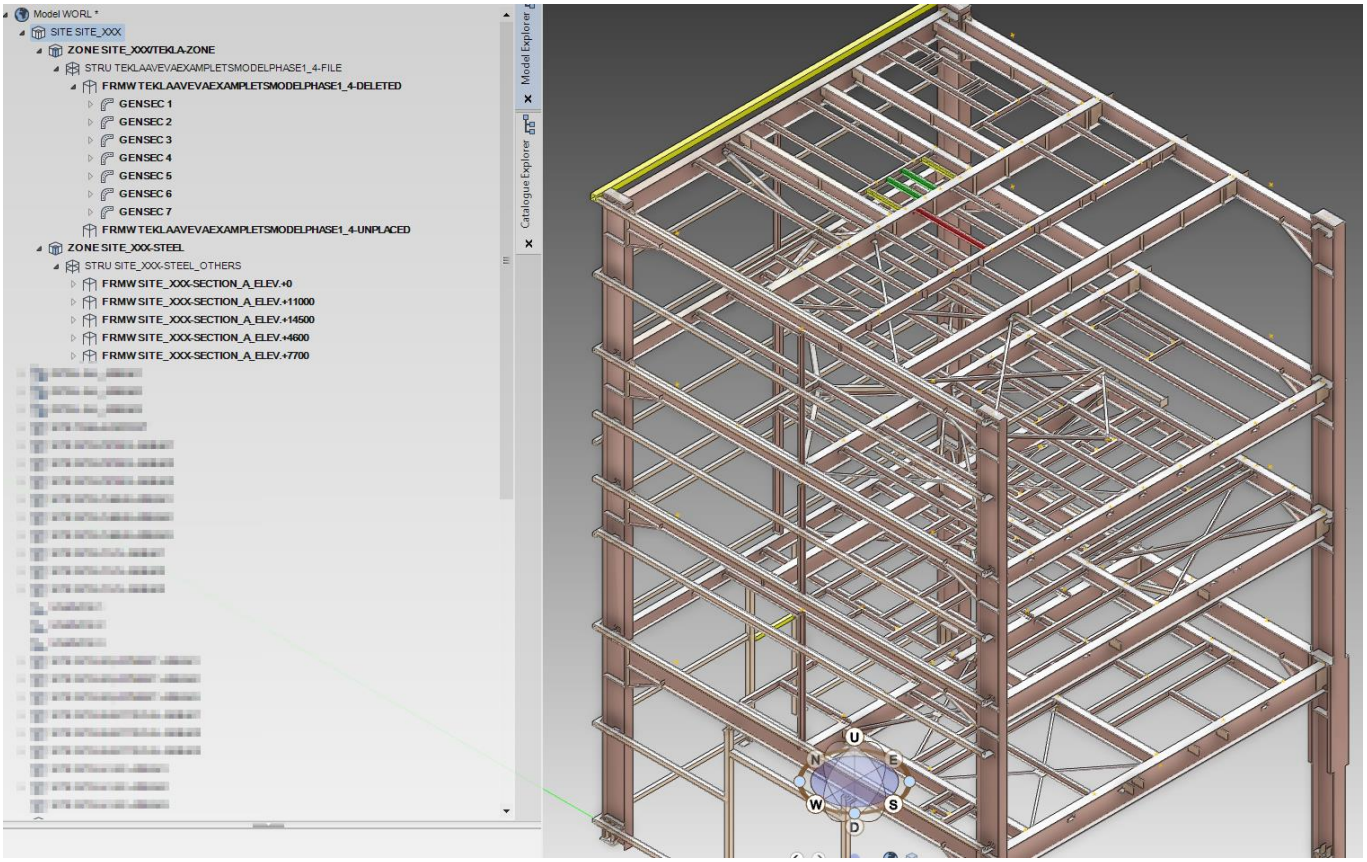
Update import instance
Prerequisite: **Create import instance**

- This is used to update the model

- When the dialog box is opened in Aveva E3D, the Aveva E3D Add-in checks if a new update is available for the model which has been exported from Tekla Structures. If an update exits, the row is marked as yellow.
- Select the row and click the **Import-Update** button.



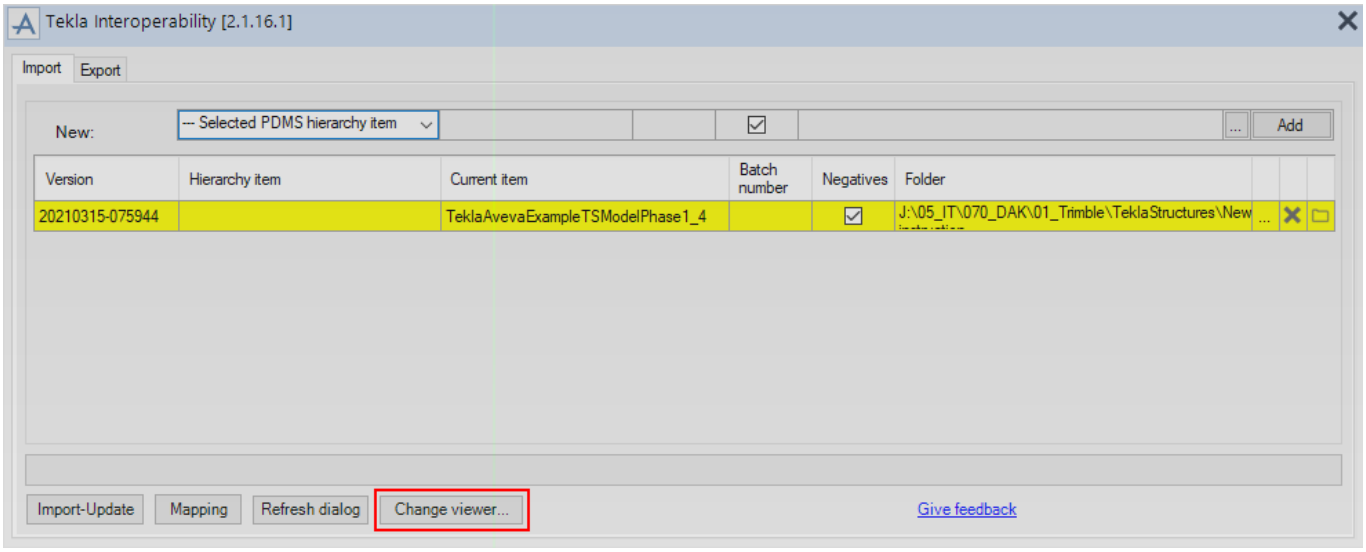
- When importing, ADDED, MODIFIED and DELETED items will be marked in the following way
  - The ADDED items will be shown in the colour Green.
  - The MODIFIED items will be shown in the colour Yellow.
  - The DELETED items will be added to –DELETED hierarchy position and shown in the colour Red. Users can see situation and then make decisions on whether they want to permanently delete the items if they choose. With attribute setting (see later Settings and Definitions paragraph) it is also possible to delete members automatically.
  - Unplaced members like hierarchy definitions which are missing or incorrect will be added to –UNPLACED hierarchy and marked in the colour Brown.

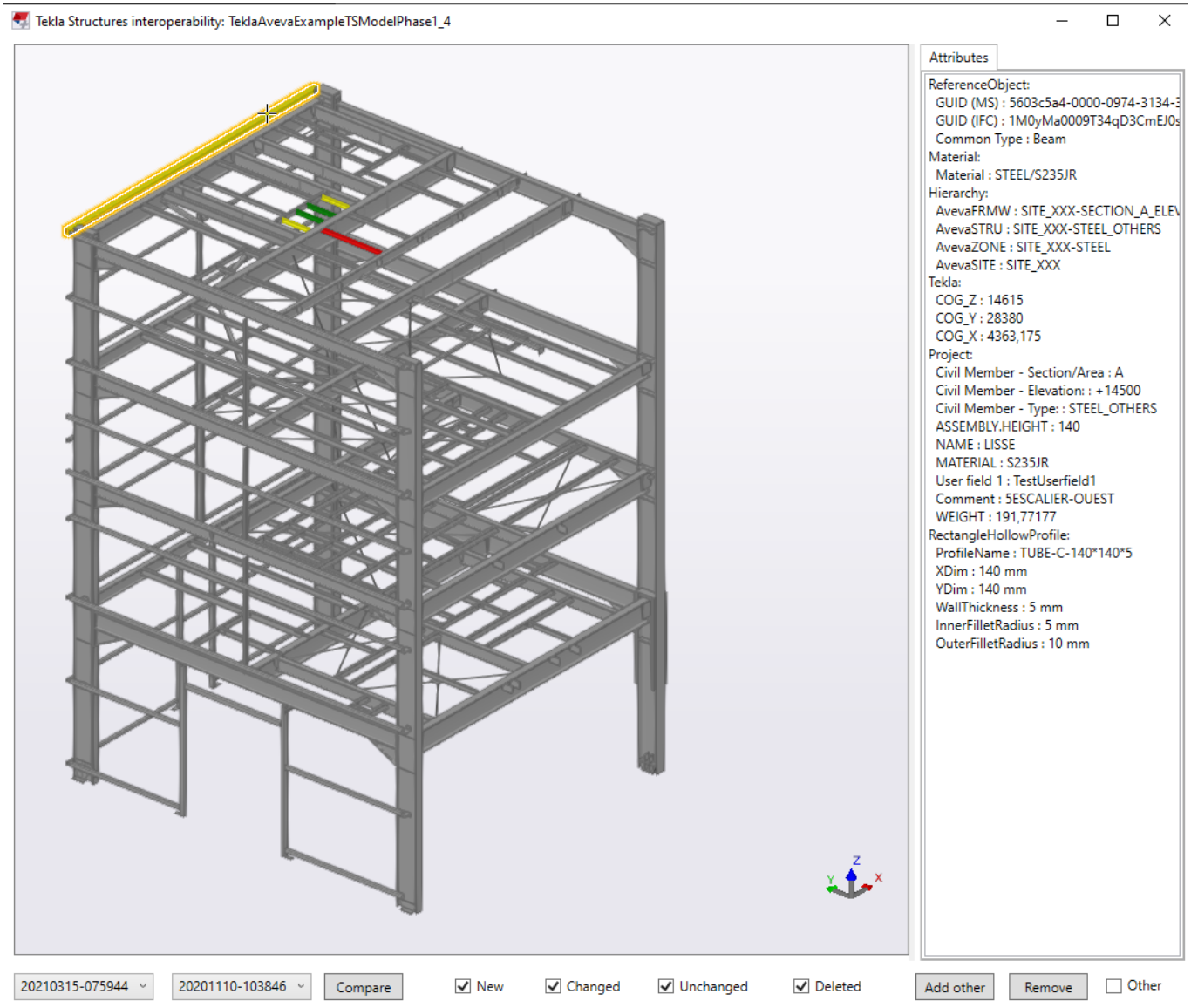


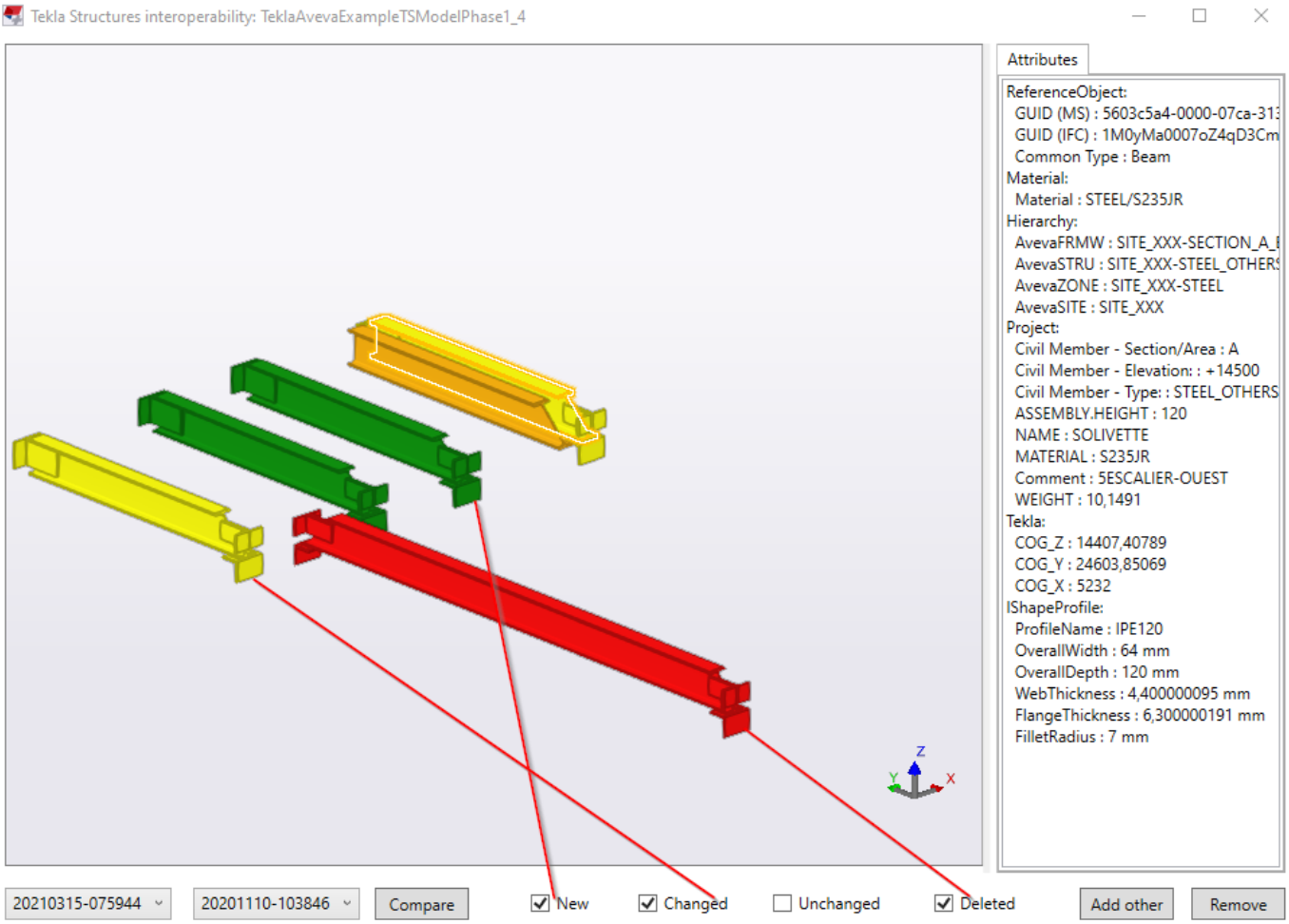
- The colours are set by turning off the auto colouring in Aveva E3D. Auto colouring is automatically turned on again after the import has finished. An update of the view will show all items in the colours defined in representation rules

The following images show the modifications when the Change Viewer option/button is used in the Tekla Interoperability dialog box in Aveva E3D. This allows the Aveva E3D user to compare 2 exported .tcZip files from Tekla Structures. Users can see what changes have occurred in the Tekla Structures model by selecting dates for the .tcZip files (option list) they wish to compare. This type of checking can be done before importing the model into the Aveva E3D model. This allows the user to visually check for errors or other issues which may be wrong prior to importing the model data into the Aveva E3D project. If the user feels there are errors or issues with the file to be imported they can check with the Structural department and get updated export files from Tekla Structures if necessary.

The Change Viewer option can also show information like reinforcements or bolts which have been exported from Tekla Structures as a normal IFC file. For additional information please see Tekla Warehouse and the release notes for the Installer for Aveva E3D import/export from/to Tekla Structures Add-in https://warehouse.tekla.com/#/catalog/details/ucfeaa770-00eb-4c6b-997f-e6423e327520 or the Tekla Structures export to Aveva E3D/PDMS Application https://warehouse.tekla.com/#/catalog/details/u12586e50-5eb3-4ccc-865f-4f1329a2e3f3


Tekla Interoperability [2.1.16.1]
Import
Export
New:
-- Selected PDMS hierarchy item
Add
Version
Hierarchy item
Current item
Batch number
Negatives
Folder
20210315-075944
TeklaAvevaExampleTSModelPhase1_4
J:\05_IT\070_DAK\01_Trimble\TeklaStructures\New
Import-Update
Mapping
Refresh dialog
Change viewer...
Give feedback


Tekla Structures interoperability: TeklaAvevaExampleTSModelPhase1_4
Attributes
ReferenceObject:
GUID (MS) : 5603c5a4-0000-0974-3134-3
GUID (IFC) : 1M0yMa0009T34qD3CmEJ0s
Common Type : Beam
Material:
Material : STEEL/S235JR
Hierarchy:
AvevaFRMW : SITE_XXX-SECTION_A_ELEV
AvevaSTRU : SITE_XXX-STEEL_OTHERS
AvevaZONE : SITE_XXX-STEEL
AvevaSITE : SITE_XXX
Tekla:
COG_Z : 14615
COG_Y : 28380
COG_X : 4363,175
Project:
Civil Member - Section/Area : A
Civil Member - Elevation: : +14500
Civil Member - Type: : STEEL_OTHERS
ASSEMBLY.HEIGHT : 140
NAME : LISSE
MATERIAL : S235JR
User field 1 : TestUserfield1
Comment : 5ESCALIER-OUEST
WEIGHT : 191,77177
RectangleHollowProfile:
ProfileName : TUBE-C-140*140*5
XDim : 140 mm
YDim : 140 mm
WallThickness : 5 mm
InnerFilletRadius : 5 mm
OuterFilletRadius : 10 mm
Z
Y
X
20210315-075944
20201110-103846
Compare
New
Changed
Unchanged
Deleted
Add other
Remove
Other

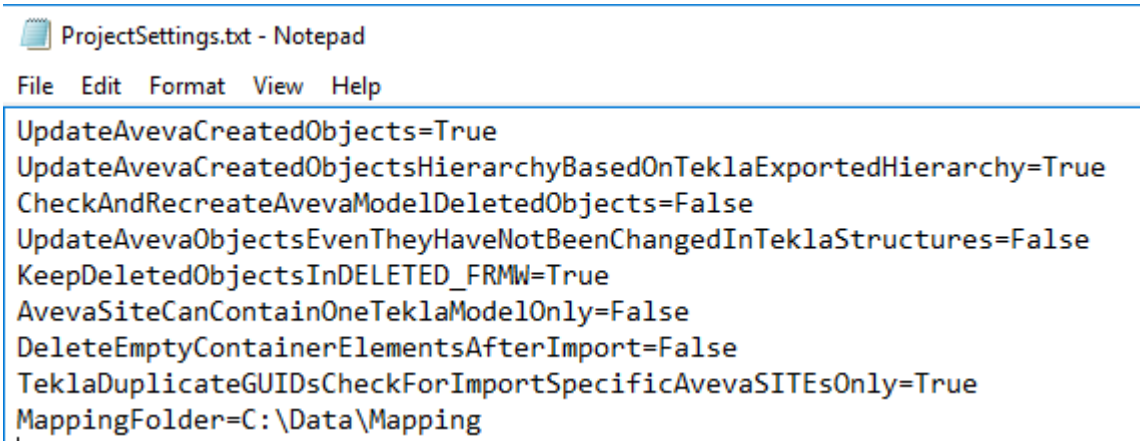


Settings and Definitions

This section lists the settings and definitions on how updates and hierarchies are managed in Aveva E3D

The hierarchy definitions are defined in the ProjectSettings.txt file. This file is created when the Tekla Interoperability application is started. The file is located under the project folder and under ...\TS-E3D\Links\TeklaStructures\Import\Settings folder.

Attribute *UpdateAvevaCreatedObjectsHierarchyBasedOnTeklaExportedHierarchy* (default value = True) defines how hierarchies defined or updated in Tekla Structures are handled in Aveva E3D. A value of True means that changes done in Tekla Structures will be transferred to Aveva E3D.



Attribute *UpdateAvevaCreatedObjects* (default value = True) defines how changes done in Tekla Structures are handled in Aveva E3D. A value of True means that changes done in Tekla Structures will be transferred to Aveva E3D.

Attribute *CheckAndRecreateAvevaModelDeletedObjects* (default value = False) defines how deleted objects in Aveva E3D are handled in the next export from Tekla Structures. A value of False means that an object will not be recreated in the next export of the model from Tekla Structures. A value of True means that an object will be recreated in the next export of the model from Tekla Structures. This option may be useful if a user has by accident deleted objects in Aveva E3D.

Attribute *UpdateAvevaObjectsEvenTheyHaveNotBeenChangedInTeklaStructures* (default value = False) defines what happens after the importing of a model into Aveva E3D. A value of False means that objects will not be updated if they have not been changed in Tekla Structures. A value of True means that objects will be updated even if they have not been changed in Tekla Structures. Additionally, if the object does not exist in Aveva E3D the object will be recreated if the attribute *CheckAndRecreateAvevaModelDeletedObjects*=True. The other objects will be updated based on the relevant values in the import file. The attribute *UpdateAvevaObjectsEvenTheyHaveNotBeenChangedInTeklaStructures* can be considered to be similar to a force update of the Aveva E3D model from Tekla Structures

Attribute *KeepDeletedObjectsInDELETED*_FRMW (default value = True) defines what happens to deleted objects when they have been imported into Aveva E3D. A value of True means that that deleted objects in Tekla Structures will be put into the DELETED hierarchy in Aveva E3D after they have been imported. A value of False means that deleted objects in Tekla Structures will be deleted from Aveva E3D and they will not be put into the DELETED hierarchy. It is recommended to set this attribute to True as it enables users to make decisions on the objects and whether they should be permanently deleted. Additionally, only objects in the DELETED hierarchy can be seen when the Change Viewer functionality is used in the Tekla Structures Interoperability dialog box.

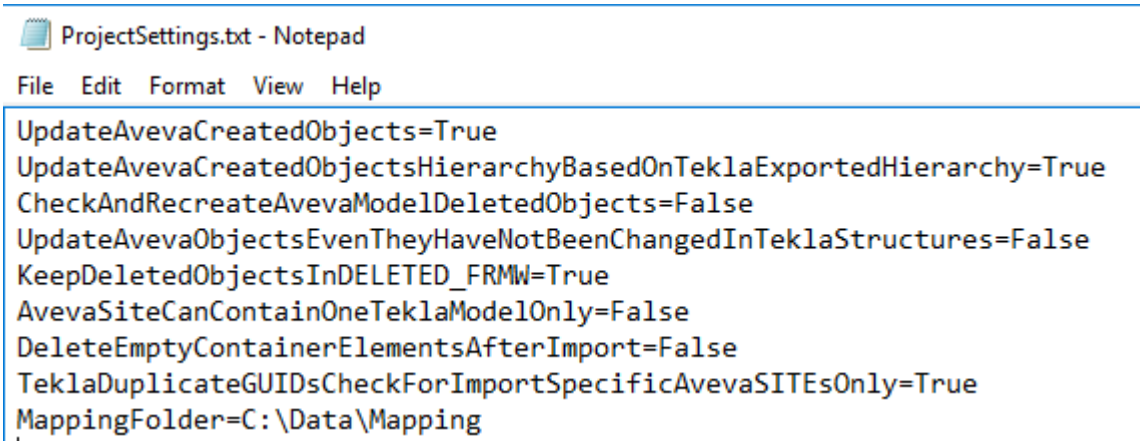
Attribute *AvevaSiteCanContainOneTeklaModelOnly* (default value = False) defines the number of Tekla Structures models which can be stored within an Aveva E3D SITE hierarchy. This option can be used in certain workflow cases. A value of True means the Aveva E3D model which includes the imported Tekla Structures objects (on certain SITE) are exactly the same as from the existing Tekla Structures model. Note: this option can only be used if the single Tekla Structures export file contains all objects of the Aveva E3D SITE. For example, it can be used if steel members included in one Tekla Structures file/SITE and concrete members are on a different file/SITE. The attribute searches through all objects in the Aveva E3D SITE hierarchy. In the file which is being imported, if the

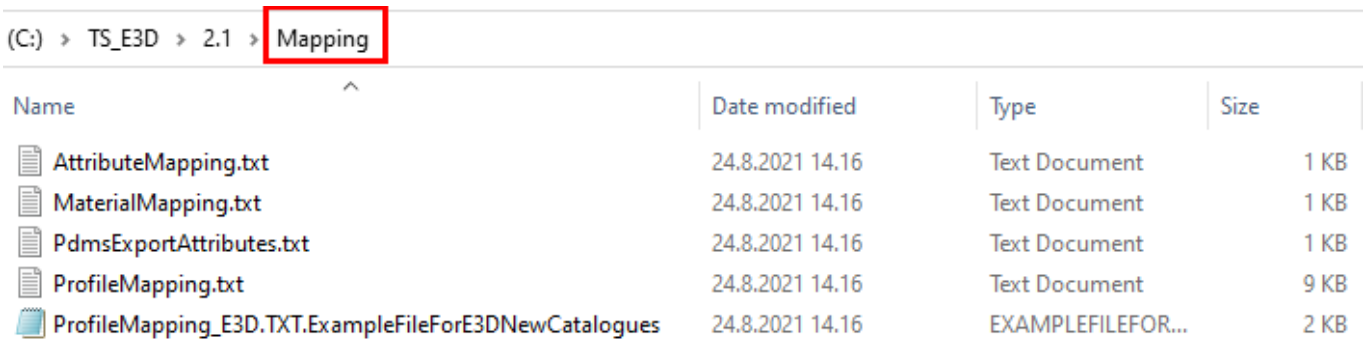
object has a Tekla Structures GUID but is not a New or Modified object then the object will be deleted. The import routine counts the SITE objects and in a case where there is more than one import it will stop. It will add details and information to the log file. Additionally when the value is True, the Aveva E3D objects are always updated from their relevant objects in Tekla Structures. A value of True is similar to a force update from Tekla Structures. A value of True overrides the value of the attribute *UpdateAvevaObjectsEvenTheyHaveNotBeenChangedInTeklaStructures*

Attribute *DeleteEmptyContainerElementsAfterImport* (default value = False) defines what happens to empty hierarchy or container elements. A value of True means that hierarchies or containers modified by Tekla Structures in the export file will be deleted if those hierarchies or containers do not contain any objects. The lowest level hierarchy or container which does not contain any objects will be deleted. A value of False means that no hierarchies or containers will be deleted even if they do not contain any objects.

Attribute *TeklaDuplicateGUIDsCheckForImportSpecificAvevaSITEsOnly* (default=True) defines which SITEs will be checked for duplicate Tekla Structures GUID numbers. A value of True means that only SITEs which exist in the tcZip export file from Tekla Structures will be checked for duplicate GUIDs in the Tekla GUID User Defined Attribute field. When there are a lot of SITEs (e.g. over 100 to 200) it can take a long time for the Aveva E3D Tekla Structures Add-in to check all of the SITEs. Duplicate Tekla Strructures GUIDs will appear if objects imported from Tekla Structures have been manually copied in Aveva E3D. Duplicate Tekla Structures GUIDs need to be removed as duplicate GUIDs will cause problems when identifying revisions and updates to objects. Additionally, a value of True should be set in cases where hierarchies are not being used (for example, FRMW level Tekla Structures files)

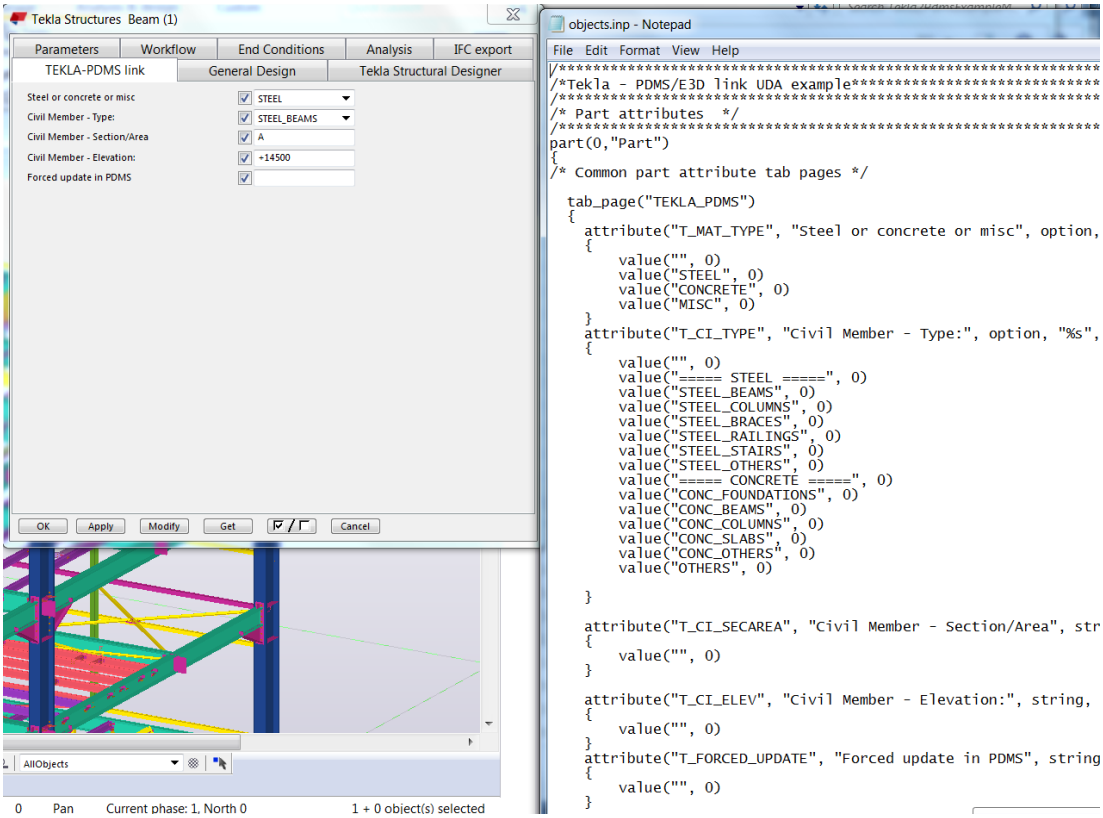
The Mapping folder (e.g. profile, attribute mapping) can also be defined in the ProjectSettings.txt file





For additional details, please see the video TeklaPDMSVideosCombinedWithVoice.mp4 available in Tekla Warehouse. The video is called Tekla_Aveva_Interoperability_video (from 2017) and is located under the Versions tab of the Installer for Aveva E3D import/export from/to Tekla Structures application https://warehouse.tekla.com/#/catalog/details/ucfeaa770-00eb-4c6b-997f-e6423e327520

The Aveva E3D hierarchy definitions (for example SITE, ZONE, STRU, FRMW, SBFR) can be specified in Tekla Structures when using the Export To Aveva application. When the application is started it creates a file called AvevaHierarchy.txt under the model folder ..\Links\Aveva\Export\Settings\AvevaHierarchy.txt. This file contains the specified Aveva E3D hierarchies (SITE, ZONE, STRU, FRMW, SBFR). The User Defined Attributes fields and the reports fields can also be used to specify hierarchies. Lines in the AvevaHierarchy.txt file can be commented out from processing by using a double forward-slash // in front of the text. User Defined Attribute (UDA) fields can also be combined. An example of a situation where UDA definitions are used on the Tekla Structures side (objects.inp) can be found on Tekla Warehouse. Please see the file Tekla_Example_Model_And_Objectslnp (ADDED 2017-07-31) available under the Versions Tab of application of Installer to Tekla Structures export to Aveva E3D/PDMS in Tekla Warehouse at https://warehouse.tekla.com/#/catalog/details/u12586e50-5eb3-4ccc-865f-4f1329a2e3f3



Example of AvevaHierarchy.txt file

AvevaHierarchy.txt

```
1  //HIERARCHYLEVEL;Parameter in TS (Uda=UDA, Rep=Report field)=value:(value is condition check string)
2  SITE;rep=PROJECT.INFO1
3  ZONE;rep=USERDEFINED.T_MAT_TYPE=0:ZONE_NOT_DEFINED
4  ZONE;rep=PROJECT.INFO1:-:rep=USERDEFINED.T_MAT_TYPE
5  STRU;rep=USERDEFINED.T_CI_TYPE=0:STRU_NOT_DEFINED
6  STRU;rep=PROJECT.INFO1:-:rep=USERDEFINED.T_CI_TYPE
7  FRMW;rep=PROJECT.INFO1:-:Section_:Uda=T_CI_SECAREA:_Elev.:Uda=T_CI_ELEV
8  FRMW;rep=PROJECT.INFO1:-:Elev.:Uda=T_CI_ELEV
9  //not used SBFR;Uda=SBFR
```

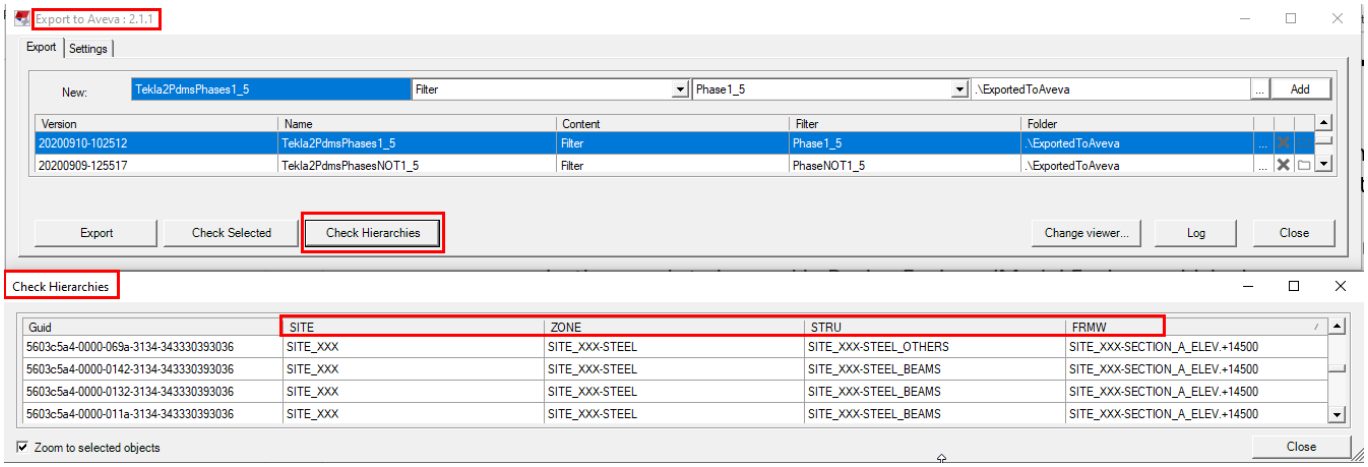
- Uda= definition is used when value of UDA is used.
- rep= definition is used when UDA is an option list and the text value in the option list is used. In option menu case Uda= would return serial number in option list.
- If-condition can be used e.g. rep=USERDEFINED.T_MAT_TYPE=0. This means that if the value=0 then the text specified at the end of the line of code will be used. In the example shown in the text file above the text “ZONE_NOT_DEFINED” will be shown if rep=USERDEFINED.T_MAT_TYPE=0. If the value is not 0 then the text at the end of the line of code will not be use and the next line of code will be processed.
- Several hierarchy definition lines like ZONE or FRMW can be used. In the FRMW example shown above, if some of UDA value (T_CI_SECAREA, T_CI_ELEV) is not defined then the next line of code for FRMW will be used, in this case Elev. : Uda=T_CI_ELEV

- If a double forward slash // comment mark is used in front of a hierarchy definition, when importing a file in Aveva E3D the STRU or FRMW selection needs to be used in the Design Explorer/Model Explorer. This also means that one file can only have one FRMW hierarchy of objects. So in other words in this case hierarchies are not used in Tekla Structures.

NOTE: A User Defined Attribute (UDA) can have a maximum of 19 characters if it is being used in conditions

In the Tekla Structures Export To Aveva application there is a Check Hierarchies button which can be used for checking the hierarchies which are going to be used by the Aveva E3D Tekla Structures Add-in when importing the model.

NOTE: In Aveva E3D spaces are not allowed to be used in hierarchy names



For additional details, please see the video TeklaPDMSVideosCombinedWithVoice.mp4 available on Tekla Warehouse under the Versions tab of the Installer for Aveva E3D to import/export from/to Tekla Structures page located here.

Some recommendations when handling settings in the text files include ensuring that the most common case for your workflow is the default value. For example,

- UpdateAvevaCreatedObjects=True and UpdateAvevaCreatedObjectsHierarchyBasedOnTeklaExportedHierarchy=True

  This means that even when modeling is started in Aveva E3D, modifications done in Tekla Structures are taken into account when being re-imported back into Aveva E3D even if objects in Tekla Structures are moved to a different hierarchy than in Aveva E3D

- UpdateAvevaCreatedObjects=True and UpdateAvevaCreatedObjectsHierarchyBasedOnTeklaExportedHierarchy=False

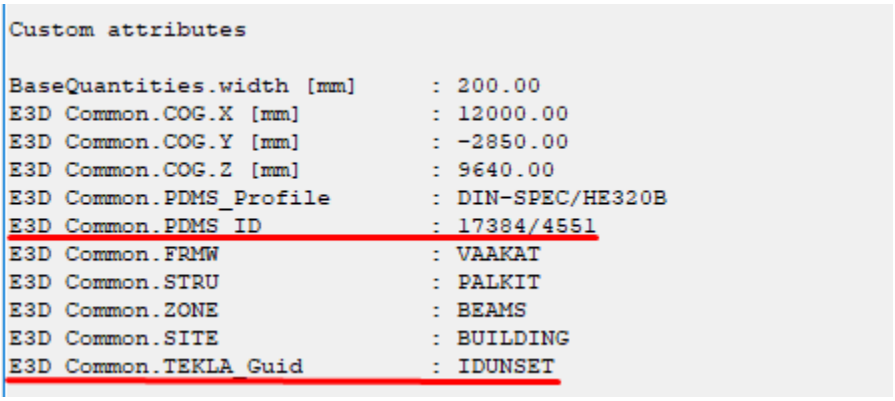
  This means that objects originally created in Aveva E3D can be modified by Tekla Structures but ensuring that the hierarchy of those objects will not be modified. Only new objects which are created in Tekla Structures will use the hierarchy defined in Tekla Structures.

- UpdateAvevaCreatedObjects=False

  This means that objects originally created in Aveva E3D will be remain the same and will not be modified by their equivalent Tekla Structures objects. Instead new objects will be created in Aveva E3D. This allows

companies to have a workflow or use case whereby they wish to keep the original Aveva E3D objects. For this situation, companies need to give careful consideration to their workflow.

If needed to check member identification numbers, the Aveva E3D member identification number is stored to the UDA name 'E3D Common.PDMS_ID' and identification number used in Tekla Structures is stored to the UDA name 'E3D Common.TEKLA_Guid' as per the picture below. Value = IDUNSET means that the member is not yet imported to Tekla Structures.

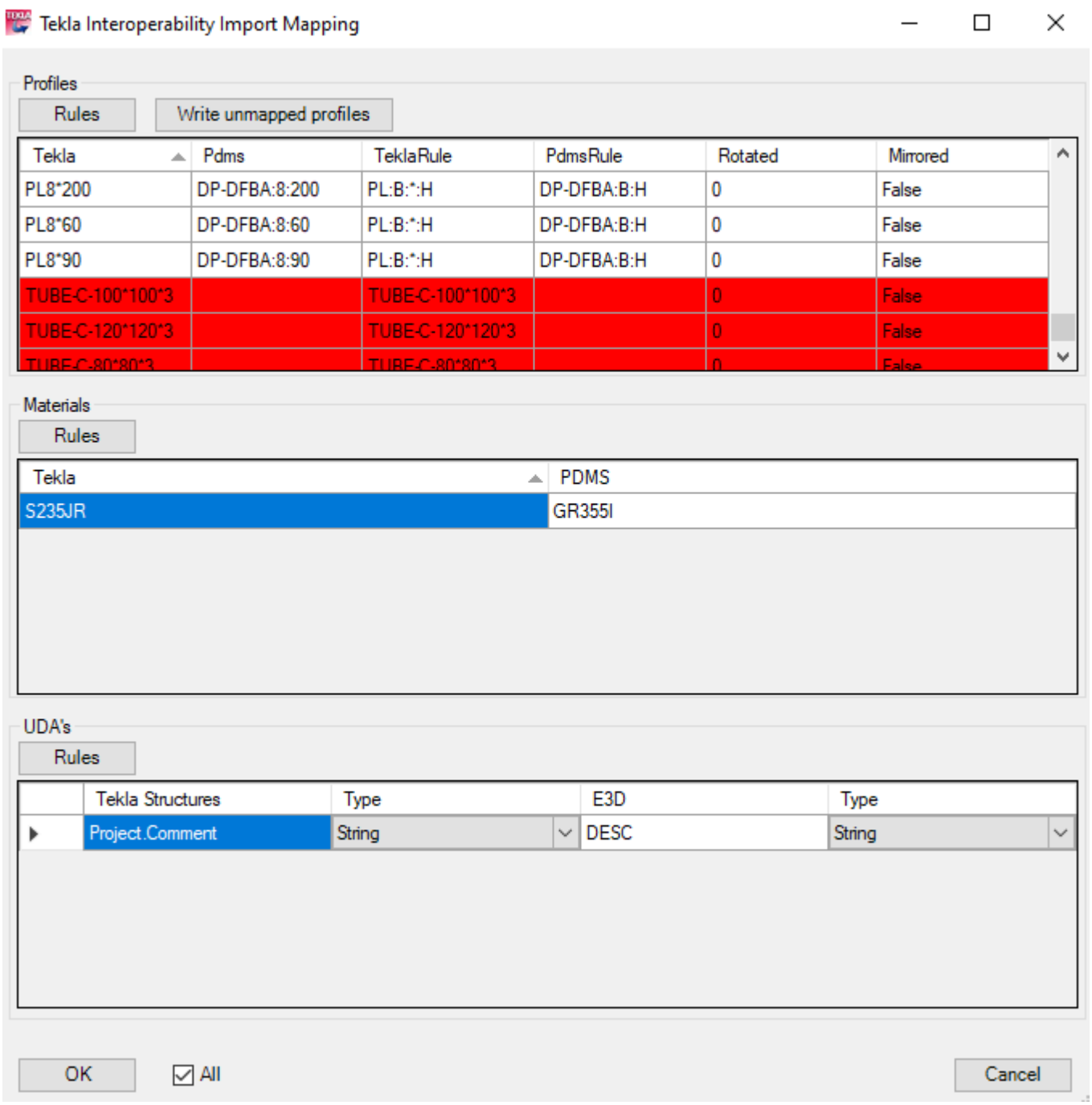


Additionally, an Unsaved import into Aveva E3D or a Canceled import into Aveva E3D is also catered for. If the Aveva E3D import session is terminated or cancelled for whatever reason without saving, when the file is re-imported into Aveva E3D the correct Tekla Structures file will be used and the model updated accordingly.

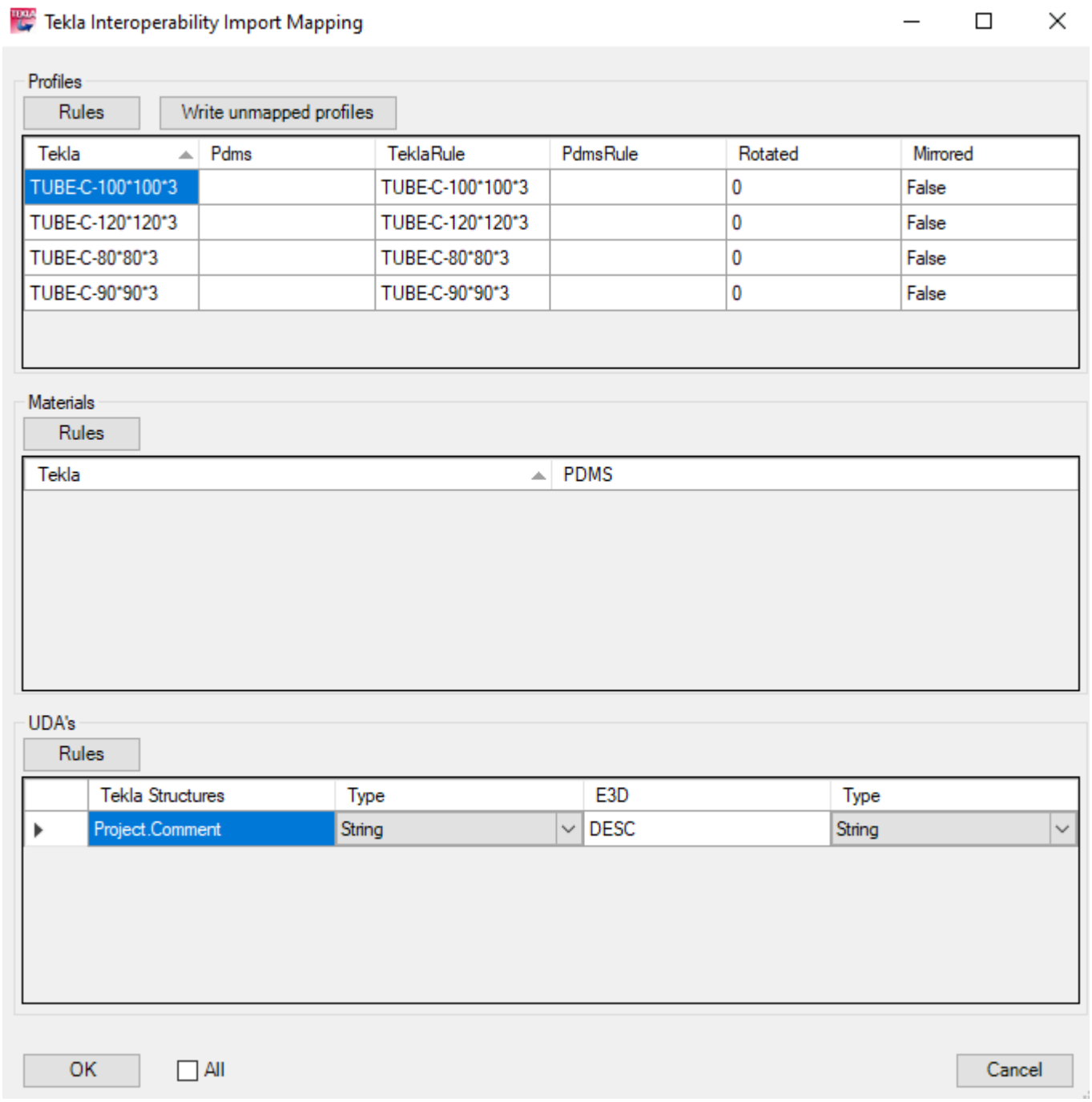
Mapping of profiles, materials and attributes (UDAs)

Prerequisite: **Create import instance**

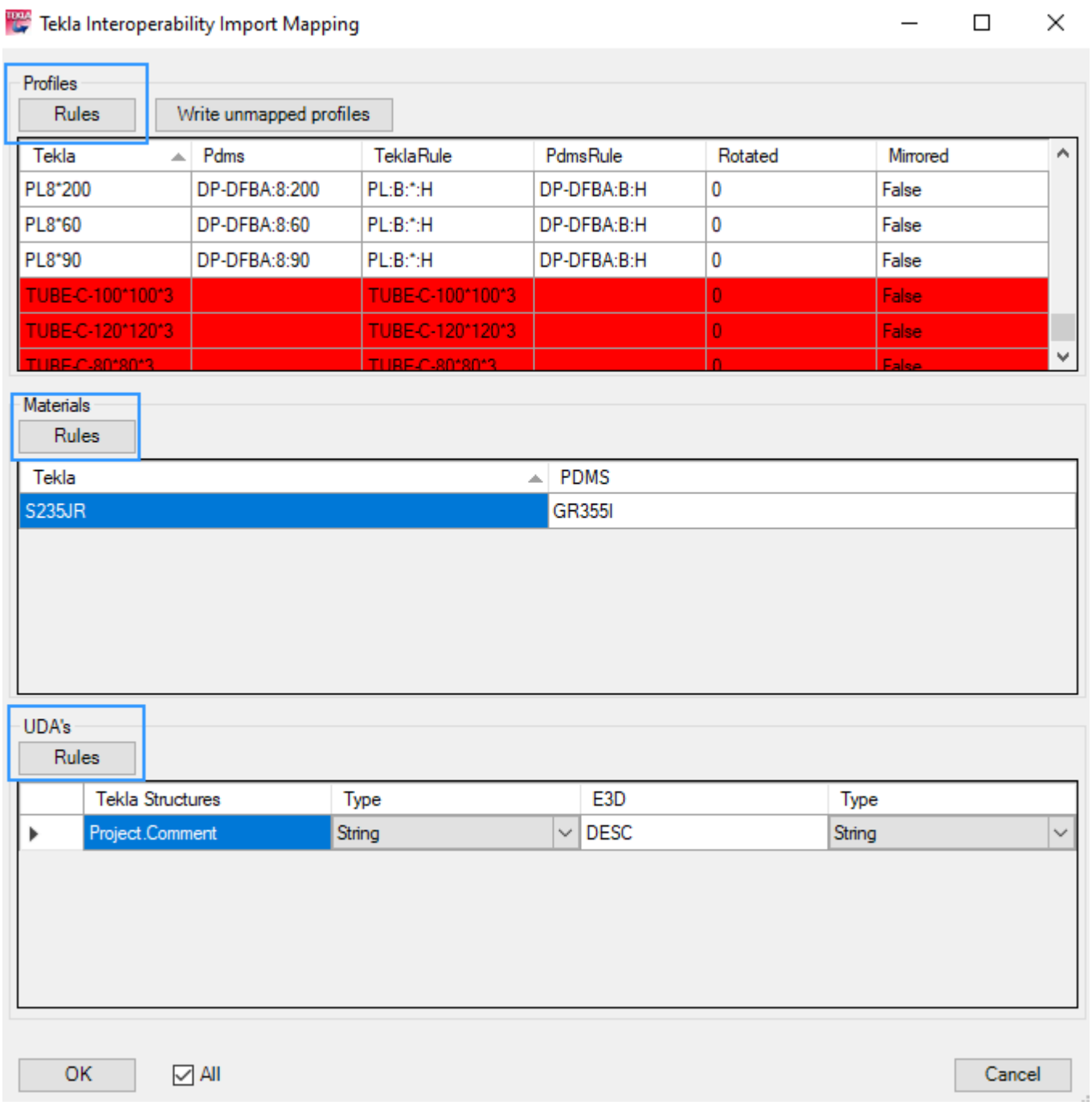
- Mapping files are stored in a project folder under TS-E3D/Mapping.
- Profile mapping: **ProfileMapping.txt**
- Material mapping: **MaterialMapping.txt**
- Attribute (UDA) mapping: AttributeMapping.txt (from Tekla)
- Attribute (UDA) mapping: **PDMSAttributeMapping.txt** (from PDMS/E3D).
  Mapping folder can also be defined in the ProjectSettings.txt file which is created when the Tekla Structures export to Aveva E3D application is started.
  NOTE: It is recommended to do all editing of the text files using a text editor, for example Notepad. This is because things like double forward slash // comment marks will not be saved if the editing of the files are done using the user interface dialog box.
- If required, steel profiles and User Defined Attributes (UDAs) mapping in Tekla Structures will be done by using the IFC object conversion functionality.
- Click **Mapping** to open the **Mapping** dialog box



- The dialog box shows the mapping settings for profiles, materials and attributes (UDAs).
- Only the profiles and the materials present in an instance (a model) will be shown in the dialog box.
- A record/row will be shown with a Red colour if it does not have a mapping defined for a profile or a material that exists in the model
- If the All check box is selected, all of the rules for Materials and UDAs are listed.



- It is possible to open and save the mapping rules by clicking the Rules buttons. The mapping file is opened with a default text editor.

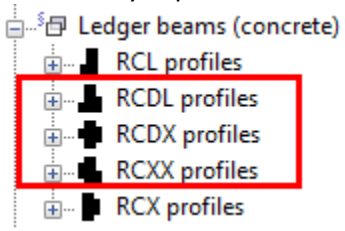


Profile mapping

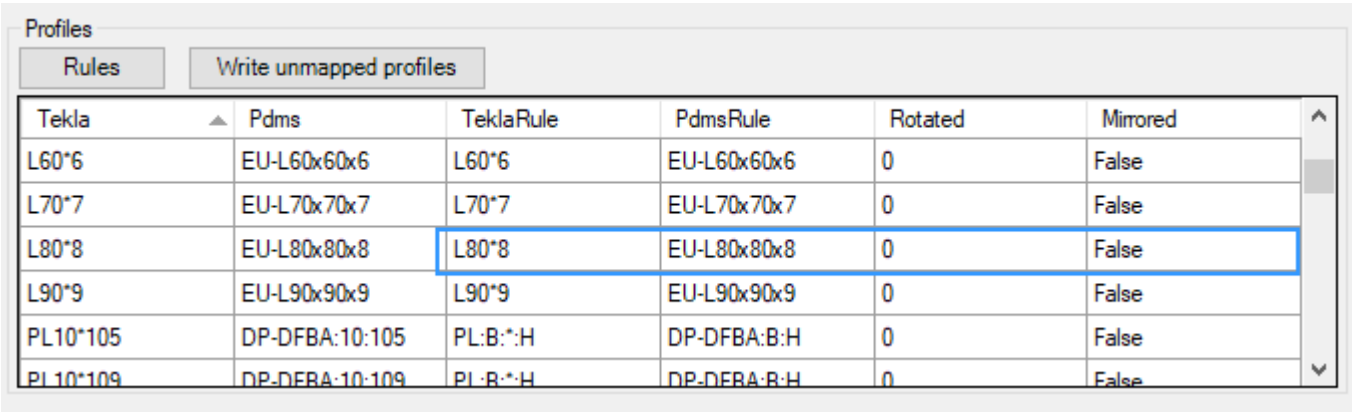
There are multiple ways to create rules for steel profile mapping. All rules need to be mapped in the ProfileMapping.txt file.

- Mapping in the ProfileMapping.txt file is in the format of Tekla Structures profile;PDMS profile
- Library profile mapping:
  - L75*75*5;DIN-SPEC/L75x7
- Parametric mapping:

    - L:B:*:H:*:T;DESPAR_SPEC/L:B:H:T or
- Profile to parametric profile mapping:
    - L200*100*10;DESPAR_SPEC/L:200:100:10
- Note: for IPE profiles an extra colon needs to be used in case of rule based mapping to library profiles. So for example
    - IPE:H;DIN-SPEC/IPE:H -> parametric profile
    - IPE:H;:DIN-SPEC/IPE:H ->library profile
- It is possible to do a library profile to library profile mapping in the dialog box.
- If a mapping is missing (empty) the part will be imported as a plate that is extruded from the object start to end with some small exceptions, e.g. Tekla Structures double ledge beams (see picture below) cannot be currently exported as extrusion parts



- In case of a wrong mapping (mapping to undefined specification), the SCTN will be created but no profile geometry will be present.



Tekla	Pdms	TeklaRule	PdmsRule	Rotated	Mirrored
L60*6	EU-L60x60x6	L60*6	EU-L60x60x6	0	False
L70*7	EU-L70x70x7	L70*7	EU-L70x70x7	0	False
L80*8	EU-L80x80x8	L80*8	EU-L80x80x8	0	False
L90*9	EU-L90x90x9	L90*9	EU-L90x90x9	0	False
PL10*105	DP-DFBA:10:105	PL:B:*:H	DP-DFBA:B:H	0	False
PL10*109	DP-DFBA:10:109	PL:B:*:H	DP-DFBA:B:H	0	False

- Rules should only be edited with an external text editor. *Note: you should only edit the rules with an external text editor when the Tekla Interoperability application is closed.*

Defining the correct syntax for the mapping file when using different standards in Aveva E3D (for example a UK standard)

If you set the Spref on a GENSEC (or SCTN) and query the spref for the GENSEC you will see the exact text for the Spref. That string is going into mapping file. If you write the complete Spref name in an Aveva command window (/BS-SPEC/xxxxx) you should get to the Spref element in Aveva E3D.

In the profile mapping file ProfileMapping.txt, it is possible to rotate and mirror steel profiles when importing them into Aveva E3D. Aveva E3D has updated its steel profile catalogues and these catalogues of steel objects have a different coordinate system especially for anti-symmetrical profiles (L shaped angle profiles, C shaped profiles etc.). It is recommended to use these new steel profile catalogues which have a different coordinate system compared with the old Aveva PDMS profile catalogues. There are two parameters at the end of each line of code for each steel profile line. These parameters are a variable for the rotation value in degrees, for example

90 or 180 and a True/False parameter for defining whether or not to mirror the object. If there are no values set for these parameters, the system will use the default values of 0 for the rotation value and False for the mirroring value. Below are some examples:

Profile values using Aveva E3D profile catalogs

L100*100*10;EU-L100x100x10;0;False

L150*100*10;EU-L150x100x10;0;False

L150*10;EU-L150x150x10;0;False

Profile values using Aveva PDMS profile catalogs

L100*100*10;DIN-SPEC/L100x10;90;False

L150*10;DIN-SPEC/L150x12;90;False

L150*100*10;DIN-SPEC/L150x100x10;180;True

If a profile is imported into Aveva E3D and the objects rotation is different to what is shown in Tekla Structures, these rotation options can be used to fix the problem.

Material mapping

- Material mapping is in the format of Tekla Structures material;Aveva E3D material. For example S355J0;GR355I where GR355I is the Aveva E3D SOLI element, not the SMTE element.

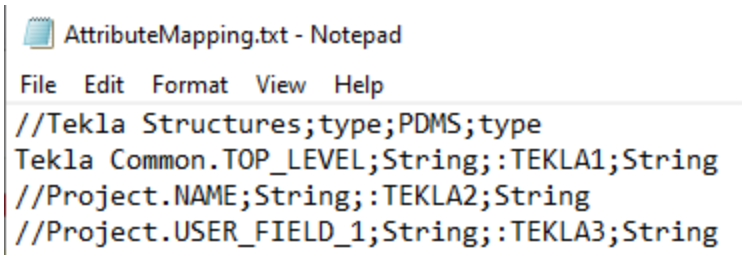
Attribute mapping

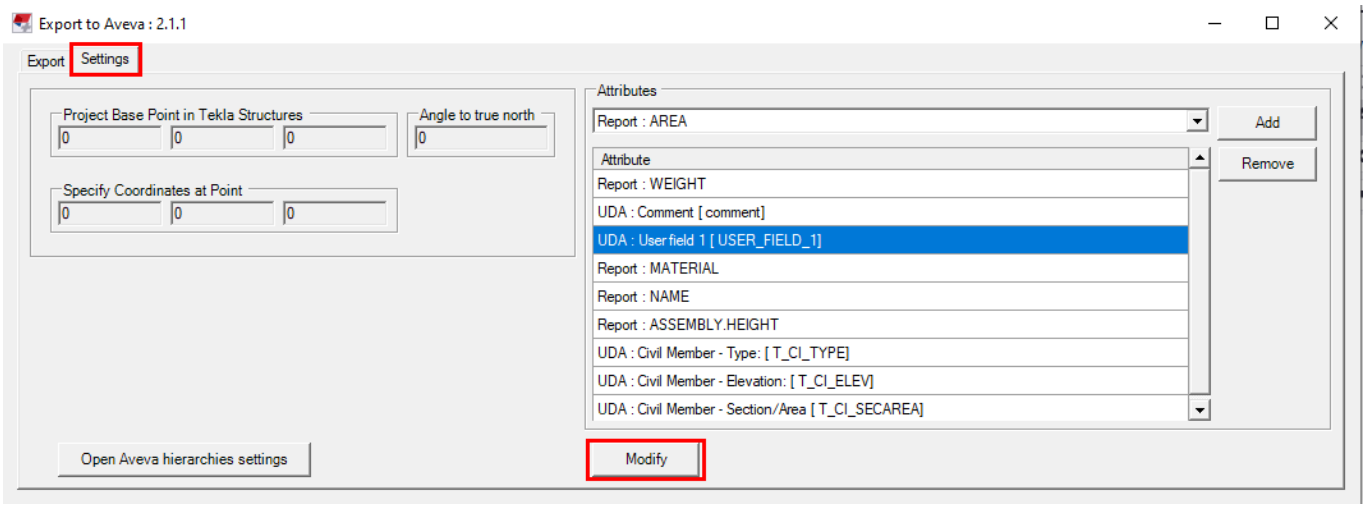
- Attribute (UDA) mapping is set by the user.
  NOTE: To get the mapping to work correctly in Aveva E3D, the corresponding Tekla Structures UDA setting must exist in Aveva E3D. If an equivalent UDA is not specified in Aveva E3D, the attribute value in Tekla Structures will not be set or transferred to the object in Aveva E3D.

- Attribute mapping is between the Tekla Structures PropertySet property and a property in Aveva E3D. The PropertySet property is defined in Tekla Structures using the Export To Aveva application and it can be a report field or a Tekla Structures UDA. A property needs to be mapped in the format of Tekla Structures PropertySet.Aveva E3D Property. The desired properties are selected in Tekla Structures using the Export to Aveva application. In the Settings tab of the Export To Aveva dialog box, users can select Report fields or UDAs and a property set name prefix of Project is used. For example, if MATERIAL attribute/property is selected and exported it will be named as Project.MATERIAL. It will be mapped in Aveva E3D in the format of Project.MATERIAL;String;:MATERIAL;String. The attribute names which need to be mapped can be seen when importing the exported .tcZip file in Tekla Structures and using the inquire command to see the attribute names.

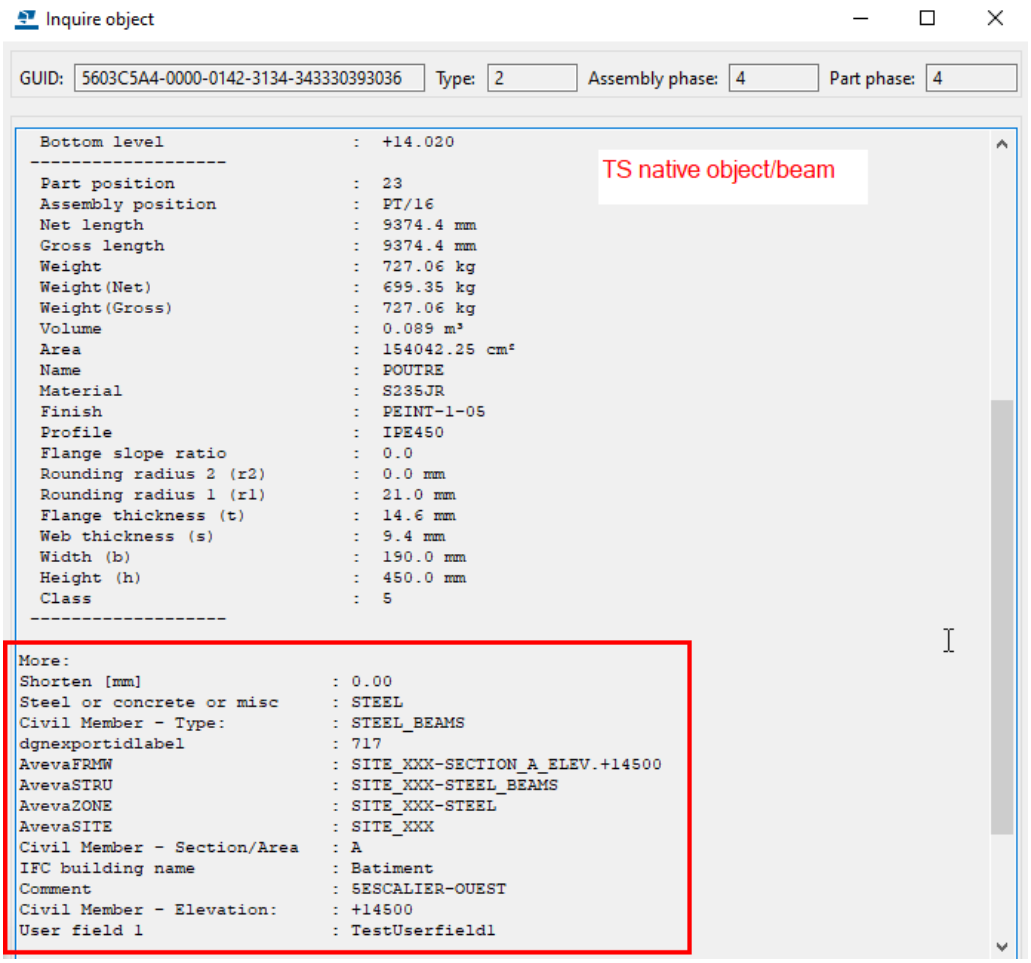
  It is also possible to use the Change Viewer button/functionality in the Tekla Structures Export to Aveva dialog. Another option to check the attribute names is to open the Tekla Structures Export IFC command and from there open additional property set Aveva_PSets. This is automatically created and used when the Tekla Structures Export to Aveva application used. It is also recommended to watch the technical

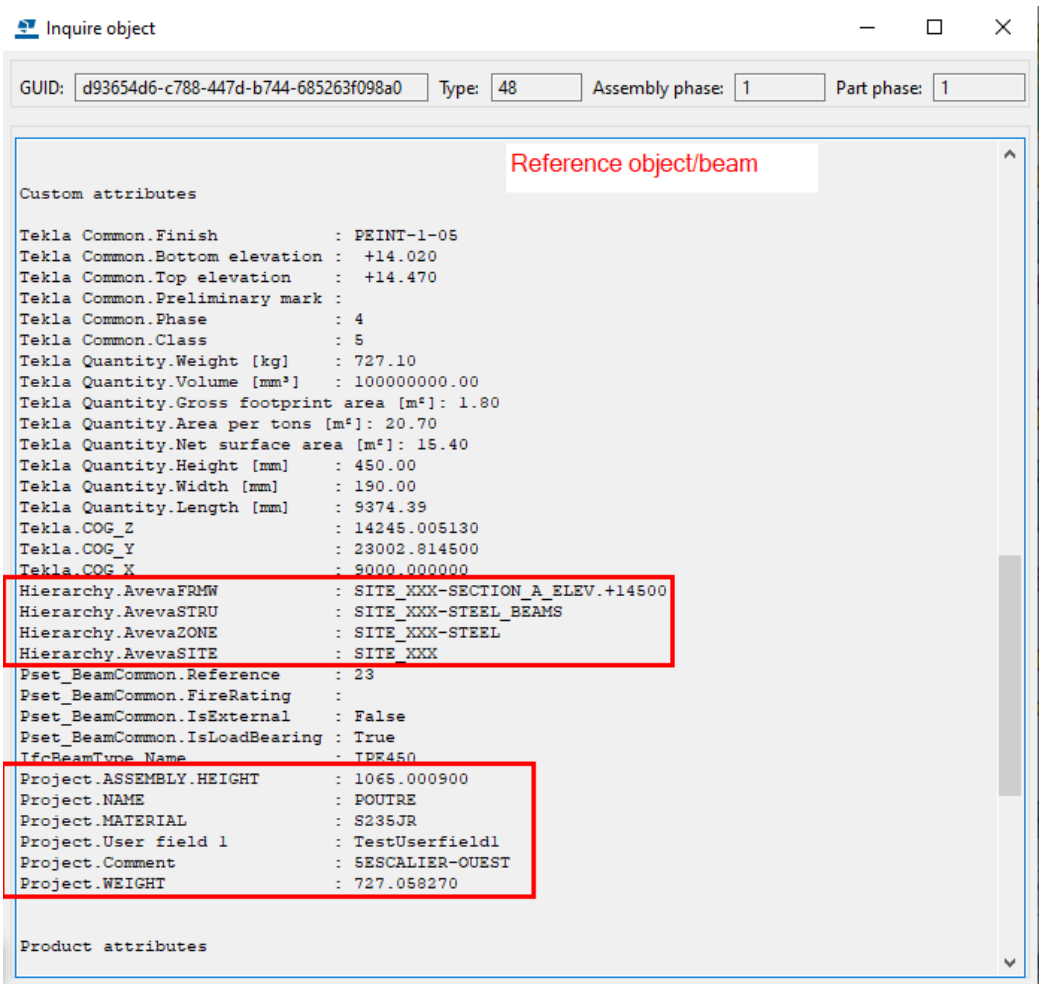
video video Tekla_Aveva_Interoperability_Video (from 2017) on located on Tekla Warehouse under the Versions tab of the Installer for Aveva E3D/PDMS import/export from/to Tekla Structures page located here. Example from AttributeMapping.txt file located in Mapping folder after installation is below



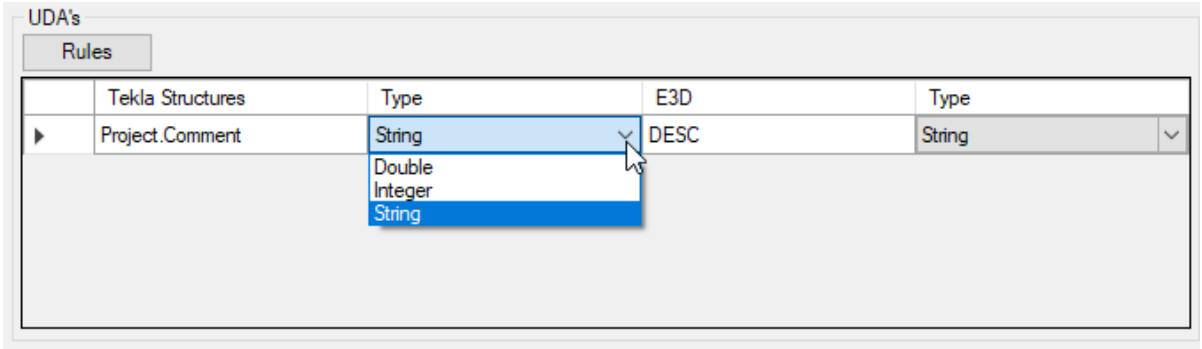


Use the Inquire command in Tekla Structures to get the details of the object

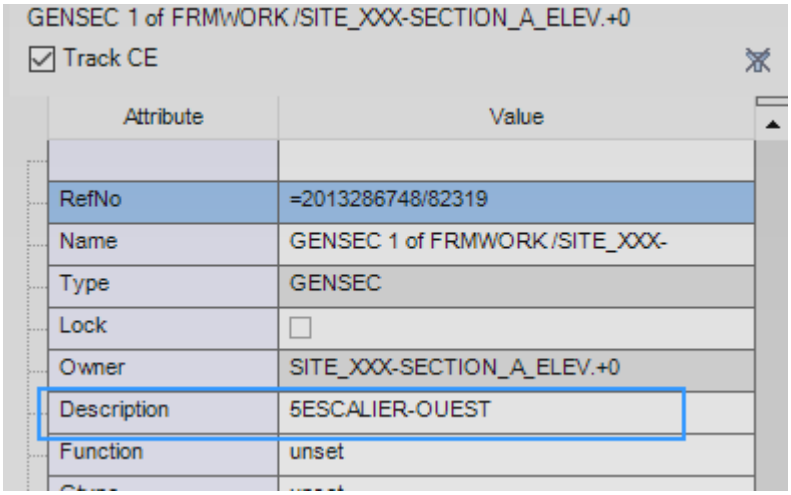

Inquire object
GUID: 5603C5A4-0000-0142-3134-343330393036
Type: 2
Assembly phase: 4
Part phase: 4
Bottom level : +14.020
Part position : 23
Assembly position : PT/16
Net length : 9374.4 mm
Gross length : 9374.4 mm
Weight : 727.06 kg
Weight(Net) : 699.35 kg
Weight(Gross) : 727.06 kg
Volume : 0.089 m³
Area : 154042.25 cm²
Name : POUTRE
Material : S235JR
Finish : PEINT-1-05
Profile : IPE450
Flange slope ratio : 0.0
Rounding radius 2 (r2) : 0.0 mm
Rounding radius 1 (r1) : 21.0 mm
Flange thickness (t) : 14.6 mm
Web thickness (s) : 9.4 mm
Width (b) : 190.0 mm
Height (h) : 450.0 mm
Class : 5
TS native object/beam
More:
Shorten [mm] : 0.00
Steel or concrete or misc : STEEL
Civil Member - Type: : STEEL_BEAMS
dgnexportidlabel : 717
AvevaFRMW : SITE_XXX-SECTION_A_ELEV.+14500
AvevaSTRU : SITE_XXX-STEEL_BEAMS
AvevaZONE : SITE_XXX-STEEL
AvevaSITE : SITE_XXX
Civil Member - Section/Area : A
IFC building name : Batiment
Comment : 5ESCALIER-OUEST
Civil Member - Elevation: : +14500
User field 1 : TestUserfield1



Aveva E3D UDA definition dialog:

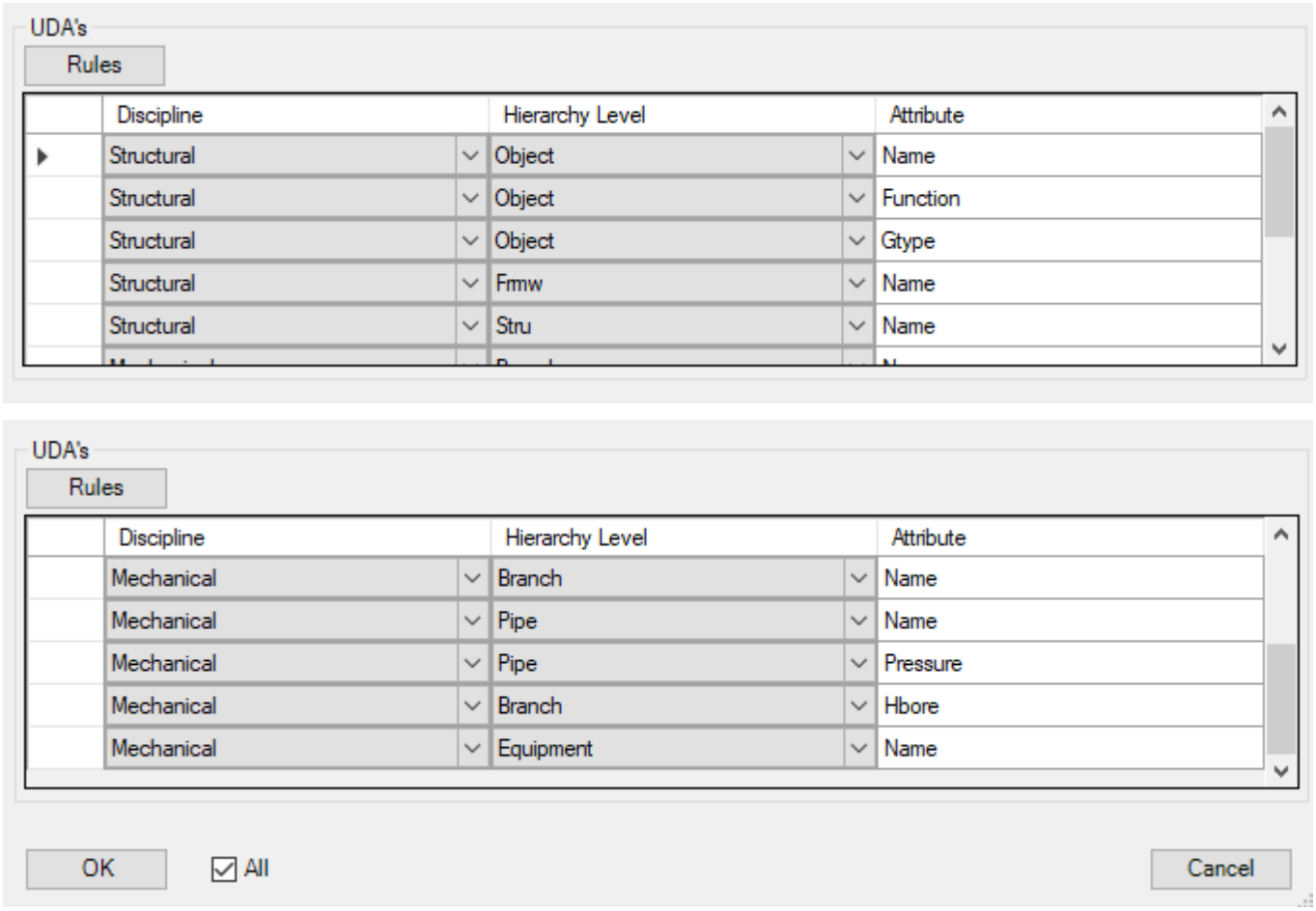


If Project.Comment is 5ESCALIER-QUEST, it appears in attribute list after import.



- There is a separate mapping file PDMSExportAttributes.txt for Export from Aveva E3D to Tekla Structures. This file also needs to be located in the project folder under TS-E3D/Mapping. Note that the UDAs for mechanical objects (pipes, equipment) can only be exported from Aveva E3D or Aveva PDMS12.1 versions.
- PDMSExportAttributes.pdf is a description document that shows the usage of mapping file with examples. It is located in C:\TS_E3D\2.1 folder after installation of Add-in.

User interface:



Definition file PdmsExportAttributes.txt:

PdmsExportAttributes.txt

```
1  //Discipline (Structural, Mechanical)
2  //Level (Object, Branch, Pipe, Hvac, Equipment, Frmw, Stru, Zone, Site)
3  //Discipline;Level;Attribute
4  //Structural;Object;Name
5  //Mechanical;Frmw;System
6  Structural;Object;Name
7  Structural;Object;Function
8  Structural;Object;Gtype
9  Structural;Frmw;Name
10 Structural;Stru;Name
11 Mechanical;Branch;Name
12 Mechanical;Pipe;Name
13 Mechanical;Pipe;Pressure
14 Mechanical;Branch;Hbore
15 Mechanical;Equipment;Name
```

Hints & Tips

- There is also Questions & Answers page on Tekla Warehouse where most common questions and answers collected related to usage of the Tekla to Aveva E3D and Tekla to Aveva PDMS links. This Q&A can be found by clicking on the Q&A link under the Details tab of the Installer for Aveva E3D to import/export from/to Tekla Structures page located here or on the Tekla Online Services site at https://teklastructures.support.tekla.com/not-version-specific/en/ext_pdms_and_tekla_structures_interoperability_q_and_a

PDMS/E3D and Tekla Structures Interoperability: Q&A, collected 28th April 2021

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Tekla Structures - Not version-specific

Question:
Having issues with the mapping to native sections

Answer:
Tekla sections shown as panels in PDMS but not as native PDMS sections.
=> TS-PDMS link has a principle that if mapping for profile/part is not found panels/plates (PANE) used in PDMS
If mapping is found then a profile section is used (SCTN). Mapping file ProfileMapping.txt is included in installation and it needs
to be in PDMS project folder under TS-PDMS/Mapping. Example of mapping row is W8X35;AISC-SPEC/W8x35

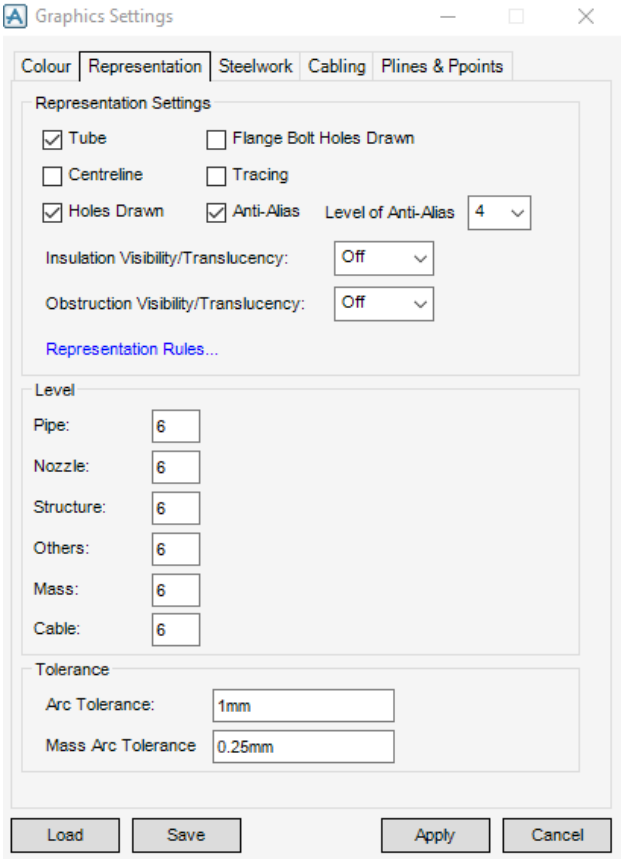
Question:
Revision handling does not work in PDMS side or error in importing file to PDMS

Answer:
Note: Do not change file name of TS export because it is used in revision handling when updates exported.
Also important that the TEKLA UDA's (TEKLA_GUID, TEKLA_IFCGUID, TEKLA_VERSION) must be created for PDMS project (see instructions).
Also important not to use spaces in file name when exported from TS

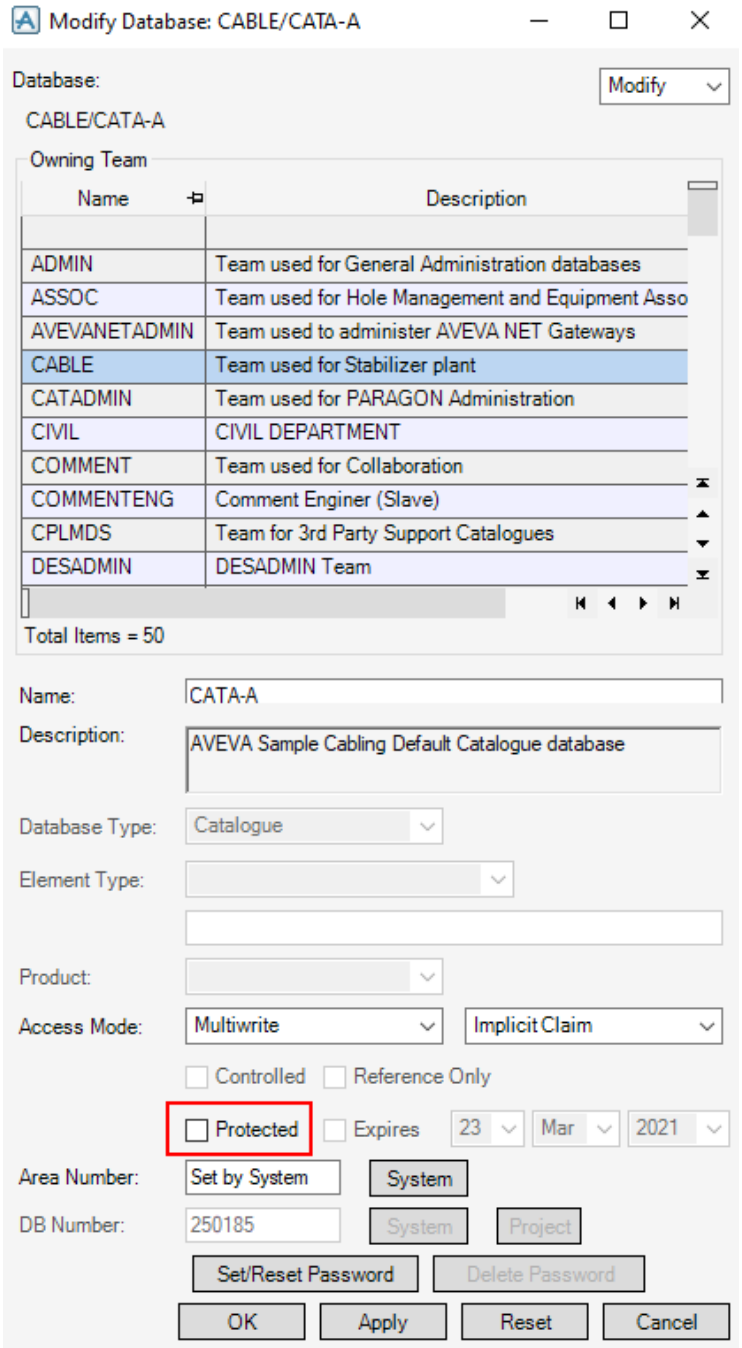
Question:
Problems to install PDMS application

Answer:
Edited file named in PDMS is related to module you are running. So
PDMS Design --> DesignAddins.xml
Marine,Outfitting --> OutfittingAddins.xml
The company setup might read files from different locations (e.g. can be read from a server based on company setup).
If so contact your PDMS support to get the modifications done correctly.
Problem can be that edited DesignAddins.xml file is not read at all.

- If cuts in the steel exist, the “Holes Drawn” check box option in the Graphic Settings dialog box should be checked in order to see the steel members correctly. See setting below,

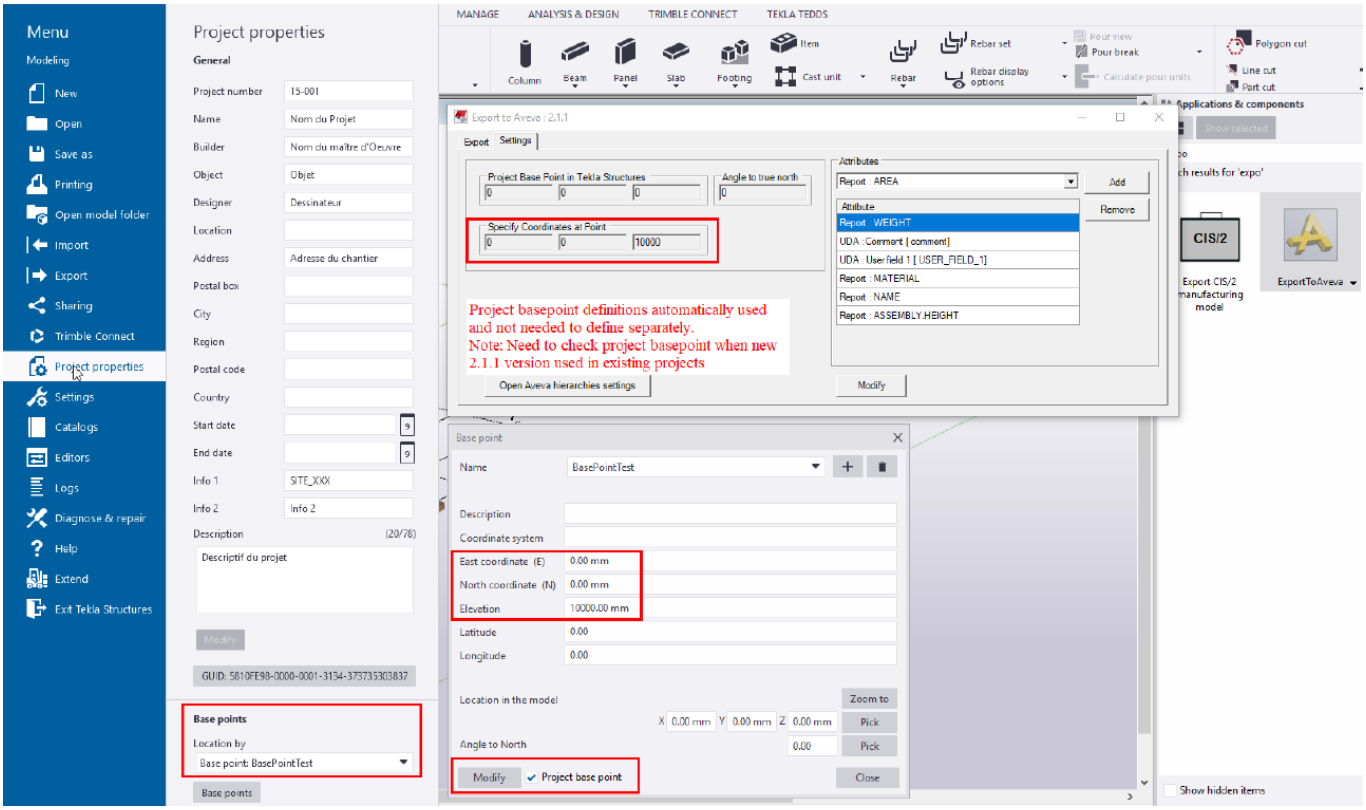


- In Aveva E3D, Catalog databases need to be unprotected by Un-checking the check box for the Protected property in the Modify Database dialog box. If this Protected option is checked and the Catalog databases are protected the link will not be able to read the profile information for PANE members. See picture below.



- From our testing we have noticed that importing files utilizing the TTY / Batch mode is significantly faster than importing files utilizing the graphical import, in some cased up to 50% faster. For example, manual graphical import took approximately 1min 30 secs while utilizing the batch (TTY) import took approximately 30 secs. For processing large files it is recommended to utilize the Batch processing option.

- If there are different coordinate systems in the Tekla Structures model environment and the Aveva E3D model environment it is recommended to define a Project base point in Tekla Structures. This Project Base Point will automatically be used when the Tekla Structures Export to Aveva is being used. The Specify Coordinates at Point coordinates should not be specified in the Settings tab of the Export to Aveva dialog box. See picture below.



- The Tekla Structures BIM Publisher application can also be used for batch exporting of files. The Tekla Structures BIM publisher can be found on Tekla Warehouse at https://warehouse.tekla.com/#/catalog/details/u1ea375b5-0819-40e4-8105-5f3d74474352 . For additional information see the end of the video Tekla_Aveva_Interoperability_video (from 2017) (TeklaPDMSVideosCombinedWithVoice.mp4) which can be found on Tekla Warehouse under the Versions tab of the Installer for Aveva E3D to import/export from/to Tekla Structures page located here.

- File based batch import and export can be used in Aveva E3D as per the instructions in this Aveva E3D to Tekla Structures Add-in - Batch routine usage chapter. Separate instructions with example files exist at Tekla Warehouse <BATCH_FILES_PDMS_E3D_AND_BATCH_INSTRUCTIONS(2020-03-20), download from Versions tab page)> . *Note: from our testing and customer feedback, the Import time is faster when using the batch import capabilities.*

Aveva E3D import/export from/to Tekla Structures Add-in - Batch routine usage

Description

The Batch routine capabilities of the Aveva E3D to import/export from/to Tekla Structures Add-in enables the applications to process a large number of files in a Batching model. The Batch routines works when importing files from Tekla Structures to Aveva E3D or exporting files from Aveva E3D to Tekla Structures. For the Batch capabilities to work, the Aveva E3D to import/export from/to Tekla Structures Add-in needs to be installed prior to the installation of the Batch routines.

Installing Batch routines

Aveva E3D

The Aveva E3D to import/export from/to Tekla Structures Batch routine can be downloaded from Tekla Warehouse. The file Batch_Files_PDMS_E3D_and_Batch_Instructions can be found on Tekla Warehouse under the Versions tab of the Installer for Aveva E3D to import/export from/to Tekla Structures page located here.

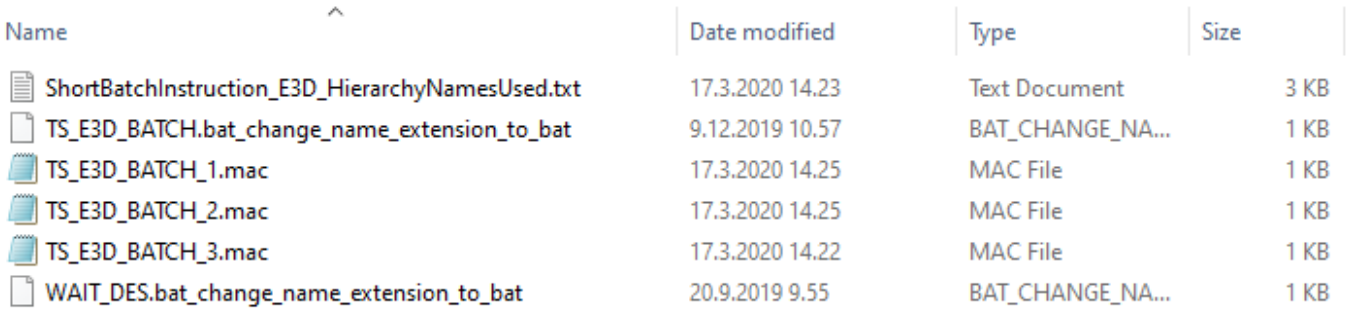
The following file is found in the downloaded AVEVA_PDMS_E3D_BatchInstructions_After_29.1_15.1_Vers_2020-03-20.Zip. It includes separate folders for Aveva E3D and Aveva PDMS usage. There are two ways to use batch functionality. First possibility is to use batch numbers which given in Tekla Interoperability dialog in a separate field of rows (see picture later). These batch numbers are used in batch macro text files. Second possibility is the use file/hierarchy names which used in batch macro text files.

E3D2.1_15.1.ExampleFilesForFileBasedBatchImportExportUsingBatchNumber folder

Name	Date modified	Type	Size
ShortBatchInstruction_E3D_BatchNumberUsed.txt	9.12.2019 12.03	Text Document	2 KB
TS_E3D_BATCH_NR.bat_change_name_extension_to_bat	9.12.2019 11.03	BAT_CHANGE_NA...	1 KB
TS_E3D_BATCH_NR1.mac	29.10.2019 15.52	MAC File	1 KB
TS_E3D_BATCH_NR2.mac	29.10.2019 15.53	MAC File	1 KB
TS_E3D_BATCH_NR3.mac	29.10.2019 15.55	MAC File	1 KB
WAIT_DES.bat_change_name_extension_to_bat	20.9.2019 9.55	BAT_CHANGE_NA...	1 KB

- TS_E3D_BATCH_NR.bat is an example file for Aveva E3D when utilizing Batch numbers
- TS_E3D_BATCH_NR1.mac; TS_E3D_BATCH_NR2.mac; TS_E3D_BATCH_NR3.mac are macro files for the relevant batching files
- TS_E3D_BATCH_NR1.mac is the file which runs the program inside Aveva E3D. The import statement should be checked to ensure it is pointing to the correct location of the TS_E3D_BATCH.dll file
- TS_E3D_BATCH_NR.bat is an example startup batch file. Aveva E3D is started in TTY mode and mac-file is run.
- WAIT_DES.bat is a file which is used to track when the previous batch run has finished and when the next batch run can be started. This can be used if the computer exporting the files from Aveva E3D runs out of memory.

E3D2.1_15.1.ExampleFilesForFileBasedBatchImportExportUsingHierarchyNames folder



Name	Date modified	Type	Size
ShortBatchInstruction_E3D_HierarchyNamesUsed.txt	17.3.2020 14.23	Text Document	3 KB
TS_E3D_BATCH.bat_change_name_extension_to_bat	9.12.2019 10.57	BAT_CHANGE_NA...	1 KB
TS_E3D_BATCH_1.mac	17.3.2020 14.25	MAC File	1 KB
TS_E3D_BATCH_2.mac	17.3.2020 14.25	MAC File	1 KB
TS_E3D_BATCH_3.mac	17.3.2020 14.22	MAC File	1 KB
WAIT_DES.bat_change_name_extension_to_bat	20.9.2019 9.55	BAT_CHANGE_NA...	1 KB

Similar files *when file (in import) or hierarchy (in export) names used instead of batch numbers* which defined on Tekla Interoperability dialog. In Aveva E3D the export hierarchies do not need to exist prior to using the Export dialog.

When exporting from Aveva E3D, Hierarchy names can be used instead of Batch numbers. When importing into Aveva E3D, File names can be used instead of Batch numbers.

- TS_E3D_BATCH.bat is an example file for Aveva E3D when Hierarchy names are used
- TS_E3D_BATCH_1.mac; TS_E3D_BATCH_2.mac; and TS_E3D_BATCH_3.mac are macro files where the file name is used when importing or the Hierarchy name is used when exporting
- TS_E3D_BATCH_1.mac is the file which runs the program inside Aveva E3D. The import statement should be checked to ensure it is pointing to the correct location of the TS_E3D_BATCH.dll file
- TS_E3D_BATCH.bat is an example startup batch file. Aveva E3D is started in TTY mode and mac-file is run.
- WAIT_DES.bat is a file which is used to track when the previous batch run has finished and when the next batch run can be started. This can be used if the computer exporting the files from Aveva E3D runs out of memory.

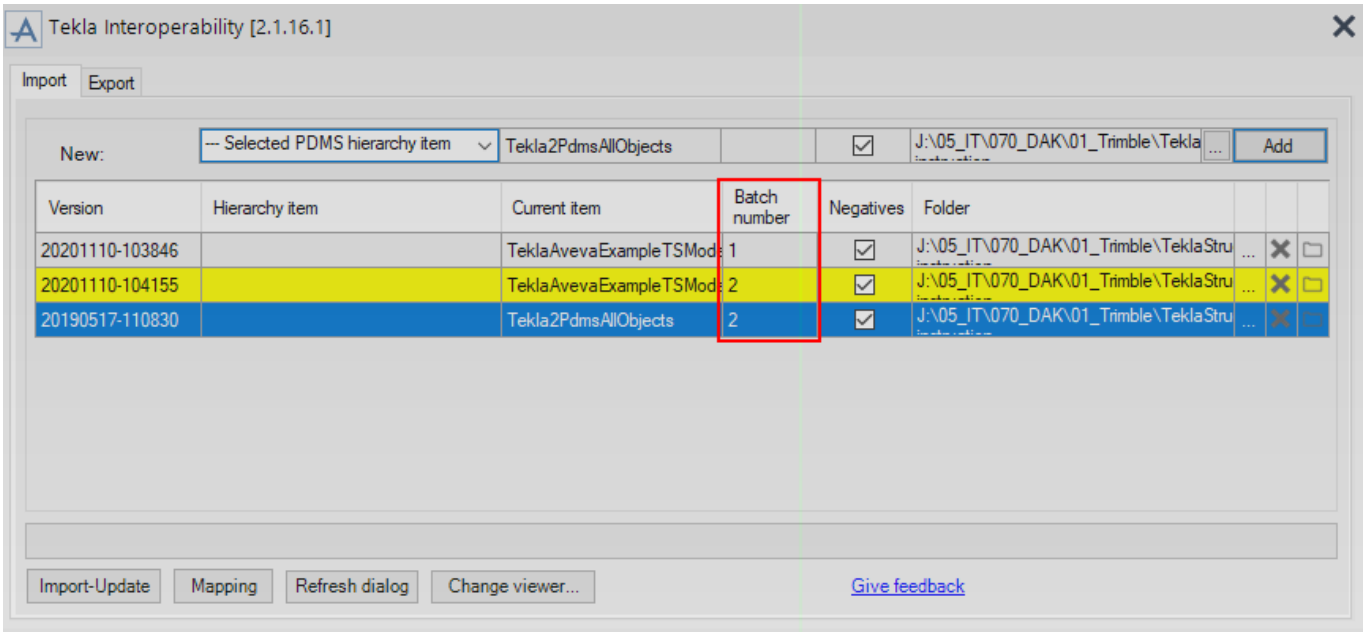
There are similar folders and similar functionality for Aveva PDMS batch usage. Folders are PDMS_29.1.ExampleFilesForFileBasedBatchImportExportUsingBatchNumber and PDMS_29.1.ExampleFilesForFileBasedBatchImportExportUsingHierarchyNames

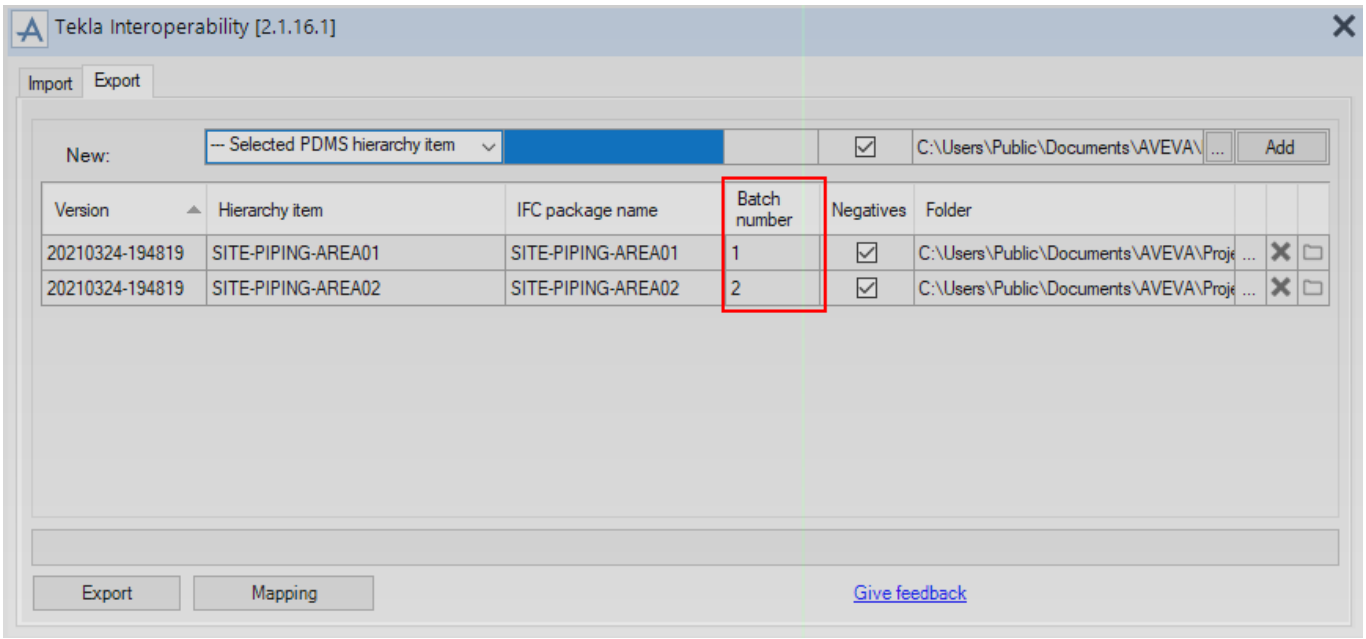
Using the Batch Routine

The Batch routine uses the content of the Tekla Interoperability dialog to determine what to Import or Export. Export hierarchies do not need to exist in the Export dialog prior to exporting in Aveva E3D. There are two ways to use the Batch Import/Export capability.

Using Batch File Numbers

Using Batch file numbers is the recommended method but this will depend on your company practice. Batch file numbers can be specified on the Tekla Interoperability dialog and the rows/models can be defines in separate files to be Imported or Exported. See the following picture for an example





With this method, the exported files are listed in separate Batch number files. Depending on the size of the Aveva E3D models, users may experience RAM memory problems with large Aveva E3D models due to a RAM limit when running 32 bit applications. With the Batch processing method, Aveva E3D can be re-started and so the computer will regain access to the available 2 GB RAM memory for 32bit software applications. With this method the Batching process will continue to restart until all of the Batch number files are processed.

An example of this process is shown in the image below where TS_E3D_BATCH_NR1.mac; TS_E3D_BATCH_NR2.mac; and TS_E3D_BATCH_NR3.mac files are examples which include an Import/Export

command (e.g. !example.ExportByBatchNumber('1')) with the batch number defined in the Tekla Interoperability dialog box

ShortBatchInstruction_E3D_BatchNumberUsed.txt

```
Export and import based on batch number

In E3D there is a problem that computer runs out of memory when the amount of exported or imported models exceeds a certain limit.
It is possible to use commands ImportByBatchNumber and ExportByBatchNumber, and give a batch number as a parameter.
Batch number is given for each model row in the Tekla interoperability dialog.
The sizes of batches should be found by testing. E3D should be closed with the command FINISH after each batch in order to release memory.

An example of the bat file:

start "" /wait "C:\AVEVA\Everything3D2.10\mon.exe" PROD E3D init "C:\AVEVA\Everything3D2.10\launch.init" tty MEM SYSTEM/XXXXXX /ALL_IN $m/C:\Users\Public\Documents\AVEVA\FileBasedBatch\TS_E3D_BATCH_NR1.mac
start "" /wait "WAIT_DES.bat"
start "" /wait "C:\AVEVA\Everything3D2.10\mon.exe" PROD E3D init "C:\AVEVA\Everything3D2.10\launch.init" tty MEM SYSTEM/XXXXXX /ALL_IN $m/C:\Users\Public\Documents\AVEVA\FileBasedBatch\TS_E3D_BATCH_NR2.mac
start "" /wait "WAIT_DES.bat"
start "" /wait "C:\AVEVA\Everything3D2.10\mon.exe" PROD E3D init "C:\AVEVA\Everything3D2.10\launch.init" tty MEM SYSTEM/XXXXXX /ALL_IN $m/C:\Users\Public\Documents\AVEVA\FileBasedBatch\TS_E3D_BATCH_NR3.mac

There should be a .mac file for each import/export batch. WAIT_DES.bat is used to track when the previous batch run has finished, and the next can be started.

An example of the mac file:

design
--$m/C:\TS_E3D\2.1\TS_E3D_BATCH.mac
import 'C:\TS_E3D\2.1\TS-E3D_Library\TS_E3D_BATCH'
handle ANY
endhandle
$p TS-E3D Interoperability Batch started.
using namespace 'TS_E3D_BATCH'
!example = object TsEThreeDBatch()

-- Run import
--$p *** IMPORT ***
--!example.ImportModels()
!example.ImportByBatchNumber('3')

--Run export
$p *** EXPORT ***
--!example.Export()
--!example.ExportByBatchNumber('2')

FINISH

Note: Batch number parameter must be an integer but it must be given as a string, that is, inside quotation marks ''.
```

Using Hierarchy and File Names

An alternative method for setting up the Batching process is to use separate files for the Exported and Imported models. When Exporting, the Hierarchy is used as the file name and when Importing the model file name is used. With this method it is also possible to import and export without adding first content to Tekla Interoperability dialog. This can also be a recommended method if e.g. content of export or import is big. Because it is not needed to first add content to Tekla Interoperability dialog but instead add content to macro text files which are used and then added automatically to Tekla Interoperability dialog.

An example of this process is shown in the image below where TS_E3D_BATCH_1.mac; TS_E3D_BATCH_2.mac; and TS_E3D_BATCH_3.mac files are examples which include the Import/Export command and also the rows/models to be imported or exported, e.g. !example.ImportModels('$

\\XYZ.com\FI\HKI_Projects\Dxxxxx\D1667B\PDMS\MEM\TS-E3D\New model 5 $

\\XYZ.com\FI\HKI_Projects\Dxxxxx\D1667B\PDMS\MEM\TS-E3D\PolybeamsTestModelPlatformTS2019 $

ShortBatchInstruction_E3D_HierarchyNamesUsed.txt - Notepad

File Edit Format View Help

```
File based export:

In E3D there is a problem that computer runs out of memory when the amount of exported or imported models exceeds a certain limit.
It is possible to use commands ImportModels and ExportModels, and give a list of exported models as a parameter.
The sizes of batches should be found by testing.
E3D should be closed with the command finish after each batch in order to release memory.

An example of the bat file:

start "" /wait "C:\AVEVA\Everything3D2.10\mon.exe" PROD E3D init "C:\AVEVA\Everything3D2.10\launch.init" tty MEM SYSTEM/XXXXXX /ALL_IN $m/C:\Users\Public\Documents\AVEVA\FileBasedBatch\TS_E3D_BATCH_1.mac
start "" /wait "WAIT_DES.bat"
start "" /wait "C:\AVEVA\Everything3D2.10\mon.exe" PROD E3D init "C:\AVEVA\Everything3D2.10\launch.init" tty MEM SYSTEM/XXXXXX /ALL_IN $m/C:\Users\Public\Documents\AVEVA\FileBasedBatch\TS_E3D_BATCH_2.mac
start "" /wait "WAIT_DES.bat"
start "" /wait "C:\AVEVA\Everything3D2.10\mon.exe" PROD E3D init "C:\AVEVA\Everything3D2.10\launch.init" tty MEM SYSTEM/XXXXXX /ALL_IN $m/C:\Users\Public\Documents\AVEVA\FileBasedBatch\TS_E3D_BATCH_3.mac

WAIT_DES.bat is used to track when the previous PDMS batch run has finished, and the next can be started.

An example of the mac file:

design
import 'C:\TS_E3D\2.1\TS-E3D_Library\TS_E3D_BATCH'
handle ANY
endhandle
$p TS-E3D Interoperability Batch started.
using namespace 'TS_E3D_BATCH'
!example = object TsEThreeDBatch()

-- Run import
--$p *** IMPORT ***
--!example.ImportModels()
!example.ImportModels('$
\\XYZ.com\FI\HKI_Projects\Dxxxxx\D1667B\PDMS\MEM\TS-E3D\New model 5 $
\\XYZ.com\FI\HKI_Projects\Dxxxxx\D1667B\PDMS\MEM\TS-E3D\PolybeamsTestModelPlatformTS2019 $
')

--Run export
$p *** EXPORT ***
--!example.Export()
!example.ExportModels('0605_PB_STEE_1 ')
!example.ExportModels('0605_PB_STEE_1_PS ')
!example.ExportModels('0605_PB_STEE_1/STRU')


FINISH

Model names can be written on one line, or multiple lines using $ character as the line change
NOTE: In ExportModels command model names are PDMS/E3D hierarchy names. In above example SITE=0605_PB_STEE_1, ZONE=0605_PB_STEE_1_PS, STRU=0605_PB_STEE_1/STRU. Hierarchy name defines from which level export will be done
```

Command name !example.ImportModels('ModelName') in a .mac file can be used but the model/file name needs already exist in the Tekla Interoperability dialog. This can be done manually or with new command !example.ImportFromPath and a folder name is given as a parameter. Example is !example.ImportFromPath('\\XXX\FI\HKI_Projects\Dxxxxx\D1234\PDMS\MOM\TS-PDMS').

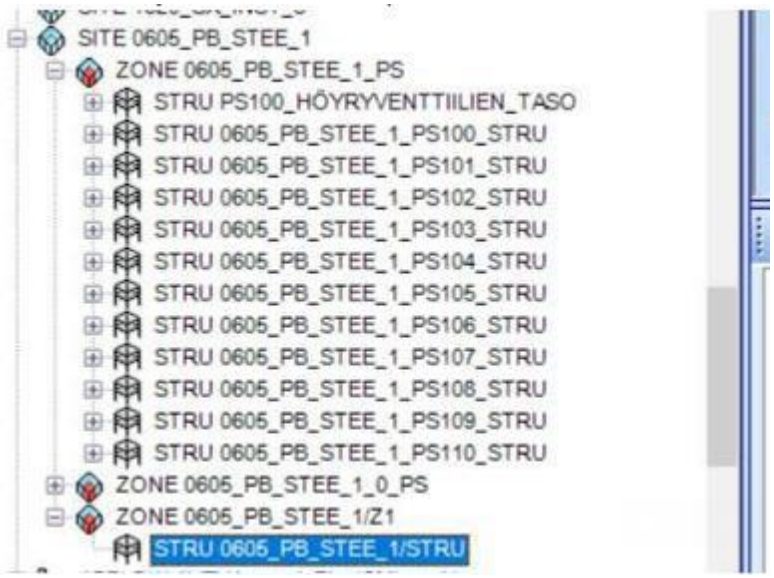
All .tcZip files are imported from the given folder (…\TS-PDMS). All files with same names (different time stamps) are imported in a normal way (consecutively) and if no new files exist, then nothing imported. This new command !example.ImportFromPath has been added to 17.3 version and later for E3D2.1 and E3D3.1 and version 29.5 and later for PDMS12.1 SP2/4 and PDMS12.1 SP5.

The Command !example.ImportModels() imports rows/models already exists in the dialog. Users should not use the commands !example.ImportModels() and !example.ImportModels('ModelName') at the same time as this would create duplicates of the import.

When using the ExportModels command in Aveva E3D, the model names are the Aveva E3D hierarchy names. For example, in the picture below the

- SITE is 0605_PB_STEE_1
- ZONE is 0605_PB_STEE_1_PS and the
- STRU is 0605_PB_STEE_1/STRU

The hierarchy name defines the level from which the export will be done.



The first way of using batch number definitions is easier and simpler because the row/model names do not need to write to files.

In Aveva E3D it is also possible to collect Aveva E3D hierarchy members to be exported with the Tekla Interoperability application. When there are a lot of different export files/models this option can be used instead of manually filling in the details in the Tekla Interoperability dialog. See detailed instruction at heading called Create export instance with selected GPSET members

With Aveva E3D version 15.1 and later, collection may not needed because the exported hierarchy names do not need to exist before hand in the Tekla Interoperability dialog. After export these will be added to dialog and can be exported manually.

Testing of batch Import

The "yellow rows" in dialog will be imported. So to test add a row to import side, close the dialog and run the macro. The file should then be imported. Same thing will happen if an updated tcZip file is copied to folder. By running the macro, the PDMS/E3D model will be updated with changes in new file. So intention is that you can add the entry once and by putting updated files to folder the E3D/PDMS model can be updated in a batch. In case of no updated file / no need to import again a below message text appear in the log file, for example

INFO [ImportRow] - Model: 1610_PL_STEE_2_GRATING. Nothing new to import, aborting...

Testing of batch Export

When exporting, the rows added to the dialog will be exported each time the macro runs. At the moment we cannot check if something has been changed and so every time an export is done.

The Import statement import 'C:\TS_E3D\2.1\TS-E3D_Library\TS_E3D_BATCH' in the picture below must point towards the folder where the TS_E3D_BATCH file is located, e.g. in the library folder.

The statement !example = object TsEThreeDBatch() is included in TS_E3D_BATCH.dll library file of Aveva E3D Add-in and this fixed statement is needed.

The macro can then be executed in E3D like this: $m /C:\TS_E3D\TS_E3D_BATCH_NR1.mac with correct path to file which finally does the import or export.

A suggestion when testing is to check with an empty Interoperability dialog and add just one entry with a small hierarchy structure. When the testing proves to be OK the batching can be extended and expanded. An example of starting E3D through Monitor module:

C:\AVEVA\Everything3D2.10\mon.exe PROD E3D init C:\AVEVA\Everything3D2.10\launch.init tty MEM SYSTEM/XXXXXX /ALL_IN $m/C:\Users\Public\Documents\AVEVA\FileBasedBatch\TS_E3D_BATCH_NR1.mac

mon.exe starts Monitor module

PROD E3D means the chosen product

init launch.init calls setting files and settings, project paths, licence paths etc.

TTY means non graphical mode option

MEM means project abbreviation (project name can be MOM, MEM, MAM or whatever with 3 letters

SYSTEM means username

XXXXXX means password

/ALL_IN means used MDB

$m/ and macro file location is the syntax for running the macro

For Aveva PDMS the syntax is about similar

start "" "C:\AVEVA\Plant\PDMS12.0.SP6\pdms.bat" TTY MOM SYSTEM/XXXXXX /ALL_IN $M/C:\Users\Public\Documents\AVEVA\FileBasedBatch\TS_PDMS_BATCH_NR1.mac

pdms.bat is a basic start file and settings, project paths, licence paths etc.

TTY means non graphical mode option

MOM means project abbreviation (project name can be MOM, MEM, MAM or whatever with 3 letters

SYSTEM means username

XXXXXX means password

/ALL_IN means used MDB

$M/ and macro file location is the syntax for running the macro

Notes when running batch process

- File TS_E3D_BATCH.dll must be placed in same folder as rest of library (TS_E3D_Library). When installing the version package the file will automatically be there.
- Make sure that dll file is unblocked
- Check also path to dll in TS_E3D_BATCH_NR.mac: import 'C:\TS_E3D\2.1\TS-E3D_Library\TS_E3D_BATCH'
- Aveva E3D can be closed automatically by commenting out the FINISH command in TS_E3D_BATCH_NR1

TS_E3D_BATCH_NR1.mac

```
design
--$m/C:\TS_E3D\2.1\TS_E3D_BATCH.mac
import 'C:\TS_E3D\2.1\TS-E3D_Library\TS_E3D_BATCH'
handle ANY
endhandle
$p TS-E3D Interoperability Batch started.
using namespace 'TS_E3D_BATCH'
!example = object TsEThreeDBatch()

-- Run import
--$p *** IMPORT ***
--!example.Import()

--Run export
$p *** EXPORT ***
--!example.Export()
!example.ExportByBatchNumber('1')

--FINISH

```

- This means that the FINISH command is commented out. If «--« is removed, E3D will be closed (FINISH will be executed).
- Splitting of import and export in batch can be done by changing macro in the following way (comment mark added in front of desired line)
-

TS_E3D_BATCH_NR1.mac

```
design
--$m/C:\TS_E3D\2.1\TS_E3D_BATCH.mac
import 'C:\TS_E3D\2.1\TS-E3D_Library\TS_E3D_BATCH'
handle ANY
endhandle
$p TS-E3D Interoperability Batch started.
using namespace 'TS_E3D_BATCH'
!example = object TsEThreeDBatch()

-- Run import
--$p *** IMPORT ***
!example.Import()

--Run export
$p *** EXPORT ***
--!example.Export()
!example.ExportByBatchNumber('1')

FINISH

```

Disclaimer