## STrimble



## Tekla Tedds 2023 User guide

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## Contents

1 Tekla Tedds 2023 Product Guides. ..... 13
2 Tekla Tedds 2023 release notes ..... 14
2.1 New and enhanced library calculations (Eurocode Design) ..... 14
Steel beam splice design (EN1993). ..... 15
Steel column splice design (EN1993). ..... 15
Steel hollow section tension only splice design (EN1993). ..... 16
Cross-laminated timber roof panel design (EN1995) ..... 17
Retaining wall analysis \& design (EN1992/EN1996/EN1997) ..... 18
RC stair design (EN1992), Precast concrete stair design (EN1992) ..... 20
Steel column design (EN1993). ..... 22
Timber member design (EN1995) ..... 22
Batch design (Eurocode Design) ..... 22
2.2 New and enhanced library calculations (American Design) ..... 22
RC stair design (ACI318), Precast concrete stair design (ACl318). ..... 23
Concrete design calculations (ACI318) ..... 24
RC beam torsion design (ACI318) ..... 24
Retaining wall analysis \& design (ACI318/TMS/MSJC) ..... 25
Wood member design (NDS) ..... 27
Steel joist design (SJI) ..... 27
Cold-formed steel joist design (AISI), Cold-formed steel wall design (AISI) ..... 27
Wood shear wall design (NDS) ..... 28
Batch design (American design) ..... 28
2.3 New and enhanced library calculations (Australian Design) ..... 29
Retaining wall analysis \& design (AS4678/AS3600/AS3700) ..... 29
2.4 New and enhanced library calculations (British Design) ..... 30
Highway design (DMRB) ..... 30
Footway and cycleway design (DMRB) ..... 31
Design traffic assessment (DMRB) ..... 32
Estimate California bearing ratio (TRRL LR 1132) ..... 33
2.5 General enhancements ..... 34
Engineering Library ..... 34
Tedds Application ..... 34
Tekla Tedds for Word ..... 34
Writing Custom Calculations. ..... 34
Software Licensing ..... 35
Security ..... 35
Tekla Tedds API. ..... 35
2.6 Interoperability improvements ..... 35
Integration with Tekla Structural Designer and Trimble Connect. ..... 35
3 Installation and licensing workflow ..... 37
3.1 Tekla Tedds license types ..... 37
3.2 If you manage your own installation of Tekla Tedds ..... 37
3.3 If someone manages Tekla Tedds for you ..... 39
3.4 Tekla Tedds 2023 hardware recommendations. ..... 39
System requirements for effective operation ..... 39
Test environments ..... 41
3.5 Create your Trimble Identity ..... 41
Creating a Trimble Identity on your first license purchase. ..... 41
Creating a Trimble Identity to join an existing organization. ..... 41
3.6 Install and license Tekla Tedds ..... 43
Subscription Licenses ..... 44
On-premises (Perpetual) Licenses ..... 45
How can I centrally deploy Tekla software? ..... 46
I want to centrally deploy Tekla Tedds what do I need to do to be able to do this?Where is the information found?46
How do I unpack the install to extract the Distributed Deployment details? ..... 47
3.7 Tekla Tedds service packs. ..... 47
Install a Tekla Tedds service pack ..... 47
3.8 Upgrade Tekla Tedds to a new version ..... 48
4 Get familiar with Tekla Tedds ..... 50
4.1 Start Tekla Tedds ..... 50
Launch Tedds (the Tedds Application) ..... 51
Launch Tedds for Word ..... 53
4.2 Tedds and Tedds for Word - what's the difference? ..... 53
4.3 Introducing the Tedds Application ..... 55
Components of the Tedds Application window. ..... 55
Select a calculation ..... 56
Search calculations in the Select Calculation dialog box ..... 57
Find a calculation ..... 57
Adjust search options ..... 58
Components of a calculation interface ..... 58
After performing a calculation ..... 59
Re-calculate the document. ..... 59
Change the header details. ..... 60
Copy the current document ..... 60
Create a new calculation document. ..... 60
Send the contents of the document to another application ..... 60
Open an existing document. ..... 61
Save the document. ..... 61
Save the document as pdf. ..... 61
Save the project as pdf ..... 61
Print the document ..... 61
Change the locale ..... 61
View hidden text, semicolons, or variables ..... 62
Adjust the zoom level ..... 63
Adjust calculation sheet details. ..... 64
Modify header labels ..... 66
Organize projects with the Project Manager ..... 67
Create a new project. ..... 67
Modify document headers or project headers ..... 68
Open or close existing projects ..... 69
4.4 Introducing Tedds for Word ..... 69
Components of the Tedds for Word window ..... 70
Document templates. ..... 71
Select a calculation template ..... 72
Modify the header or footer of a calculation template ..... 75
Create new calculation templates ..... 78
Library Access System ..... 81
Use the Library Access System: Simple mode ..... 82
Use the Library Access System: Advanced mode ..... 86
Interface Designer ..... 104
Components of the Interface Designer ..... 105
Create a custom page template ..... 122
Create an example interface ..... 124
Sketch Viewer ..... 129
Open the Sketch Viewer empty ..... 129
Open an existing sketch in the Sketch Viewer ..... 130
Components of the Sketch Viewer window ..... 130
Open a new sketch window ..... 132
Transfer a sketch to the Sketch Viewer ..... 132
Adjust the view of a sketch ..... 133
Copy a sketch to your calculations ..... 134
Close sketch windows ..... 135
4.5 Configuring settings ..... 135
Startup options ..... 135
Environment options ..... 136
Environment options (the Tedds Application) ..... 136
Environment options (Tedds for Word) ..... 137
Document options ..... 137
View options (the Tedds Application only) ..... 138
Send To options (the Tedds Application only) ..... 139
Save options ..... 140
Calculating options ..... 140
General calculating options ..... 141
Sketch options ..... 142
Result options ..... 143
Progress options ..... 144
Regional settings ..... 145
Error options ..... 146
Beam analysis options ..... 146
Calc item options ..... 147
Debugging options ..... 147
Dialog options ..... 149
Variables ..... 149
Values ..... 149
Sorting ..... 149
Setup options ..... 150
Application data options ..... 150
Calc index options ..... 150
Calc library options ..... 151
Calc project options ..... 151
Calc document options ..... 152
Excel workbook options ..... 152
Update service options ..... 152
Feedback options ..... 153
Profile options ..... 154
Library Access System settings (Tedds for Word only) ..... 154
Microsoft Word settings (Tedds for Word only) ..... 159
Stop automatic capitalization ..... 159
Set up AutoText ..... 159
Use hidden text ..... 160
4.6 Tekla Tedds Quick Start Guides ..... 160
Quick start guide - US design examples ..... 161
Using Tedds (US design example) ..... 161
Writing Tedds calculations - stage 1 (US design example) ..... 182
Using library calculations in Tedds for Word (US design example) ..... 194
Writing Tedds calculations - stage 2 (US design example) ..... 203
Enhancing calculations (US design example) ..... 211
Quick start guide - Eurocode design examples ..... 218
Using Tedds (Eurocode design example) ..... 218
Writing Tedds calculations - stage 1 (Eurocode design example) ..... 239
Using library calculations in Tedds for Word (Eurocode design example) ..... 251
Writing Tedds calculations - stage 2 (Eurocode design example) ..... 261
Enhancing calculations (Eurocode design example) ..... 270
Quick start guide - Australian design examples ..... 277
Using Tedds (Australian design example) ..... 277
Writing Tedds calculations - stage 1 (Australian design example). ..... 298
Using library calculations in Tedds for Word (Australian design example) ..... 310
Writing Tedds calculations - stage 2 (Australian design example) ..... 319
Enhancing calculations (Australian design example) ..... 327
5 Writing custom calculations ..... 335
5.1 Components of calculations. ..... 335
Overview (SI Metric). ..... 336
Overview (US Imperial) ..... 337
Expressions ..... 338
Equal signs. ..... 338
Results fields ..... 339
Explanations (SI Metric) ..... 339
Explanations (US Imperial) ..... 339
Delimiters (SI Metric) ..... 340
Delimiters (US Imperial) ..... 340
Variables (SI Metric). ..... 341
Variables (US Imperial) ..... 342
Units (SI Metric) ..... 343
Units (US Imperial) ..... 343
5.2 Create and modify expressions ..... 344
Create expressions ..... 344
Modify expressions ..... 344
5.3 Define results ..... 345
Define intermediate results ..... 345
Define final results ..... 345
Define result formats. ..... 345
Use a format other than the default for a particular results field ..... 346
Format letters and precision numbers ..... 346
Define formats for intermediate results ..... 347
Define formats for final results ..... 347
Define units for results ..... 348
Change the units of results. ..... 348
5.4 Show or hide semicolons ..... 349
5.5 Use units in calculations ..... 350
Use units in input. ..... 350
Use units in results ..... 350
Change units in calculations ..... 350
Use constants with units ..... 351
Use system units. ..... 352
Use system units in calculations ..... 352
View all system units ..... 352
Add system units ..... 352
Delete system units. ..... 353
5.6 Use variables ..... 353
Calc section variables ..... 354
Document variables ..... 355
System variables ..... 355
Define variables ..... 355
Assign a value to a variable ..... 356
Assign a unit to a variable ..... 356
Modify variables ..... 356
Modify the value of a variable ..... 356
Modify the units of a variable ..... 357
Store variables as expressions ..... 357
Use calc section variables ..... 358
Define calc section variables ..... 358
View calc section variables ..... 358
Write out calc section variables into a document ..... 359
Promote calc section variables into document variables ..... 360
Delete calc section variables ..... 360
Use document variables ..... 361
Define document variables ..... 361
View document variables ..... 361
Add document variables below existing calc sections ..... 361
Write out document variables into a document ..... 362
Delete document variables ..... 363
Use system variables ..... 364
Use system variables in your calculations ..... 364
View all system variables ..... 364
Insert system variables in your document ..... 365
Use the Variables dialog box ..... 365
5.7 Calc sections ..... 368
Add new calc sections ..... 369
Change the title of a calc section. ..... 369
Cut, copy and paste calc sections ..... 370
Delete calc sections ..... 370
Delete calc section fields ..... 370
Find the next or previous calc section ..... 370
5.8 Calculate results. ..... 370
Calculate an expression ..... 371
Calculate a selected area ..... 371
Recalculate a previously selected area ..... 371
Calculate a calc section ..... 371
Calculate from the beginning of a document to a selected expression ..... 371
Calculate from a selected expression to the end of a document ..... 372
Calculate an entire document ..... 372
5.9 Introducing calculation errors ..... 372
Error alerts ..... 372
Error categories ..... 373
React to errors ..... 375
Fix variable definition errors ..... 375
React to dimensional or non-fatal errors ..... 376
React to fatal errors ..... 376
Find errors ..... 376
5.10 Automated calculations ..... 377
5.11 The Progress Log ..... 377
Select the items displayed in the Progress Log ..... 378
Filter the items displayed in the Progress Log ..... 379
Roll up the Progress Log ..... 380
5.12 Enhancing Tedds for Word calculations with Tedds fields ..... 380
Input fields ..... 381
Create Input fields ..... 382
Show fields ..... 384
Create Show fields ..... 384
Create Simple Show fields ..... 385
Create Value of variable Show fields ..... 386
Create conditional Show fields ..... 387
Create Advanced Show fields ..... 388
Message fields ..... 389
Create Message fields ..... 390
Create Simple Message fields ..... 391
Create Value of variable Message fields ..... 391
Create conditional Message fields ..... 392
Create Advanced Message fields ..... 393
Log fields ..... 394
Create Log fields ..... 395
Create Simple Log fields ..... 396
Create Value of variable Log fields ..... 396
Create conditional Log fields ..... 397
Create Advanced Log fields ..... 398
Excel link fields ..... 399
Create Excel Link fields ..... 399
Create a compatible Excel worksheet ..... 402
Data list fields ..... 402
Data Table fields ..... 404
Data graph fields ..... 405
Calc item fields ..... 406
Create Calc Item fields ..... 406
Create Simple Calc Item fields ..... 407
Create conditional Calc Item fields ..... 408
Modify Tedds fields ..... 408
Modify the content of Tedds fields ..... 409
Fix Tedds field errors ..... 409
Enter formatted text in Tedds fields ..... 409
Use the string function ..... 411
Use conditions. ..... 
6 Other Tedds features ..... 414
6.1 Data lists ..... 414
Components of the Data List dialog box. ..... 415
Adjust the view of the Data List dialog box. ..... 416
View the details of a selected item. ..... 416
Return an item to your calculations ..... 417
Return an item to your calculations. ..... 418
Select the page containing the correct item type. ..... 418
Select the correct item. ..... 418
6.2 Data tables ..... 419
Components of the Data Tables window ..... 420
Linked data tables ..... 421
Select an item in a data table ..... 421
Interpolate data within a data table. ..... 423
Clear an interpolation ..... 423
Search specific information in a data table ..... 424
Search specific information in a data table. ..... 424
Change the search criteria for a data table ..... 424
Clear a search ..... 425
Return data table information to your calculations ..... 425
Return data table information to your document. ..... 425
View the different details of a data table ..... 426
Adjust data table settings ..... 426
Close the Data Tables window. ..... 427
Close the Data Tables window and return variables. ..... 428
Close the Data Tables window without returning variables ..... 428
6.3 Data graphs ..... 428
Components of the Data Graph window ..... 428
Select a point in a data graph ..... 430
Interpolate data within a data graph ..... 431
Interpolate within a data graph ..... 431
Clear an interpolation ..... 431
Return data graph information to your calculations. ..... 432
Return point information to your calculation ..... 432
Adjust data graph settings. ..... 432
Close the Data Graph window. ..... 433
Close the Data Graph window and return variables. ..... 433
Close the Data Graph window without returning variables ..... 434
6.4 2D analysis ..... 434
Start 2D analysis ..... 434
Start 2D analysis (the Tedds Application) ..... 435
Start 2D analysis (Tedds for Word). ..... 435
Components of the 2D Analysis dialog box. ..... 435
Create a 2D analysis model ..... 437

1. Define geometry for the model. ..... 438
2. Define design members for the model. ..... 439
3. Define loading for the model ..... 439
4. View and examine results. ..... 440
5. Specify output details. ..... 441
Modify a 2D analysis model ..... 441
Modify a group of cells ..... 441
Modify expressions. ..... 441
Sort data ..... 442
Example 2D analysis model. ..... 442
Example 2D analysis model (SI Metric). ..... 442
Example 2D analysis model (US Imperial) ..... 444
Creating the example 2D analysis model ..... 445
6.5 Section properties calculator ..... 456
Start the Section Properties Calculator. ..... 456
Start the Section Properties Calculator (the Tedds Application) ..... 456
Start the Section Properties Calculator (Tedds for Word) ..... 456
The Section Designer. ..... 457
Create sections in the Section Designer ..... 459
Modify sections. ..... 463
Structure sections ..... 465
Control the position of objects on the canvas ..... 466
Move objects on the canvas ..... 467
Rotate objects ..... 469
Snap objects with respect to each other ..... 472
Adjust Section Designer settings ..... 473
View section properties ..... 477
Save a section to disk ..... 477
Return section properties to your calculations ..... 478
7 Interoperability ..... 479
7.1 Tekla Tedds Integrator ..... 479
7.2 Tekla Structural Designer ..... 480
7.3 Trimble Connect ..... 481
Storing Tekla Tedds Projects and Documents ..... 482
Launch Trimble Connect Project Explorer from the Tedds Application ..... 482
Link or unlink a project ..... 483
Create folders, rename folders, rename files ..... 484
Upload the documents from your Tedds project as pdfs. ..... 484
View the uploaded pdfs in Trimble Connect ..... 485
Modify the identity of the linked model and objects. ..... 486
8 References ..... 488
8.1 Tedds fields and functions ..... 488
Syntax conventions ..... 488
Major Tedds field syntax ..... 489
Input field syntax ..... 490
Show field syntax ..... 490
Message field syntax. ..... 491
Log field syntax ..... 491
Excel Link field syntax ..... 492
Data List field syntax. ..... 493
Data Table field syntax ..... 494
Data Graph field syntax ..... 495
Calc Item field syntax ..... 496
Other Tedds fields ..... 496
Evaluate script calc item fields ..... 496
Evaluate metafile calc item fields ..... 497
Evaluate RTF calc item fields ..... 498
Evaluate interface calc item fields ..... 498
Time fields ..... 499
Date fields ..... 499
Date and time fields ..... 500
Run macro fields. ..... 500
Time and date formatting options ..... 501
Mathematics ..... 502
8.2 Expression text format ..... 516
8.3 Mathematical symbols ..... 518
8.4 Dimensional analysis ..... 519
8.5 Result formats and precision ..... 523
8.6 Units ..... 527
8.7 Pre-defined system variables ..... 540
8.8 System and user libraries ..... 542
Naming libraries ..... 543
Library Access System icons ..... 543
Share libraries created for personal use. ..... 544
Create libraries for organizational use ..... 544
Finding items in libraries and sets ..... 544
Tips for creating libraries ..... 545
Frequently used procedures in creating system libraries ..... 546
Change items to point to a different library type ..... 547
Change the location of the user libraries directory ..... 548
Change the location of the system libraries directory. ..... 548
Import a library ..... 549
Create system libraries ..... 549
Before creating system libraries ..... 550
Create system libraries ..... 550
Save system libraries ..... 551
After creating system libraries ..... 551
Modify system libraries ..... 551
Before modifying system libraries ..... 552
Modify system libraries ..... 552
Add items ..... 553
Modify items ..... 553
After modifying system libraries ..... 553
8.9 Error messages ..... 554
Tedds error messages ..... 556
Library Access System error messages. ..... 567
Sketch viewer error messages ..... 569
Data Tables error messages ..... 570
Data Graph error messages ..... 571
Section Designer error messages ..... 572
8.10 Toolbars and buttons ..... 575
Tedds ribbon commands (the Tedds Application only) ..... 576
Tedds ribbon groups (Tedds for Word only) ..... 585
Library group ..... 585
Calculate group ..... 585
Header group ..... 586
Calc Section group ..... 587
Show/Hide group ..... 588
Font group. ..... 588
Insert group ..... 589
Tools group ..... 59
Library Access System toolbars ..... 594
Simple mode ..... 594
Advanced mode ..... 595
Sketch Viewer toolbar ..... 597
Data Tables toolbar ..... 598
Data Graph interpolate bar ..... 599
Section Designer toolbars ..... 600
Standard toolbar ..... 600
Drawing toolbar ..... 602
Section Designer tools toolbar ..... 603
Nudge toolbar ..... 604
Structure toolbar. ..... 604
8.11 Import Tedds documents into Tedds for Word ..... 605
Import Tedds documents into Tedds for Word ..... 605
8.12 Shortcut keys ..... 606

## ${ }^{1}$ Tekla Tedds 2023 Product Guides

## Welcome to Tekla Tedds documentation!

## What's new in this version?

For new features and improvements, see the Tekla Tedds 2023 release notes (page 14).

## New to Tekla Tedds?

Start your learning journey using our interactive elearning courses which consist of tutorials that you can take in any order. Alternatively you can read the Tekla Tedds Quick Start Guides (page 160).

## Other resources

The Tekla User Assistance services are 24/7 online support channels for fast self-service, where you can find all the product guides, additional knowledgebase articles and instructional videos.

The Tekla Discussion Forum is the place to meet other users and discuss topics related to Tekla products. You can ask questions, contribute to the community by sharing your knowledge or get answers from support personnel.

The Tekla Helpdesks support your daily operations so that our systems function as expected and any problems are solved as quickly as possible.

## 2

## Tekla Tedds 2023 release notes

Welcome to Tekla Tedds 2023!
Check the information below on the many new features and improvements in this version.

Some features documented here were included in previous updates to Tedds 2022.

- New and enhanced library calculations (Eurocode Design) (page 14)
- New and enhanced library calculations (American Design) (page 22)
- New and enhanced library calculations (Australian Design) (page 28)
- New and enhanced library calculations (British Design) (page 30)
- General enhancements (page 34)
- Interoperability improvements (page 35)


### 2.1 New and enhanced library calculations (Eurocode Design)

The following engineering library calculations has been added or enhanced in Tedds 2023;

- $\quad$ Steel beam splice design (EN1993) (page 15)
- Steel column splice design (EN1993) (page 15)
- Steel hollow section tension only splice design (EN1993) (page 16)
- Cross-laminated timber roof panel design (EN1995) (page 17)
- Retaining wall analysis \& design (EN1992/EN1996/EN1997) (page 18)
- RC stair design (EN1992), Precast concrete stair design (EN1992) (page 20)
- Steel column design (EN1993) (page 22)
- Timber member design (EN1995) (page 22)
- Batch design (Eurocode Design) (page 22)


## Steel beam splice design (EN1993)

New calculation in Tedds 2023 which checks the design of a steel beam splice connection for cover plates and end plates between two identical steel sections subject to bending, shear and axial forces. The design is in accordance with EN1993 and the national annexes for the UK, Ireland, Singapore, Malaysia, Finland, Norway, Sweden and the recommended Eurocode values.

Video demonstration


## Steel column splice design (EN1993)

New calculation in Tedds 2023 which checks the design of a column splice connection for both bearing and non-bearing cover plates, and end plates subject to moments, axial forces, and structural integrity (tying force). The design is in accordance with EN1993 and the national annexes for the UK,

Ireland, Singapore, Malaysia, Finland, Norway, Sweden and the recommended Eurocode values.
Video demonstration


## Steel hollow section tension only splice design (EN1993)

New calculation in Tedds 2023 which checks the design of a hollow section splice connection with end plates subject to tension axial forces only. The design is in accordance with EN1993 and the national annexes for the UK, Ireland, Singapore, Malaysia, Finland, Norway, Sweden and the recommended Eurocode values.
Video demonstration


## Cross-laminated timber roof panel design (EN1995)

New calculation in Tedds 2023 which determines the capacity of a crosslaminated timber roof panel inclined at an angle of 20 to 70 degrees and subjected to a series of area loads applied to its top edge. Shear, flexure, axial compression and deflection checks are performed and horizontal and vertical reactions are reported. The design is in accordance with EN1995 and the national annex for the UK, Ireland, Finland, Norway, Sweden and the recommended Eurocode values.

Video demonstration


## Retaining wall analysis \& design (EN1992/EN1996/EN1997)

Significantly enhanced in Tedds 2023 to include the following new features and improvements:

- Specify custom load combinations which allow the analysis part of the calculation to be used for other design codes.
- Include the restoring effect of surcharge loading in the stability calculations.
- Include or exclude active pressures on the key in the stability calculations.
- Include or exclude passive pressures of the soil in the stability calculations.
- View the analysis model from within the user interface to provide transparency on how the analysis model is configured.
- Option to specify mesh reinforcement in the stem and base rather than just loose bar reinforcement.
- Added an additional check for a masonry reinforced wall to check the shear resistance of the concrete alone if the masonry shear check fails.
- Added the shear enhancement in Annex J for masonry retaining walls so that a wall has a greater chance of passing the shear check (not applicable for the Finland national annex).

- Enhanced to include a Calc API so the calculation can be used in automation scenarios including the option to completely disable the user interface.
- The batch design has also been updated to include a Retaining wall stability analysis example.

```
Calculation (Calc Item) Retaining wall - Stability analysis (EN1997)
File name
Item name
$(SysLbrDir)Retaining wall design-EN1997-si-engb.lbr
Retaining wall analysis & design
```

```
Variables
Input work sheet name Stability analysis in (EN1997)
Output work sheet name Stability analysis out (EN1997)
Start row
End row
Auto
Options
Show user interface Disabled (use Calc API if supported by calculation)
Output document
None
Output folder
```


## Calculate

| WallType | h_\{ret\} <br> mm | $\backslash 62$ <br> deg | d_\{cover\} <br> mm | d_\{exc\} <br> mm | h_\{stem\} <br> mm | t_\{stem\} <br> mm |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| C | 1800 | 0 | 500 | 200 | 2600 | 300 |
| C | 3200 | 0 | 500 | 200 | 3700 | 300 |
| SIR | 2200 | 0 | 500 | 500 | 3000 | 250 |
| StR | 3000 | 0 | 600 | 200 |  |  |
| StR | 1160 | 0 | 200 | 200 |  |  |


| FoS_\{sl_C1\} | FoS_\{ot_C1\} | FoS_\{bp_C1\} | FoS_\{sl_C2\} | Fos_\{ot_C2\} | FoS_\{bp_C2\} | CalcResultutil _CalcResult |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1.554 | 2.969 | 7.805 | 1.266 | 3.045 | 3.810 | 0.790 | Pass |
| Undefined | Undefined | 3.624 | Undefined | Undefined | 2.074 | 0.482 | Pass |
| 1.754 | 5.250 | 9.903 | 1.430 | 5.571 | 6.750 | 0.699 | Pass |
| 1.263 | 1.935 | 2.647 | 1.091 | 2.070 | 1.117 | 0.917 | Pass |
| 2.789 | 6.471 | 9.099 | 2.415 | 7.092 | 5.030 | 0.414 | Pass |

## RC stair design (EN1992), Precast concrete stair design (EN1992)

Enhanced in Tedds 2023 to include the option to apply additional loads on the lower or upper landings. This can for example be used to design for one stair unit bearing onto another.


## Steel column design (EN1993)

Enhanced in Tedds 2023 to include a Calc API so the calculation can be used in automation scenarios including the option to completely disable the user interface. The batch design has also been updated to include a Steel column design example.

## Timber member design (EN1995)

Enhanced in Tedds 2023 to allow deflection checks to be included when the calculation is used via its Calc API. When used with Tekla Structural Designer the appropriate data for deflection checks will be automatically included.

## Batch design (Eurocode Design)

Enhanced in Tedds 2023 to include examples for the following calculations:

- Steel column design (EN1993)
- Steel beam splice design (EN1993)
- Steel column splice design (EN1993)
- Steel hollow section tension only splice design (EN1993)
- Retaining wall analysis \& design (EN1992/EN1996/EN1997) - Stability analysis


### 2.2 New and enhanced library calculations (American Design)

The following engineering library calculations has been added or enhanced in Tedds 2023;

- RC stair design (ACI318), Precast concrete stair design (ACI318) (page 23)
- Concrete design calculations (ACI318) (page 23)
- RC beam torsion design (ACI318) (page 24)
- Retaining wall analysis \& design (ACI318/TMS/MSJC) (page 25)
- Wood member design (NDS) (page 27)
- Steel joist design (SJI) (page 27)
- Cold-formed steel joist design (AISI), Cold-formed steel wall design (AISI) (page 27)
- Wood shear wall design (NDS) (page 27)
- Batch design (American design) (page 28)


## RC stair design (ACI318), Precast concrete stair design (ACI318)

New calculations in Tedds 2023 which check the design of a precast or cast-inplace reinforced concrete straight flight of stairs. The stairs span longitudinally between supports at the top and the bottom of the flight and are unsupported at the sides. Supporting beams are located at the outside edges of the landings. The design is in accordance with ACI 318-19(22), ACI 318-14 and ACI 318-11.

Video demonstration


## Concrete design calculations (ACI318)

In Tedds 2023 all the following concrete design calculations have been updated in accordance with the 2022 reapproved version of ACI318-19:

- Anchor bolt design (ACI318)
- Footing analysis \& design (ACI318)
- RC 2D analysis \& design (ACI318)
- RC beam analysis \& design (ACI318)
- RC beam design (ACI318)
- RC beam torsion design (ACI318)
- RC column design (ACI318)
- RC corbel design (ACI318)
- RC one way slab design (ACI318)
- RC pile cap design (ACI318)
- RC shear wall design (ACI318)
- RC two way slab design (ACI318)
- RC wall design (ACI318)
- Tilt-up wall panel design (ACI318)


## RC beam torsion design (ACI318)

New calculation in Tedds 2023 which calculates the quantity of torsional reinforcement required, if any, for a solid rectangular section subjected to a combination of direct shear force and torsional moment. In accordance with ACI318-19, ACI318-14 and ACI318-11.
Video demonstration
Design options
Design code $\mathrm{ACI} 318-19$

## Retaining wall analysis \& design (ACI318/TMS/MSJC)

Significantly enhanced in Tedds 2023 to include the following new features and improvements:

- Include the restoring effect of surcharge loading in the stability calculations.
- Specify custom load combinations which allow the analysis part of the calculation to be used for other design codes.
- Include or exclude active pressures on the key in the stability calculations.
- Include or exclude passive pressures of the soil in the stability calculations.
- View the analysis model from within the user interface to provide transparency on how the analysis model is set up.
- Specify, or have calculated, a user-defined seismic force so that input forces can be entered directly from a geotechnical report.
- Option to allow a fully grouted CMU wall with reinforcement at different spacing, so you can comply with the seismic requirement for a fully grouted wall and have the flexibility to vary the reinforcement spacing.
- Option to specify the soil bearing pressure as net or gross so either value specified in a geotechnical report can be used.

- Enhanced to include a Calc API so the calculation can be used in automation scenarios including the option to completely disable the user interface.
- The batch design has also been updated to include a Retaining wall stability analysis example.

```
Calculation (Calc Item) Retaining wall - Stability analysis (ACI318)
File name
Item name
$(SysLbrDir)Retaining wall design-ACl318-us-enus.lbr
Retaining wall analysis & design
```

Variables
Input work sheet name
Output work sheet name
Start row
End row
Stability analysis in (ACI318)
Stability analysis out (ACI318)
Auto
Auto
Options
Show user interface
Output document
Disabled (use Calc API if supported by calculation)
Output folder

## Calculate

| Walliype | h_\{ret\} <br> ft | $\backslash 62$ <br> deg | d_\{cover\} <br> ft | d_\{exc\} <br> ft | h_\{stem\} <br> ft | t_\{stem\} <br> in |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| C | 6.5 | 0 | 2 | 0.667 | 8.5 | 12 |
| C | 10.5 | 0 | 1.667 | 0.667 | 12.167 | 12 |
| SIR | 7.25 | 0 | 1.667 | 1.667 | 9.917 | 10 |
| StR | 9.833 | 0 | 2 | 0.667 |  |  |
| StR | 3.833 | 0 | 0.667 | 0.667 |  |  |


| oS_\{sl_C1\} | FoS_\{ot_C1\} | FoS_\{bp_C1\} | FoS_\{s1_C2\} | FoS_\{ot_C2\} | FoS_\{bp_C2\} | _CalcResultutil | _CalcResult |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1.553 | 2.110 | 3.767 | 1.553 | 2.110 | 3.767 | 0.644 | Pass |
|  |  |  |  |  | 2.255 | 0.443 | Pass |
| 1.969 | 5.963 | 2.680 | 1.969 | 5.963 | 2.680 | 0.508 | Pass |
| 1.910 | 2.868 | 2.394 | 1.910 | 2.868 | 2.394 | 0.524 | Pass |
| 2.185 | 4.826 | 4.595 | 2.185 | 4.826 | 4.595 | 0.458 | Pass |

## Wood member design (NDS)

Enhanced in Tedds 2023 to allow deflection checks to be included when the calculation is used via its Calc API. When used with Tekla Structural Designer 2022 Service Pack 2 or later the appropriate data for deflection checks will be automatically included.

## Steel joist design (SJI)

Updated calculation in Tedds 2023 in accordance with the Steel Joist Institute Standard Specification Load Tables and Weight Tables for Steel Joists and Joist Girders, 45th Edition.

## Cold-formed steel joist design (AISI), Cold-formed steel wall design (AISI)

Updated calculations in Tedds 2023 in accordance with SSMA Product Technical Guide 2022.

## Wood shear wall design (NDS)

Updated in Tedds 2023 in accordance with the Special Design Provisions for Wind and Seismic 2021.


## Batch design (American design)

Enhanced in Tedds 2023 to include examples for the following calculations:

- RC stair design (ACl318)
- RC beam torsion design (ACl318)
- Retaining wall analysis \& design (ACI318/TMS/MSJC) - Stability analysis


### 2.3 New and enhanced library calculations (Australian Design)

The following engineering library calculations has been added or enhanced in Tedds 2023;

- Retaining wall analysis \& design (AS4678/AS3600/AS3700) (page 29)


## Retaining wall analysis \& design (AS4678/AS3600/AS3700)

The following Australian design engineering library calculations have been significantly updated for Tedds 2023.

## Retaining wall analysis \& design (AS4678/AS3600/AS3700)

Significantly enhanced to include the following new features and improvements:

- View the analysis model from within the user interface to provide transparency on how the analysis model is set up.
- Specify custom load combinations which allow the analysis part of the calculation to be used for other design codes.
- Include the restoring effect of surcharge loading in the stability calculations.
- Include or exclude active pressures on the key in the stability calculations.
- Include or exclude passive pressures of the soil in the stability calculations.

- Also enhanced the calculation to include a Calc API so the calculation can be used in automation scenarios including the option to completely disable the user interface.
- The batch design has also been updated to include a Retaining wall stability analysis example.


### 2.4 New and enhanced library calculations (British Design)

The following engineering library calculations has been added or enhanced in Tedds 2023;

- Highway design (DMRB) (page 30)
- Footway and cycleway design (DMRB) (page 31)
- Design traffic assessment (DMRB) (page 32)
- Estimate California bearing ratio (TRRL LR 1132) (page 33)


## Highway design (DMRB)

New calculation which specifies the design of new pavement and foundation construction in accordance with the Design Manual for Roads and Bridges.


## Footway and cycleway design (DMRB)

New calculation in Tedds 2023 which specifies the design of new footway and cycleway in accordance with the Design Manual for Roads and Bridges.

| Pavement loading |  |
| :---: | :---: |
| (i) Footway and cycleway loading classification | Pedestrian and cyde only |
| Subgrade assessment |  |
| Subgrade assessment method | Estimate subgrade CBR $\quad \checkmark$ |
|  | Estimate CBR... |
| (i) Estimated subgrade CBR | 4 \% |
| Surfacing |  |
| (i) Surfacing type | Asphalt $\quad \checkmark$ |
|  | 20 mm surface course |
| Foundation |  |
| (i) Subbase type | MCHW 803 Type 1 |
| Preview footway design |  |
| Pedestrian and cycle only footway or cycleway surfaced with asphalt <br> 20 mm surface course <br> 50 mm binder course <br> 100 mm MCHW 803 Type 1 subbase |  |
| Output options |  |
|  | Output options... |

## Design traffic assessment (DMRB)

New calculation in Tedds 2023 which calculates traffic loading for the design of road pavements in accordance with the Design Manual for Roads and Bridges.


## Estimate California bearing ratio (TRRL LR 1132)

New calculation in Tedds 2023 which estimates the California Bearing Ratio (CBR) value of the formation level using the method outlined in Appendix C of the Transport and Road Research Laboratory (TRRL) laboratory report TRRL LR 1132.


### 2.5 General enhancements

A number of general enhancements have been made for Tedds 2023. (Note that some features documented below were included in previous updates to Tedds 2022).

## Engineering Library

Fixed the Section properties calculator to prevent "incorrect argument" errors from occurring when using the calculation with the European locale setting.

## Tedds Application

Enhanced the Project Manager to automatically synchronise the selected document in the project tree whenever an open document which belongs to the project is activated.

Enhanced to include a new option: when a project is saved to a single PDF file a page break can be included between each document.

## Tekla Tedds for Word

Updated the default Tedds for Word document template (Calc 1) to use header labels which are consistent with the Tedds Application's document templates. This ensures that when documents are sent from the Tedds Application to Tedds for Word the document is presented consistently.

Enhanced the DataSetOpen, DataLibraryOpen and DataltemOpen dialogs so that the Lookln directory and the Window Size settings are automatically remembered. The item lists used in those dialogs have also been optimised to automatically resize the columns when shown in the details view.

## Writing Custom Calculations

Enhanced calculation user interfaces so that the footer property of a ListView control is more aesthetically pleasing.
Enhanced calculation user interfaces, now the information icon associated with an input control remains enabled when the input control is disabled.

Added a new drawing function DrawLabelStringOffset which allows the text part of a label to be offset from the labels line. When an offset is applied the line is extended from the start coordinate to the offset position.

Enhanced DListSetItem so that the currently selected page and datalist file can be selected in a single operation.

## Software Licensing

Added a warning when starting Tekla Tedds using a subscription license to inform you in case your license is due to expire within the next 30 days.

## Security

Improved security by updating the embedded web browser from Chromium Embedded Framework (CEF) to WebView2 from Microsoft which ensures that security updates are managed independently by Microsoft Windows update.

## Tekla Tedds API

Enhanced the Tedds application API to include the following new features:

- Added BIM model ID property to the project object so that a specific IFC model can be associated with the connected BIM project.
- Added a BIM object IDs property to the document object so that a document can be associated with one or more objects in the IFC model which is associated with the connected BIM project.
- Added an event for when a document is exported.
- Added an event for when the BIM project information associated with the Tedds project is modified.


### 2.6 Interoperability improvements

## Integration with Tekla Structural Designer and Trimble Connect

New in Tedds 2023: Tekla Tedds documentation which is uploaded to a Trimble Connect project can be automatically attached to the appropriate objects in a 3D model so that collaborators can easily access the information.

1. Using Tekla Structural Designer:
a. Link the model to the appropriate Trimble Connect project.
b. Upload an IFC model to Trimble Connect.
c. Export the Tekla Tedds documentation to the Tedds Application.

The new Tedds project which is created will be automatically linked to the same Trimble Connect Project and the same IFC model. Each document created in the Tedds project will include a reference to the object(s) in the IFC model which that document relates to.
2. Using Tekla Tedds:
a. Upload the Tedds project to Trimble Connect.

Each uploaded PDF document will be automatically attached to the object(s) in the IFC model.
3. Using Trimble Connect:
a. Open a 3D view of the IFC model.
b. Select the Attachments window.
c. View the Tekla Tedds documentation using the attachment list or the model view.


# ${ }^{3}$ <br> <br> Installation and licensing <br> <br> Installation and licensing workflow 

 workflow}

To use Tekla Tedds, you need to have a license. The installation steps you need to take are different depending on the type of license you have: for server licensing, you need to install additional tools, which are not necessary when using online licenses.

Click to expand the section relevant to you and follow the links in the text for detailed instructions.

### 3.1 Tekla Tedds license types

Tekla Tedds cannot be used without a valid license. There are two types of license: online and server*

- An online license is connected to your Trimble Identity. The license is delivered directly to the Tekla Online Admin tool, where your company's Tekla Online account administrators can assign the online licenses to individual users. When Tekla Tedds starts, you log in to Trimble's cloud to reserve your license.
- If you have a server license, you need to install a license server on your computer or on a separate server in your internal network. Tekla Tedds connects to your local license server to check your license.
*Local and local USB legacy licenses are still supported, but are no longer available as new purchases.


### 3.2 If you manage your own installation of Tekla Tedds

NOTE To ensure a good experience using our software, make sure your computer meets the Tekla Tedds 2023 hardware recommendations (page 39).

If your organization has no main user who manages Tekla Tedds for you, your installation proceeds like this:

1. Make sure you have your Trimble Identity set up:
a. If you have received an email invitation from Trimble to create a Trimble Identity, follow the instructions in the email to create your account to ensure you have the correct access rights.
If you wish to use a different email address for this account, create the account using your invitation first and then change the email address.
b. If you have not received an invitation, you can create a new Trimble Identity to download the software. Click here to create a new Trimble Identity.
To have access to your online licenses, you must be added to an organization group in Tekla Online by your organization's account administrator.
2. If you have a new account, Log in at https://account.tekla.com/, fill in all the required profile information, and click Save.
3. Download the installation package for Tekla Tedds from Tekla Downloads. At the site, click Download for a guided experience that ensures you have all necessary files.

4. If you have an online license, install the software:

- Run the Tekla Tedds installer and make sure the installation finishes successfully.

See Install and license Tekla Tedds (page 43) if you need more detailed instructions.

- After you have completed the Tekla Tedds installation, you can now start Tekla Tedds

5. If you have a server license, install the software:

- At the Server - Install the license server software on the server and activate your licenses.

See also: How can I centrally deploy Tekla software? (page 46)

- At the Client PCs - Run the Tekla Tedds installer and make sure the installation finishes successfully.
See also: Install and license Tekla Tedds (page 43) if you need more detailed instructions.

6. Start learning how to use Tekla Tedds:

- For a brief overview, see Get familiar with Tekla Tedds (page 50).


### 3.3 If someone manages Tekla Tedds for you

If your organization has a Tekla Tedds administrator (IT administrator or main user), you should follow their instructions for installation and licensing. You may still need to consider the following points:

- You need an account to access Tekla online services and online licenses. If your administrator has not invited you to your organization and assigned online licenses to you, ask to join so that you have access to all Tekla online services and licenses:

Click here to create a new Trimble Identity

- In most cases, your Tekla Tedds administrator will prepare an installation package for you or install the software for you. Ask your administrator for further instructions.

Start learning how to use Tekla Tedds:

- For a brief overview, see Get familiar with Tekla Tedds (page 50).


### 3.4 Tekla Tedds 2023 hardware recommendations

## System requirements for effective operation

| Item | Requirement |
| :--- | :--- |
| CPU | Multi core Intel i3 Series or above, |
|  | Xeon or AMD equivalent <br> Highest affordable performance <br> recommended. |


| Item | Requirement |
| :---: | :---: |
| Memory | - 2GB <br> - Memory requirements are dependent on document content. |
| OS | - Microsoft Windows 11 64bit / 10 64bit <br> - Operating systems must be running the latest service packs / updates. <br> - See Test Environments (below) for full details of supported operating systems. |
| Graphics | - $1920 \times 1080$ resolution <br> - 1 GB or higher of dedicated RAM. |
| Disk space | - 1 GB or more of free space for installation. <br> - Operational disk space requirements are highly dependent on document content. |
| Internet connection | - Required for access to Online Services and some documentation. |
| Microsoft Word | - 32-bit or 64-bit version of Microsoft Word Office 365, 2021, 2019 or 2016 <br> - Microsoft Word needs to be fully service packed. |
| License Service | - Tekla Structural License Service 4.3 including Sentinel RMS 10.0 (license server) and Sentinel RMS 9.7 (application devices). |
| License Server | - The latest version of the Tekla Structural Licence Service, at time of release, is shipped and installed with the software. If you have chosen to have a separate licence server, it is always our recommendation that you also run the latest version of the Tekla Structural License Service on it to ensure compatibility. |


| Item | Requirement |
| :--- | :--- |
|  | Please see 'System requirements' <br> on this page for specific version <br> details. |

## Test environments

The application is tested and supported on the following business versions of Microsoft Windows with the latest updates applied:

- Windows 11 64-bit
- Windows 10 64-bit


### 3.5 Create your Trimble Identity

You need a Trimble Identity to download Tekla Tedds and to use your online licenses. The Trimble Identity is connected to a Tekla Online organization (a user group for your physical organization).

## Creating a Trimble Identity on your first license purchase

- If you did not have an existing Trimble Identity, Trimble sends you an email with an invitation to complete your account creation. Create your account using the link in this email and make sure you fill in all of the required user profile information.
- If you are a company's named contact, you are invited to your Tekla Online organization by Trimble when the organization is created in Tekla Online.

You will receive an email to accept membership in your new Tekla Online organization. You are then responsible for managing the organization together with other administrators that you may assign.

## Creating a Trimble Identity to join an existing organization

To create a new Trimble Identity account:

1. If you have received an email invitation from Trimble to create a Trimble Identity, follow the instructions in the email to create your account to ensure you have the correct access rights. Otherwise, Click here to create a new Trimble Identity.
2. Click Create a Trimble ID.

## © Trimble

## Create a Trimble ID

Already have an account? Sign in

| First Name | Last Name |
| :--- | :--- |
| First Name Last Name |  |

Email
name@email.com
3. Enter your name and email, (If you have several different email addresses, use your company email address), then click Send Code.
4. Look for a verification email in your inbox and click the link provided to verify you account. You must verify your account to access your Trimble Identity.

NOTE If you do not receive this email in your inbox, check your Spam/ Junk email folder.
5. Log in with your new account, fill in all the required profile information, and click Save.
6. Join your Tekla Online organization in one of the following ways:
a. Switch to the Organization page on your user profile page, select an organization that you would like to join, and click Send request. If there are no organizations listed, it means your email address does not match with any existing organization's email address.
b. Ask your company's Trimble Identity administrator to invite you, and accept the invitation when it arrives via email or on your user profile pages at https://account.tekla.com/.

Your Trimble Identity is now active, and you can install and license Tekla Structures.

NOTE Membership in an organization can also affect your access to your organization's cloud-stored data, such as Tekla Model Sharing models. Make sure you do not switch between organizations unnecessarily. When available, use your company email address with your Trimble Identity.

### 3.6 Install and license Tekla Tedds

When you install Tekla Tedds, you will be asked to select your license method from a range of options. These are fully explained in the "Tekla Engineering Software - Installation and Licensing Guide" which can be viewed during the installation process by clicking the button shown below.


To install Tekla Tedds:

1. Download the installation file from Tekla Downloads to your computer.
2. Double-click the installation file to run the installation.
3. Follow the steps in the installation wizard to complete the installation.

## Subscription Licenses

If you have Subscription Licenses they will use the Tekla Online License Method and the 2023 license(s) should already have been added to your Tekla Online Organization. Select the "Tekla Online" license method option when installing as shown in the picture below:


- In order to use a Tekla Online license you will need: a verified Trimble Identity \& Tekla Online Account; to be a member of your company's Tekla Online Organization; have an Online License assigned to you by your Organization's Administrator; to Sign In to your Tekla Online account when you run the program.
- For more guidance on using Tekla Online Licensing see the following videos; Using Tekla subscription licenses and Managing Tekla subscription licenses.


## On-premises (Perpetual) Licenses

ATTENTION For perpetual licenses using Sentinel RMS (both local and server), Tekla Tedds 2023 will require the activation of a new 2023 version license. You should already have received your 2023 Product Activation Key (PAK) as these are distributed prior to the software release. Please contact your local Service Department now if you do not have your PAK. To minimize any down time, we recommend you activate your PAK BEFORE installing this release.

ATTENTION License Server Version - if you are using Sentinel RMS Server Licenses, we recommend the Tekla Structural License Service on your license server should be updated now to version 4.3.x or later which incorporates Sentinel RMS 10.0 (which adds support for Windows 11). The installation for this can be obtained from Tekla Downloads.

- For more information about this please see the Tekla Structural License Service Release Notes for V4.3.0.0 (March 2023) and TUA Article 2023 Release Products \& Tekla Structural License Service 2023 - Important Information.
- For any type of On-premises (Perpetual) Licenses, select the "Onpremises" License Method option when installing, then the appropriate option on the next page as follows:
- For a mix of pooled Subscription and Sentinel RMS server licenses, select the "Automatic" option as described in this TUA Article.
- Otherwise, select the "Server Sentinel RMS", "Local Sentinel RMS" or "Local Hardware Key" option appropriate to your license type*.
- *If you have a mix of license methods per product, you can edit the license method used by each product after the installation as described in this TUA Article.



## How can I centrally deploy Tekla software?

## I want to centrally deploy Tekla Tedds what do I need to do to be able to do this?

Tekla installations are designed to support distributed deployment scenarios using Windows Group Policy or proprietary Software Management Systems (SMS). The SMS software will vary depending upon your chosen deployment process and therefore we are unable to offer detailed technical assistance on how to implement this. What we can provide is a list of requirements / components and how to install them to allow you to package up a centralized install in your chosen deployment process.

## Where is the information found?

Every release of the software has different dependencies so the best way for us to distribute this information is to ship it in the installation download. Because the vast majority of users will never need to know this we do not
provide links to the information via the installation wizard - you have to unpack the download to find the information.

## How do I unpack the install to extract the Distributed Deployment details?

1. Run the downloaded installation package

- Allow the unpacking process to complete and the Installation wizard to launch

2. Cancel the Installation wizard
3. Open a Windows explorer and navigate to

- C:\Program Files (x86)\Common Files\Tekla\Structural\Install Cache

4. In here there should be a sub folder related to the product and release you are trying to install, e.g. "tekla_tedds_YYYY_MMYYYY"
5. Open this subfolder and open

- Distributed Deployment.htm


### 3.7 Tekla Tedds service packs

Service packs update the existing installed version software. You do not need to separately install previous service packs in order to install the most current service pack. For example, you can install service pack 2 without installing service pack 1.

- Service packs can include new features, and improvements and fixes to existing features. We recommend that all users install the latest service pack.

You can find the service packs in Tekla Downloads.

## Install a Tekla Tedds service pack

You can install a service pack to update a version or a previous service pack. Service packs can contain new features, and improvements and fixes to existing features

If you have the related Tekla Tedds version or a previous service pack installed on your computer, you do not need to remove it before installing a new service pack.
To install the service pack

1. Download the service pack software installation file from Tekla Downloads to your computer.
2. Double-click the installation file to run the installation.
3. Follow the steps in the installation wizard to complete the installation.

### 3.8 Upgrade Tekla Tedds to a new version

If you already have Tekla Tedds installed and are upgrading to a new major version please note that the existing version will be replaced - so 2023 will replace 2022 for example. (Service packs are slightly different as these are cumulative updates, so for these you only need to install the latest.)
To upgrade your version, simply proceed to Install and license Tekla Tedds (page 43) as if you were a new user.

## The Update Service

Using the Update Service is the easiest way to keep your Tedds installation up to date. It runs inside Tedds and will notify you if updates are available. You can then install them directly from the list of updates in the Software manager.


A message appears in the Tedds Status bar (bottom of window) if updates are available. Click this to open the Software Manager to list and install the updates. You can also check for updates at any time by selecting the "Check for Updates" button on the Help tab of the Ribbon.

## 4

## Get familiar with Tekla Tedds

Tekla Tedds is software for performing structural engineering calculations. You can choose to run it as Tedds (the Tedds Application), or as the more sophisticated Tedds for Word.

- Start Tekla Tedds (page 50)
- Tedds and Tedds for Word - what's the difference? (page 53)
- Introducing the Tedds Application (page 55)
- Introducing Tedds for Word (page 69)
- Configuring settings (page 135)
- Tekla Tedds Quick Start Guides (page 160)


### 4.1 Start Tekla Tedds

1. To start Tekla Tedds do one of the following:

- In the Windows start menu, find and select Start Tedds.
- On the desktop, double-click the Start Tedds icon.

The Tedds Start wizard appears.

## © Welcome

Tedds
Use the extensive library of calculations.
(recommended for new users)

## Tedds for Word

Use the extensive library of calculations to create complete project reports or write your own custom calculations.


Follow the instructions below to continue.
NOTE See Tedds and Tedds for Word - what's the difference? (page 53) for more information about the choices.

## Launch Tedds (the Tedds Application)

At the Tedds Start wizard:


1. Click Tedds.

The Tedds Start Page appears.


On the Tedds Start Page you have the following options:

- If you have purchased additional regional libraries, you can set the default region locale by using the Locale list.
- To create an empty document and select a calculation in the calculation library, go to the New tab and select New Document

TIP If necessary, on the New tab, you can also click the calculation name in the Recently used calculations list. Tedds then creates a new document containing the selected calculation.

- To open an existing document, either click Open Document and browse to find the document, or click the document name in the list under Open Document.
- To create an empty project, go to the New tab and click New Project.
- To open an existing project, either click Open Project and browse to find the project, or click the project name in the list under Open Project.
- To open the Tedds quick start guide, release notes, user guide, or help in a new window, click the required command under Learn the product.


## Launch Tedds for Word

At the Tedds Start wizard:


1. Click Tedds for Word.

If you have more than one version of Microsoft Word installed on your computer, click the version that you want to use.

A new Tedds for Word document opens, in which you can start writing your own calculations.

NOTE After launching Tedds for Word, you may want to adjust some Microsoft Word settings. For further information, see Microsoft Word settings (page 158).

What next?

- The recommended learning path for new users is to go through the interactive elearning course First steps with Tekla Tedds
- Hands-on calculation writing examples are also provided in the Quick Start Guides (page 160)


### 4.2 Tedds and Tedds for Word - what's the difference?

When you launch Tedds, the Tedds Start wizard typically displays two editions:

1. Tedds
2. Tedds for Word

NOTE The Tedds edition is also referred to as the Tedds Application.

## Tedds (the Tedds Application)

Tedds is very simple and powerful and completely self-contained. In addition, Tedds requires no knowledge of any other package. This edition gives you access to all the major Tedds calculations and to most of the utilities. If you are new to Tedds and have access to both editions, we recommend that you start by using the Tedds edition.

To find out more, see: Introducing the Tedds Application (page 55)

## Tedds for Word

Tedds for Word gives you access to all Tedds calculations (including component calculations) and all the utilities. However, Tedds for Word is even more powerful: you can include multiple Tedds calculations in the same document along with text, pictures, and output from other applications.
Tedds for Word is entirely integrated with and operates within Microsoft Word. That is why you need to have access to and some knowledge of Microsoft Word to use Tedds for Word.

In Tedds for Word, you can write and format documents according to your needs. You also have all the editing features of Microsoft Word at your disposal to create professional-looking reports.

In addition, Tedds for Word allows you to write your own calculations. You can simply type the variables and formulae within a Word document, and then use Tedds for Word commands to automatically resolve the calculations. When the inevitable design changes occur, modify your calculations and re-calculate the document, and Tedds for Word calculates the new results for you.
Using Tedds for Word you can:

- Define and perform your own calculations in any Microsoft Word document quickly and simply.
- Access standard calculations by using the Library Access System.
- Access component calculations by using the Library Access System.
- Include engineering data in your calculations by using data lists, data tables, and data graphs.
- Calculate anything from a single calculation to an entire document.
- Automatically verify the dimensional accuracy of your calculations by specifying the appropriate units for your variables.
- Define multiple calc sections in your document, so that the same variables can have different values within your document.

To find out more, see: Introducing Tedds for Word (page 69)

### 4.3 Introducing the Tedds Application

Tedds allows you to automate your engineering calculations. Tedds has been written by structural engineers for structural engineers, and therefore, it should meet the requirements of your everyday engineering tasks.

To perform calculations in Tedds, you simply need to select the calculation (page 56) that you need in the Tedds calculation library. Tedds automatically runs the calculation, and prompts you for any additional information that is needed.
If the calculation requires information that you would traditionally obtain from a printed source (such as a book of section properties, safe load tables, or code graphs), Tedds allows you to select the details in a data list (page 414), a data table (page 419), or a data graph (page 428).
Once you have completed the input and made the appropriate selections, Tedds completes the calculations and displays the results.
Once you have performed the calculation, you can save it to disc, send it to a range of destinations, print it, or recalculate it.

## Components of the Tedds Application window

To efficiently use Tedds, see the main components of the the Tedds Application window in the following image.


1. The file menu: contains file management commands, such as Save, Close, and Print.
2. The Tedds ribbon: contains the tabs that allow you to access all features of Tedds.

TIP If you need more information on a command, rest the mouse pointer over a command icon. A tooltip appears and describes the action that you can perform by clicking the icon.
3. The Project Manager window: allows you to organize multiple documents together into a single project.
4. A Tedds calculation: displays a calculation that you have performed in Tedds.
This area in the the Tedds Application window remains empty before you run a calculation.

## Select a calculation

When you create a new document in Tedds, the Select Calculation dialog box automatically appears. To select a calculation in the dialog box, see the following instructions.


NOTE The list in the Select Calculation dialog box depends on the locale that Tedds currently uses. Typically, you can view the standard Tedds calculations. Depending on the locale and your previous use of Tedds, you may also have other options available. The other options can be,
for example, calculations that use a particular set of units, or calculations that you have downloaded on the Tedds web site.

In order to switch to another locale, see Change the locale (page 61).

1. Click the folder for the type of calculation that you need.

The folder opens and displays the calculations within it.
2. Double-click the name of the required calculation.

Tedds performs the calculation, invoking any data lists, data tables, or other features that the calculation requires.

## Search calculations in the Select Calculation dialog box

In the Select Calculation dialog box, you can use search text to quickly locate specific calculations. If necessary, you can also adjust the search properties to find better results.


## Find a calculation

1. Type the desired search text in the Find in list field.

If your search text matches a calculation, Tedds opens the relevant group and views the matching item.
2. If the displayed result is not correct, do one of the following:

- Click Next to see the next item that matches your search text.
- Click Previous to return to the previous item that matched your search text.
- Adjust the search text.


## Adjust search options

- Click the Options button on the right side of the Find in list field.
- If necessary, select one or more of the following options:
- Match case: If you select this option, the search only matches if both the letters and their case are identical to your search texts.
- Find in item descriptions: If you select this option, the search looks for the search text also in the calculation descriptions. If you do not select this option, the search only looks for the search text in item name.


## Components of a calculation interface

Once you have started calculating, all of the Tedds calculations share a similar style of interface. See important calculation interface details in the following paragraphs.


1. Context-sensitive information box
displays additional information about the selected variable, if available.

## 2. NOTES

displays additional details on the calculation that you are performing.
3. SKETCHES
displays a sketch related to the calculation that you are performing.
4. VARIABLES
lists all the variables and their values in the current calculation document. You can select variables and then enter them in the calculation, if necessary.
5. FEEDBACK
allows you to send feedback to the Tedds development team.
6. SUPPORT
opens a new window that allows you to contact the Tedds support.
7. Data fields
allow you to type in necessary information. In some cases, variables may have validation, which prevents you from entering invalid information.
8. Buttons
allow you to enter more information or select a particular item that the current calculation requires.
9. Navigation buttons (such as Finish and Cancel)
allow you to finish the calculation, cancel the calculation process, or go to the next or previous page in the calculation interface.

## After performing a calculation

Once Tedds has performed a calculation, you have several options to continue. You can:

NOTE The following only applies to the Tedds Application.

TIP Tedds can have more than one document open at once. To view open documents or to switch between them, click the appropriate document tab directly above the window that contains the calculation.

## Re-calculate the document

Re-calculating the document allows you to change any data in the calculation interface. Tedds remembers all variables and settings for the calculation.
To re-calculate the document:

1. On the Home tab, click Calculate.

The calculation interface opens.
2. Adjust the data according to your needs.
3. Click Finish.

Tedds re-calculates the document.

## Change the header details

1. On the Home tab, click Header.

For more information, see Adjust calculation sheet details (page 64).

## Copy the current document

1. On the Home tab, click Duplicate.

Tedds copies the current document. If necessary, you can now re-calculate the document and change the calculation data.

## Create a new calculation document

1. On the Home tab, click New.

The Select Calculation dialog box opens, allowing you to select the appropriate calculation.

## Send the contents of the document to another application

1. Click to open the file menu.
2. Hover the mouse pointer over Send To.
3. Select where you want to send the document.

NOTE There is a difference between sending the calculation to Microsoft Word or Tedds for Word:

- Sending the calculation to Microsoft Word will copy only the text into a Word document.
- Sending the calculation to Tedds for Word copies the calculation and all the variables into Tedds for Word, so that they can be re-calculated.

If you regularly send calculations to the same destinations, we recommend that you select the Wizard... option. This way, you can select the destination you want to use each time you click Send To.

## Open an existing document

1. On the Home tab, click Open.
2. Select the Tedds document (with a .ted file extension) that you want to open.

## Save the document

1. On the Home tab, click Save.
2. Define the file name and location.

Tedds saves the document as a .ted file, including all of the input, settings and variables. You or anyone else with access to Tedds can open and reuse the document.

## Save the document as pdf

1. Click the file menu, then click the drop-down button adjacent to Save As....
2. Click Save As PDF
3. Define the file name and location.

Tedds saves the document as a .pdf file.

## Save the project as pdf

1. Click the file menu, then click the drop-down button adjacent to Save As....
2. Click Save Project As PDF

The command will run the Save Project as PDF wizard which is a multi page user interface for choosing how the project should be saved to PDF.
3. On Page 1 Documents, choose which documents in the project should be included in the PDF file.
4. Click Next
5. On Page 2 Options, choose how the PDF file(s) are created.

## Print the document

- In the file menu, click Print.


## Change the locale

The locale that Tedds uses determines which calculations you can access and which data you can use in your calculations. If you have purchased additional
regional libraries, you can switch to any of the available locales by using the Locale list on the Home tab. To change the locale, do the following:

1. On the Home tab, click Locale.
2. In the list that appears, select the desired locale.

NOTE Re-calculating the document after changing the locale may lead to incorrect results. Ensure that the new locale is compatible with the existing calculations.

## See also

Regional settings (page 145)

## View hidden text, semicolons, or variables

Tedds automatically hides some elements in your calculations, such as intermediate calculations, delimiters, and variables. However, if necessary, you can decide to view the hidden elements. For more information, see the following paragraphs.

NOTE The following only applies to the Tedds Application.

## Show or hide hidden text

Tedds automatically views the important steps of a calculation in the document. However, Tedds also needs to perform intermediate calculations in order to obtain their results for subsequent use. If all the calculations were visible, the complete set of calculations would be inordinately long and convoluted. Tedds handles this by using hidden text. This means that the calculations exist, but normally you neither see nor print them. However, if necessary, you can view the intermediate calculations.

To review hidden calculations, do the following:

- On the View tab, select the Hidden Text option.

You can now see all the calculations in the document.
TIP To hide the intermediate calculations again, clear the Hidden Text option.

## Show or hide semicolons

Tedds can perform multiple calculations on the same line of the text. In these situations, semicolons (;) separate calculations from one another. In order to avoid any distraction to the flow of calculations, Tedds usually hides all
semicolons. However, if necessary, you can view them to determine the different calculations.

To view the semicolons in your calculations, do the following:

- On the View tab, select the Semicolons option.

You can now see all the semicolons in the document.
TIP To hide the semicolons again, clear the Semicolons option.

## View variables

When Tedds performs calculations, it stores the results as variables. Generally, you see the variables in the calculations, although some of them may be in hidden text.

To quickly view the final result of a particular variable:

1. On the Home tab, click Variables.

The Variables dialog box opens.
The dialog box contains the following tabs:

- The Manage tab: allows you to delete variables in your calculation.
- The Document tab: allows you to view all the variables in the current document.
- The System tab: allows you to view all the pre-defined variables that Tedds recognizes.

See also: Use the Variables dialog box (page 365)

## Adjust the zoom level

Generally, Tedds shows the results of a calculation as they would look if they were printed. This means that some of the calculations may be too small to review easily on screen. You may also sometimes want to see an overview of several pages of a large calculation. Therefore, Tedds allows you to zoom the display according to your needs. See the following instructions.

NOTE The following only applies to the Tedds Application.

1. On the View tab, click Zoom.

The Zoom dialog box opens.
2. Type the desired zoom percentage.
3. Click OK.

The zoom level changes to match the specified percentage.

## Adjust calculation sheet details

Tedds contains a series of different templates that you can use in your calculations. In addition, you can include your company details and logo in the header of calculation documents, and set header details that are only applicable to an individual document.

NOTE The following only applies to the Tedds Application.

1. On the Home tab, click Header.

The Header Properties dialog box opens.
2. Click to open the Document tab.

3. Set the calculation sheet details.

The fields that you see on the Document tab depend on the current calculation template. If you change the calculation template, you may have to set additional information.

TIP If necessary, you can copy the document details from one document to another. Do the following:
a. Ensure that you have opened both the document whose details you want to copy, and the document to which you want to copy the details.
b. Go to the document whose details you want to copy and open the Header Properties dialog box.
c. Click Copy All.
d. Go to the document where you want to past the header details and open the Header Properties dialog box.
e. Click Paste All.

The header details are pasted to the current document.
4. Go to the Company tab.

5. Adjust the company name and address according to your needs.

TIP If you want Tedds to use the details which you have defined here as default company details, select the Save these settings as the default for new documents option.
6. Go to the Template tab.

7. In the Document Template section, click Select... to select the desired document template.
8. If necessary, in the Header Logo section, click Browse... to add your company logo to the header, and scale the logo appropriately.

NOTE You have two options when adding the company logo. You can either:

- Create a link to your logo file, so that any changes to the logo are applied to the header as well.
- Embed the logo, so that the current logo is maintained even if the source file changes.


## 9. Click OK.

The changes are applied to the header.

## Modify header labels

If you need to modify the labels of the various header property fields, you can modify the labels to meet your needs. In order to do so, see the following instructions.

1. In the Header Properties dialog box, click Edit labels...

The Edit Header Property Labels dialog box opens.


NOTE The fields in the Edit Header Property Labels dialog box depend on the currently used calculation template. If you change to a different template, some labels may no longer be appropriate, or you may have to set new labels.
2. Modify the labels according to your needs.
3. Click OK.

The Edit Header Property Labels dialog box closes.
4. In the Header Properties dialog box, click OK.

The changes are applied to the document header.

## Organize projects with the Project Manager

The Project Manager window in the Tedds Application allows you to adjust and organize your projects. In this section, you will learn to create, open, and close projects, add existing documents to projects, reorganize the documents within projects by using folders, and modify project headers.

## Create a new project

To create a new project, see the following instructions.
NOTE The following only applies to the Tedds Application.

1. Open the file menu.
2. Hover the mouse pointer over the New... button.
3. In the list, select New Project.

An empty project is created. The project appears in the Project Manager window.
4. In the field next to the project, type a suitable name for the project.

## Add documents into a project

In case you need to add new calculation documents into your current project, see the following instructions.

NOTE The following only applies to the Tedds Application.

1. On the Project tab, do one of the following:

- To insert an existing document in the project, click Existing Document.
- To insert a new calculation in the project, click New Document.
- To insert the currently active calculation document in the project, click Active Document.

2. If necessary, repeat step 1 until you have added all necessary documents.

## Reorganize documents within a project

When you create a new project, it initially has a flat structure. However, if you want to organize the documents more hierarchically, you can add folders to the currently open project. For more information, see the following instructions.

NOTE The following only applies to the Tedds Application.

1. On the Project tab, click Folder.

An empty folder appears within the current project in the Project Manager window.
2. In the field next to the empty folder, type a name for the folder.
3. Move the desired documents into the folder either by dragging them into the folder or by using the Move Up or Move Down commands on the Project tab.

## Modify document headers or project headers

Tedds contains two types of headers: document headers and project headers. Document headers apply to an individual document, whereas project headers are common to all documents within a project. Modifying the header information can be particularly useful when you add documents with existing header information into a project. In order to modify the headers of a document or a project, see the following instructions.

NOTE The following only applies to the Tedds Application.

## Modify the header of an individual document

1. On the Home tab, click Header.

The Header Properties dialog box opens.
The Header Properties dialog box contains the following tabs:

- Document tab: allows you to modify the header information regarding the document.
- Company tab: allows you to modify the company information visible in the header.
- Template tab: allows you to change the document template and select a logo that is used in the header.

2. Modify the header properties according to your needs.
3. Click OK.

The changes you made are applied to the current document.

## Update all headers in a project

1. On the Project tab, click Project Header.

The Header Properties dialog box opens.
The Header Properties dialog box contains the following tabs:

- Document tab: allows you to modify the header information regarding the document.
- Company tab: allows you to modify the company information visible in the header.
- Template tab: allows you to change the document template and select a logo that is used in the header.

2. Modify the header properties according to your needs.
3. Click OK.

If the project contains several documents, Tedds asks you whether you want to apply the new header properties to all documents in the project.
4. Click Yes.

The changes are applied to the entire project.
NOTE Only the settings that you have modified in the Header Properties dialog box are overwritten in each document.

## Open or close existing projects

You can easily open or close existing projects using the file menu. For more information, see the following instructions.

NOTE The following only applies to the Tedds Application.

- Do one of the following:

| To | Description |
| :--- | :--- | :--- |
| Open an existing project | 1.On the file menu, click Open Project... <br> 2. <br> Browse to find and select the required <br> project. |
| Close an open project | $1 . \quad$ On the file menu, click Close Project. |

### 4.4 Introducing Tedds for Word

Tedds for Word is a Microsoft Word add-in that allows you to automate your engineering calculations and create professional-looking calculation documents. The following paragraphs introduce Tedds for Word and its main features.

With Tedds for Word, you can either select and execute an existing calculation in the Tedds engineering library, or create and modify your own calculations. You can also combine the two approaches.
In addition, Tedds for Word allows you to:

- Format your documents in the way that you want to arrange them.
- Customize the document headers and footers to match your company style.
- Include multiple calculations in your document.
- Include output from other applications in your document.
- Access all the standard engineering data which the calculations in the Tedds engineering library use.
- Link calculations together to copy input data or results from one calculation to another.
- Save fragments of your document to your own engineering library, so that you can reuse them later.
- Integrate your spreadsheets with Tedds.
- Share your calculations with other Tedds users.

NOTE These instructions have been written to reflect Microsoft Word 2016. If you are using a different version of Microsoft Word, some features may vary.

## Components of the Tedds for Word window

To efficiently use Tedds for Word, see the main components of the Tedds for Word window in the following image.


1. Tedds tab
allows you to access all features of Tedds for Word.
2. Tedds ribbon
appears when you click the Tedds tab. The Tedds ribbon allows you to quickly access the most common features of Tedds for Word.
3. Tedds ribbon groups
are toolbars that allow you to use the most common features of Tedds for Word with a single click.

## 4. Library Access System

allows you to browse the predefined calculations in the Tedds engineering library and your own calculations.

## See also

Tedds ribbon groups (Tedds for Word only) (page 585)
Library Access System (page 81)

## Document templates

Document templates offer a convenient way of standardizing the appearance of your calculation documents. Tedds for Word contains a number of calculation templates, which can easily give your calculations a professional look.

NOTE The following only applies to Tedds for Word.
Like other Word templates, the Tedds for Word templates contain elements connected to:

- Page appearance, such as page size, orientation, and margins
- Paragraph formats, such as font size and line spacing
- Character formats, such as font type

In addition to helping you create professional-looking documents, templates simplify modifying the information in the header and footer of a calculation sheet.

NOTE You can also use standard Word templates to adjust the appearance of your document.

If you use a Word template, Tedds for Word adds the macros that it needs to function.

If you attempt a calculation in a document that does not have the necessary macros, Tedds for Word will offer to add them, and convert the Word template into a Tedds for Word template.
Before converting a Word template into a Tedds for Word template, note that:

- Once you have added the Tedds for Word macros into a template, you can only use that template if you have Tedds for Word installed. Do not convert your Word templates into Tedds for Word templates, if you want to use the template later without Tedds for Word.
- Converting a Word template into a Tedds for Word template only adds the macros that Tedds for Word needs to function. Therefore, you will need to create the paragraph styles yourself to format the document correctly.
- You cannot add Tedds for Word macros to the Normal.dot template, which is automatically used for all documents that you open in Word.


## Select a calculation template

When you select a calculation template, you have three options. You can either use the default template of Tedds for Word, select some other Tedds for Word calculation template, or use a special Tedds for Word calculation template in order to create your own calculation templates.

NOTE The following only applies to Tedds for Word.
In addition to using Tedds for Word calculation templates, you can use a standard Word template.

If you choose to use a Word template, Tedds for Word automatically adds the macros which it requires in order to work correctly. However, in that case,
Tedds for Word does not add any page layout, paragraph or character styles.
TIP To avoid untidy results and having to define specific paragraph styles for your calculations, we strongly recommend using calculation templates in your calculations.

## See also

Create new calculation templates (page 78)

## Use the default template

1. Click the File menu.
2. In the left side pane, click New Tedds document.

A new document opens based on the default calculation template.

## Use a specific calculation template

1. Click the File menu.
2. In the left side pane, click New.

3. Click the PERSONAL tab.

The Tedds for Word calculation templates are located in the Calcs A4 and Calcs letter folders.
4. Click to open the desired folder.
5. Click the calculation template which you want to use.

A new document opens based on the chosen template.

## Use a special calculation template

Tedds for Word contains special calculation templates, designed to function as the basis of your own calculation templates. These calculation templates are called Tedds normal (Arial) and Tedds blank (Arial). The difference between the special calculation templates is that the blank template includes a border around the calculations area of the page, whereas the normal template does not.

1. Click the File menu.
2. In the left side pane, click New.

3. Click the PERSONAL tab.

The Tedds for Word calculation templates are located in the Calcs A4 and Calcs letter folders.
4. Click to open the desired folder.
5. Click the special calculation template which you want to use.

A new document opens based on the chosen template.

## Modify the header or footer of a calculation template

When you use a Tedds for Word calculation template, you can insert document details or company information in the header or footer, or modify the property labels in the header or footer according to your needs. To modify the
header or footer using the Header properties dialog box. To modify the header or footer, see the following instructions.

NOTE The following only applies to Tedds for Word.

## See also

Document options (page 137)

## Open the header

- In the Header ribbon group, click the Edit button.

The Header properties dialog box appears.

## Add document details

1. Open the header.

The Header properties dialog box appears.
2. Ensure that the Document tab is open.
3. Type document details in the fields.
4. To save the details, click OK.

TIP You can easily copy the document details from one document to another by using the Copy all and Paste all buttons in the Header properties dialog box.

## Add company details

1. Open the header.

The Header properties dialog box appears.
2. Go to the Company tab.

3. Type your company details in the fields.
4. To save the company information for all future Tedds for Word documents, select the Save these settings as the default for new documents option.
5. To save the details, click OK.

## Change the header logo

1. Open the header.

The Header properties dialog box appears.
2. Go to the Template tab.

3. Click Browse... to select the file which you want to use as the logo.
4. To use the logo in all future Tedds for Word documents, select the Save these settings as the default for new documents option.
5. To save the logo, click OK.

## Modify header labels

Property labels explain the input which is required in a particular table cell. In case the property labels in the header do not meet your needs, you can modify them.

1. Open the header.

The Header properties dialog box appears.
2. In the lower left corner of the dialog box, click Edit labels

The Edit header property labels dialog box opens.


NOTE The Edit header property labels dialog box may look different depending on the template that you are using.
3. Make the desired changes to the labels.
4. To save the changes, click OK.

## Create new calculation templates

The standard Tedds for Word calculation templates give you a wide range of layout options. However, if you wish, you can also create your own calculation templates with the Tedds Template designer. To do so, see the following instructions.

NOTE The following only applies to Tedds for Word.

## See also

Document options (page 137)

## Open the Tedds Template Designer

1. Go to Tools --> More --> Tedds options.
2. Under Environment, select the Show Tedds Template designer tab option. The Tedds Template designer tab opens.


## Open a new template

1. On the Tedds Template designer tab, click Tedds for Word.
2. In the list that appears, select the desired calculation template. The selected calculation template opens.

Edit the header and footer of the template

1. To edit the header and footer of a template, do one of the following:

- Double-click the header or footer area of the document.
- On the Tedds Template designer tab, in the click Header --> Edit or Edit footer.

2. Modify the existing table in the header or footer, or insert a new one.
3. To enter fixed text in the cells, on the Tedds Template designer tab, click Insert --> Property label.
4. From the list that appears, select a suitable label.

NOTE If you want to modify the property labels, click Header --> Edit.
In the Header properties dialog box that appears, click Edit labels and modify the labels according to your needs. For more information, see Modify the header or footer of a template (page 75).
5. To add variable text in the table, insert Property value cells by clicking Insert --> Property value, and in the list that appears, select a suitable value.

Insert a logo in the template

1. Click Insert --> Property value.
2. From the list that appears, select Logo.
3. Click Header --> Edit. The Header properties dialog box appears.
4. Go to the Template tab.

5. Click Browse... to select the file which you want to use as the logo.
6. To use the logo in all future Tedds for Word documents, select the Save these settings as the default for new documents option.
7. To save the logo, click OK.

Save a calculation template as the default Tedds for Word template

1. To save the file, click File --> Save as.
2. Click Tools --> More --> Tedds options.
3. In the Options - Default dialog, click Documents.
4. To set the template as default document template, do one of the following.

- If the template is open, click Use current.
- Click Select and select the new default template.

Save a calculation template as the default Tedds template

1. To save the file as a word template, click File --> Save as and save the item in the.dotx form.
2. Go to the Tedds Template designer tab.
3. Click File --> Save .Tet.
4. Open Tedds.
5. On the Tedds ribbon, click Options.
6. Under Documents, click Select and in the Company folder, select the new default template.

## Library Access System

When you use Tedds for Word, you can access the calculations and engineering data in the Tedds engineering library by using the Library Access System. The following paragraphs cover the basic components, library types, and modes of the Library Access System and launching the Library Access System.

NOTE The Library Access System is only available in Tedds for Word.

## Components of libraries and sets

Libraries include two types of components: entries and items. See the components and their functions in the table below.

| Name | Description |
| :--- | :--- |
| Entries | Actual calculations, sketches, tables, <br> or other pieces of data that the library <br> contains, and that you can copy to <br> your calculations. |
| Properties | Reference information that describes <br> a particular entry, such as Short Name, <br> Long Name, or Item Details. |

Sets include two types of components: groups and items. See the components and their functions in the table below.

| Name | Description |
| :--- | :--- |
| Groups | Organize the items in a set into a <br> logical order to help you find the <br> items easily. |
| Groups may contain other groups, |  |
| items, or both. |  |, | Point to an entry in a library, which |
| :--- |
| you can execute by executing the |
| item. |
| When you execute an item, the entry |
| that the item refers to is copied to |
| your document. |

## Library types

The Library Access System uses two types of libraries: system libraries and user libraries.

- System libraries are intended to hold company standard information, which will not change frequently and which you normally cannot change. All libraries installed with Tedds for Word are system libraries.
- User libraries contain your own data, and you can modify them.

At installation, Tedds for Word creates a My Libraries directory that contains an empty MyCalcs.Ibr user library file. The MyCalcs.Ibr file is the default saving location of the data that you want to save to the Tedds engineering library.

## Modes

- The simple mode allows you to find, preview and execute groups and items. In addition, you can adjust the Library Access System settings.
- The advanced mode allows you to use more advanced features of the Library Access System. The features include creating and modifying your own sets, and sharing your calculations.


## Launch the Library Access System

- On the Tedds tab, click 国 Launch the Tedds Library Access System. The Library Access System window opens.


## See also

Library Access System icons (page 543)
Library Access System toolbars (page 594)
Library Access System settings (Tedds for Word only) (page 154)
Use the Library Access System: Advanced mode (page 85)
Use the Library Access System: Simple mode (page 82)
Basic Library Access System procedures: Advanced mode (page 86)
Basic Library Access System procedures: Simple mode (page 83)

## Use the Library Access System: Simple mode

The Simple mode of the Library Access System allows you to access the key functionality of the Library Access System with the help of simple toolbars. The Simple mode allows you to have one set open at a time.

NOTE The following only applies to Tedds for Word.
The following image displays the Library Access System in Simple mode:


## See also

Library Access System toolbars (page 594)
Library Access System icons (page 543)
Basic Library Access System procedures: Simple mode (page 83)

## Basic Library Access System procedures: Simple mode

The following paragraphs cover the basic procedures of the Library Access System window, such as manipulating the view of a set, executing an item, finding sets, and configuring settings.

NOTE The following only applies to Tedds for Word.

## See also

Library Access System settings (Tedds for Word only) (page 154)
Open the index

- Click the Index button.

Open a set

1. Double-click the set that you want to open.

Manipulate the view of a set

- To expand a set, select the set and press the * key on the numeric keypad.
- To collapse a set, select the set and press the - key on the numeric keypad.

Preview an item

1. Select the item.
2. Click View --> Preview.

A preview of the item opens.

## Execute an item

1. Double-click the item which you want to execute.

If you select a solution item (marked with 里) or an example item (marked with 四), the Insert Calc Item dialog box appears.

| Insert Calc Item |  |  |  |
| :---: | :---: | :---: | :---: |
| Insert Calc Item |  |  |  |
| Choose how you want to insert this Calc Item into a document. |  |  |  |
| Onew document |  |  |  |
| $\bigcirc$ Append to active document |  |  |  |
| O) Insert in active document |  |  |  |
| $\square$ Add new Calc Section |  |  |  |
| Title: | 2 D analysis |  |  |
|  | Insert page |  |  |
|  | Variables for so that a calc another sectio |  | ique lis calc in |
| $\square$ Don't ask me again |  | OK | Cancel |

a. Select where and how you want to insert the item.

- To insert the calc item in a new document, select New document.
- To append the calc item in the end of the current document, select Append to active document.
- To insert the calc item at the location of your insert point in the current document, select Insert in active document.
- To insert the calc item in a new calc section, select Add new Calc Section.
- To insert a page break before the new calc section, select Insert page break.
b. Click OK.

NOTE You have to calculate the executed item in order to receive results.

Search a set

1. Click Find.
2. In the Find field, type the search entry.
3. Use the buttons on the right side of the Find field to browse the results of the search.

NOTE To modify the Find options, click the rightmost button next to the Find text box.

The list below appears.


If you select Match case, the search will only find a match if both the letters and their case are identical to your search entry.

If you select Find in item descriptions, the search will search item descriptions in addition to item names.

Display item or group properties

1. Select the item or group whose properties you want to view.
2. To see the properties, do one of the following:

- Right-click the item and in the context menu that appears, click View properties.
- Click View --> Properties.

Adjust settings

- Click Tools --> Options.

The Options - Default dialog box appears.

Change the Library Access System mode

- Click View --> Advanced Menus.


## Use the Library Access System: Advanced mode

Using the Advanced mode allows you to manage libraries and further adjust the Library Access System window. You can create your own sets and modify them by adding, modifying and deleting groups and items.

NOTE The following only applies to Tedds for Word.

NOTE The sets installed with Tedds for Word are protected, and therefore, they cannot be modified. If you want to modify one of the installed sets, we recommend saving the set with a new name and modifying the renamed set.

The following image displays Library Access System in the Advanced mode.


## See also

Basic Library Access System procedures: Advanced mode (page 86)
Library Access System toolbars (page 594)
Library Access System icons (page 543)

Basic Library Access System procedures: Advanced mode
In the following paragraphs, we cover the basic procedures of the Library
Access System window, such as manipulating the view of a set, executing an item, finding sets, and configuring settings.

NOTE The following only applies to Tedds for Word.

## See also

Create new sets (page 91)
Add new items into a set (page 94)
Add new groups into a set (page 93)
Build new sets based on existing sets (page 95)
Modify groups and items (page 97)

Open the index

- Click the 自 Index button.

Open a set

- Double-click the set that you want to open.

Email a set and referenced libraries
RESTRICTION To email a file, you must have a Microsoft Outlook profile.

1. Select and open the set that you want to send.
2. Click File --> Send....

Tedds for Word adds the set and the libraries that reference to it as attachments to a new email.

Import a library

1. Click File --> Import....
2. In your user libraries directory, select the library that you want to import.
3. Click Open.

The imported user library opens.

Export a set

1. Click File --> Export...
2. Name the set and select the file type you want to save the set in. You can select:

- Text file
- XML file


## 3. Click Save.

If you selected text file as the file type, the Export Options dialog box appears.
a. Adjust the export options and the properties to be included in the text file.


NOTE If you select the Indent groups option, the text file will appear to have the same structure as your set.
b. Click OK.

## Manipulate the view of a set

To manipulate the view of the set, you have the following options:

- To expand a group, select the group and press the * key on the numeric keypad.
- To expand a group one level, select the group and press the + key on the numeric keypad or double-click the group.
- To collapse a group, select the group and press the - key on the numeric keypad.
- To change the level of detail displayed on the screen, select the group and click View --> Long names .
If the Long names option appears to be selected, you are viewing the long names of items. If the Long names option does not appear to be selected, you are viewing the short names of items.


## Preview an item

- Do one of the following:
- Select the item and click View --> Preview.
- Click Preview.

Undo an action

- Click Edit --> Undo.


## Execute an item

1. Do one of the following:

- Double-click the item that you want to execute.
- Select the item that you want to execute and click Execute.

If you select a solution item (marked with 畏) or an example item (marked with 四), the Insert Calc Item dialog appears.

| Insert Calc Item $\times$ |  |  |  |
| :---: | :---: | :---: | :---: |
| Insert Calc Item |  |  |  |
| Choose how you want to insert this Calc Item into a document. |  |  |  |
| Onew document |  |  |  |
| $\bigcirc$ Append to active document |  |  |  |
| () Insert in active document |  |  |  |
| $\square$ Add new Calc Section |  |  |  |
|  | 2 D analysis |  |  |
|  | Insert pag |  |  |
| Variables for each calc section are stored in a unique list so that a calc in one section is separated from a calc in another section. |  |  |  |
| $\square$ Don't ask me again |  | OK | Cancel |

a. Select where and how you want to insert the item.

- To insert the calc item in a new document, select New document.
- To append the calc item in the end of the current document, select Append to active document.
- To insert the calc item at the location of your insert point in the current document, select Insert in active document.
- To insert the calc item in a new calc section, select Add new Calc Section.
- To insert a page break before the new calc section, select Insert page break.
b. Click OK.

NOTE You have to calculate the executed item in order to receive results.

## Search a set

1. Click $\rho$ Find.
2. Type the search entry.
3. Use the buttons on the right side of the Find field to browse the results of the search.

TIP To modify the Find options, click the rightmost button next to the Find field.

The following list appears:


If you select Match case, the search will only find a match if both the letters and their case are identical to your search entry.

If you select Find in item descriptions, the search will search item descriptions in addition to item names.

Display item properties

1. Select the item whose properties you want to see.
2. To see the properties, do one of the following:

- Right-click the item and in the menu which appears, click View properties.
- Click View --> Properties.

Adjust settings

- Click Tools --> Options.
- Click Tools --> Options.

The Options - Default dialog box appears. For more information on adjusting Library Access System settings, see Library Access System settings (page 154).

Change the Library Access System mode

- Click View --> Simple Menus.


## Create new sets

You can create new sets to store items according to your needs, creating new items and groups or copying items from other sets. For detailed instructions, see the following paragraphs.

NOTE The following only applies to Tedds for Word.

1. Do one of the following:

- Click File --> New.
- Click ${ }^{\text {Co }}$ New Calc Set Wizard.

The New Calc Set Wizard appears.
New Calc Set Wizard
This wizard will guide you through the steps to create a new
Calc Set.
you to store and reuse the calculations you write.
To continue, click Next.
2. To proceed, click Next. The following view appears.

3. Type the name of the set in the Name field.
4. If necessary, modify the automatically generated short name and file name.
5. Click Next. The following view appears.

6. Set the default information that Tedds for Word proposes for new items. You can modify the default information each time you create a new set.
7. Click Next.

8. To finish creating the set, click Finish.

TIP To create a new, empty and untitled set, you can also click File --> New blank set.

## See also

Build new sets based on existing sets (page 95)
Modify sets (page 99)
Add new groups into a set (page 93)
Add new items into a set (page 94)

## Add new groups into a set

Groups are useful in organizing sets and calculation items into collections that are linked by a particular theme. This way, you can easily access the calculations that you need in a certain project or situation. To add new groups into a set, see the following instructions.

NOTE The following only applies to Tedds for Word.

1. Select the item or group above the position where you want to place the new group.
2. Do one of the following:

- Click Edit --> New Group.
- Click New Group.

The New Group dialog box appears.
3. Type a short name and, if necessary, a long name for the group.
4. Click OK. If you have selected an empty group as the place where you want to add the new group, Tedds asks you whether you want to create the new group inside the selected group.
a. Click Yes to add the group inside the selected group, or No to add the group below the selected group.
Tedds adds the group into the location that you selected.

## See also

Add new items into a set (page 94)
Create new sets (page 91)
Delete groups and items (page 100)
Modify sets (page 99)
Modify groups and items (page 97)
Library Access System settings (Tedds for Word only) (page 154)

Add new items into a set The Library Access System allows you to save your own calculation items into sets. That way, you can easily reuse your calculations later. To add new items into a set, see the following instructions.

NOTE The following only applies to Tedds for Word.

1. Open the set you want to add the item in to.

NOTE This must be a set that you have created. The sets installed with Tedds for Word are protected, and therefore, they cannot be modified.
2. Click Edit --> New Item.

If you have the Confirm selection in Word option selected, follow the instructions below.
a. The Library Access System asks you to highlight the item in your Tedds for Word document.
b. Highlight the item and click OK.

If you have the Select format and category of item contents option selected, follow the instructions below.
a. In the Paste special dialog, select the format in which you want the information be stored in the library.
3. In the New item properties dialog, type the name of the new item, and select the library where the item is saved.


NOTE To enter optional item properties, click More.

## 4. Click OK.

If you have selected an empty group as the place where you want to add the new item, the Library Access System asks you whether you want to create the new group inside the selected group.
a. Click Yes to add the item inside the selected group, or No to add the item below the selected group.

The Library Access System adds the item into the location which you selected.

## See also

Add new groups into a set (page 93)
Create new sets (page 91)
Delete groups and items (page 100)
Modify groups and items (page 97)
Modify sets (page 99)
Library Access System settings (Tedds for Word only) (page 154)

Build new sets based on existing sets
Sometimes, you may want to create a calculation set that contains many items from another set. In this case, we recommend that you build a new set based
on the existing set, instead of creating a new set and adding the desired items manually. For detailed instructions, see the following paragraphs.

NOTE The following only applies to Tedds for Word.

## See also

Create new sets (page 91)

Build new sets based on existing sets

1. Click Tools --> Set Builder...

The Build New Calculation Set dialog box opens.

2. Type the search text and select an appropriate search type in the Search type list and, if necessary, click Select...
3. According to your needs, click Search and Add or Search and Replace. The search results appear.
4. To remove an item from the set, select the result and click Remove.
5. Repeat steps $2-4$ as needed.
6. When the result list only displays the items that you want to include in the set, click Build.

Tedds creates a new untitled set that contains the items on the results list.

## Search tips

See some tips for searching items in the following list:

- To search with the exact search text, select Match whole word only.
- To search with the exact search text and the case of the letters that you type, select Match case.
- To clear the result list, click Remove All.
- To search the set again and add the results to the result list, click Search and Add.
- To search the source set again and replace the items in the result list, click Search and Replace.
- To narrow the search results, you can build intermediate sets that match the current search criteria. Then, you can search the intermediate sets with new search criteria as many times as necessary, until the set only contains the items that you need. Once you are finished, remember to delete the intermediate sets.

Modify groups and items
In order to achieve the set layout that you require, you may need to modify groups and items within your set. To modify a group or an item, see the following instructions.

NOTE The following only applies to Tedds for Word.

## See also

Modify sets (page 99)
Add new groups into a set (page 93)
Add new items into a set (page 94)
Delete groups and items (page 100)

## Modify group properties

1. Right-click the group that you want to modify.

A context menu appears.
2. In the context menu, click Edit --> Group.... The Edit Group dialog box appears.
3. Modify the long and short name of the group according to your needs.

NOTE Name, or the short name, is mandatory information.

## 4. Click OK.

Modify item properties
You may sometimes need to change the properties of an item without changing its library content. You may, for example, need to add a new item
similar to an existing one, and thus need to modify the properties of the existing item to clarify the difference between the two.

1. Select the item that you want to modify.
2. Click Edit --> Edit Item Properties...
a. If the item is password protected, type the correct password to modify the item properties.
The Edit Item Properties dialog box appears.

3. Modify the item properties according to your needs.

NOTE Name and library file are mandatory information.
To add optional information, click More.
4. Click OK.

## Modify item contents

1. Double-click the item to execute it in the current Tedds for Word document.
2. In the document, make changes to the calculations according to your needs.
3. Verify that the modified calculations work correctly.
4. Open the Library Access System and select the item that you modified.
5. Depending on your settings, do one of the following:
a. If you have not selected the Confirm selection in Word option, highlight the calculations that you want to save for the current item.
b. If you have selected Confirm selection in Word option, Library Access System allows you to select the calculations while modifying the item.
6. Click Edit --> Edit Item Contents....
a. If you have selected the Paste special option in the Library Access System settings, select the type in which you want to save the item and click OK.

b. If the item is password protected, type the correct password.

When Tedds has saved the changes to the item, a confirmation message appears on the screen.

## Modify sets

You can modify your sets using two main approaches: drag and drop and the clipboard. Drag and drop allows you to simply select a group or an item within the current set, drag it into a second set, and copy the item there by releasing it. You can also change the location of the item inside a set by dragging and dropping it. For more information on modifying sets, see the following instructions.

NOTE The following only applies to Tedds for Word.

TIP To simplify dragging and dropping groups or items from one set to another, you can arrange the sets side by side. To do that, click Window --> Tile horizontally.

## Enable drag and drop

If you want to use drag and drop while modifying sets, ensure that you have enabled dragging and dropping in Library Access System settings. For more information, see Library Access System settings (page 154).

Copy an item within the same set using drag and drop

- Hold down the Ctrl key while doing the drag and drop.

Cut an item

- Click Edit --> Cut.

Copy an item

- Click Edit --> Copy.

Paste an item

- Click Edit --> Paste.

If you drag and drop or paste a group or an item into an empty group, Library
Access System asks you whether you want the item to be pasted within or below the selected group.

- To copy the group or item inside the group, click Yes.
- To copy the group or item below the group, click No.


## Delete groups and items

Sometimes, you may need to delete groups and items from a set or from your user libraries. Deleting an item from a set simply removes the item from the selected set, whereas deleting a group from a library permanently removes the group and all of its contents from the library.

NOTE The following only applies to Tedds for Word.

## See also

Library Access System settings (Tedds for Word only) (page 154)
Modify groups and items (page 97)
Modify sets (page 99)

## Delete groups and items from a set

1. Select the group or item that you want to delete.
2. Click Edit --> Delete From Set.

If you have selected the Delete item from set option in the Library
Access System message settings, Tedds asks you to confirm deleting the group or item.
a. Click Yes.

WARNING Deleting a group or an item following these instructions will delete the permanently from Library Access System. Therefore, any set that points to the deleted item or group can no longer display the item or group. Deleting a group or an item from a library is irreversible.

1. Select the group or item that you want to delete.
2. Click Edit --> Delete From Set \& Library.
a. If the group is password protected, type the password.
b. If you have selected the Delete item from library option in the Library Access System message settings, Tedds asks you to confirm deleting the group or item. Click Yes.

## Share calculations to other Tedds users

At some point, you may need to share your calculations to other Tedds users. For this purpose, you can use the Calc Publishing Wizard. With Calc Publishing Wizard, you can create installation packages, which automatically install the calc set to the other user's computer. In addition to the set itself, installation packages contain all the libraries associated with the set.
Installation packages can also contain data lists, data tables, and data graphs.
NOTE The following only applies to Tedds for Word.

Create calculation packages

1. Click Tools --> Calc Publishing Wizard.

The Tedds Calc Publishing Wizard opens.

2. To select the appropriate type in the Package Type list, see the options below.

- If your calculations only use data lists, data tables, and data graphs provided with Tedds, select Tedds System Calculation.
- If your calculations use your own customized data lists, data tables, and data graphs, select Tedds System \& User Calculation.

3. In the side pane, click the Sets folder.
4. Click Add file.
5. Select the items that you want to add to your project.
6. To prevent other users from overwriting the file, you can select the file and ensure that the ReadOnly value is set to True.

| Data |  |
| :--- | :--- | :--- |
| FileName |  |
| ReadOnly 2D Analysis calculations.las <br> Size True | 761 B |

7. Go to the Properties tab.
8. Define properties for the installation package.


Title, Author, and Output installation package (the location where the installation package will be created) are mandatory information.
9. Click Build.

Tedds creates an .MSI file in the location that you defined in Output installation package.

TIP Consider saving the publishing project, so that you can easily rebuild the package if you have updated the calculations and want to share the new versions.

## Install calculation packages

- Double-click the desired .MSI file and follow the on-screen prompts.

The calculation is now available in the index in both Tedds and Tedds for Word.

TIP You can copy the installation package to an USB flash drive, email it, or publish it online.

## Interface Designer

The Interface Designer is a tool for creating customized dialogs, also known as interfaces, that allow the user to enter data for multiple input fields in the same place. Interfaces help you to make your calculations more user-friendly, intelligent, and automated.

By using interfaces in your calculation, you can:

- Have all the input data visible and presented at the start of the calculation.
- Group related input together in a logical way.
- Enter data with the help of multiple control types, for example check boxes and lists.
- Validate input when it is entered.
- Apply maximum and minimum values to input.
- Scroll through and revise input before continuing the calculation.
- Add buttons for making selections from data lists, data tables, and so on.
- Add sketches and notes to the interface to illustrate the calculation.

NOTE The Interface Designer is only available in Tedds for Word.
To start the Interface Designer, do the following:

1. In the Insert ribbon group, click User Interface.

The Manage User Interfaces dialog box appears.

2. Select where you want to insert the user interface and click New.

The Tedds Interface Designer window opens, displaying an empty interface template.

## See also

Components of the Interface Designer (page 105)
Create a custom page template (page 122)
Create an example interface (page 124)

## Components of the Interface Designer

To understand the structure and components of the Interface Designer, see the following image and paragraphs.

NOTE The following only applies to Tedds for Word.

## Components of the Tedds Interface Designer window

In the following image, see the structure and some other components of the Tedds Interface Designer window.


1. Interface Designer toolbar
allows you to access the most common features of Interface Designer with a single click.
The Interface Designer toolbar allows you to:

- Close the Tedds Interface Designer window and insert the interface in your calculations.
- Access the Tedds user guide for help.
- Undo or redo an action.
- Add pages, input controls, and output controls.
- Move a components up or down.
- Cut, copy, and paste interface components.
- Delete interface components.

2. Property pane
allows you to enter and modify the properties of the selected interface component.
3. Empty rows
display where you can add new interface components.
4. Context-sensitive help box
guides you in entering the correct information for each entry in the property pane.

## Components of an interface

You can use the following components to create an interface:

- Pages
- Controls
- Groups
- Page items
- Data views

Each of the interface components is explained individually in the documentation.

When you create components in your interface, the Interface Designer views exactly how the components will appear when a calculation is performed using the interface.

## See also

Pages (page 107)
Controls (page 110)
Groups (page 115)
Page items (page 117)
Data views (page 120)

## Pages

Pages represent actual pages of the interface. The overall layout of your interface is also set at page level. A page can contain multiple controls, groups, page items and data views. In addition, if necessary, you can define circumstances when a page is enabled and when it is not.

NOTE The following only applies to Tedds for Word.

## See also

Controls (page 110)
Groups (page 115)
Page items (page 117)
Data views (page 120)

## Add pages

1. Do one of the following:

- On the Interface Designer toolbar, click Page.
- At the bottom of the window, click the 㿻 Add new page button.

A name field appears on the left side of the 费 Add new page button.
2. Type a page name in the field.

## Page properties

The Page properties property pane allows you to define the page layout of the selected page.

TIP To access the Page properties property pane, click the name of the desired page at the bottom of the Interface Designer window.

| Page Properties |  |  |
| :---: | :---: | :---: |
|  | Appearance |  |
|  | Name |  |
|  | Title |  |
| > | Buttons | Back Next Cancel |
|  | Undo on cancel | True |
| $\checkmark$ | Library Items |  |
| > | Notes library item |  |
| > | Page library items |  |
| > | Sketch library item |  |
| $\checkmark$ | Template |  |
|  | Size | Medium |
|  | Custom | False |
|  | Layout | 0 |
|  | Resizable | False |
| $\checkmark$ Events | Events |  |
| > | Creating |  |
| > | Created |  |
| > | Activated |  |
| $\rangle$ | Input changing |  |
| > | Input changed |  |
| $\rangle$ | Input updated |  |
| > | Output updated |  |
| > | Validation failed |  |
| > | Validation succeedec |  |
| , | Deactivated |  |
| $\checkmark$ Information |  |  |
| > | Information |  |

See the property fields of the Page properties property pane in the following table:

| Property name | Description |
| :---: | :---: |
| Appearance |  |
| Name | The name that you give to the page to identify it. The name is not visible in the final interface. |
| Title | The text that appears at the top of the interface for the current page. |
| Buttons | The buttons that appear at the bottom of the interface. |
| Undo on cancel | Determines whether changes are automatically cleared when the user clicks the Cancel button on the page. |
| Library items |  |
| Notes library item | A library item that is displayed when the user clicks the Notes button in the interface. |
| Page library items | Page library items that are included in the page, provided that the page template accepts calculation items. |
| Sketch library item | A library item that is displayed when the user clicks the Sketches button in the interface. |
| Template |  |
| Size | Size of the page template. |
|  | NOTE The Size can only be defined and changed on the first page of your interface. |
| Custom | Determines whether the interface template is a custom template that you can customize according to your needs. <br> For more information, see Create a custom page template. |
| Layout | Allows you to select page template style from several standard layouts. |
| Resizable | Determines whether the user can resize the interface. |
|  | Events |
| Creating | A calculation that is performed before the page is created. |
| Created | A calculation that is performed once the page is created. |


| Property name | Description |
| :--- | :--- |
| Activated | A calculation that is performed each time the user <br> activates the page. |
| Input changing | A calculation that is performed just before the user <br> modifies input. |
| Input changed | A calculation that is performed when user has <br> modified the value of an input control. |
| Input updated | A calculation that is performed when the user has <br> modified the value of all input controls on the <br> page. |
| Output updated | A calculation that is performed when all output <br> controls have been updated after the user has <br> modified the value of input controls. |
| Validation failed | A calculation that is performed when validation of <br> the input controls on the page fails. |
| Validation succeeded | A calculation that is performed when validation of <br> the input controls on the page succeeds. |
| Deactivated | A calculation that is performed when the page is <br> deactivated. |
| Information | Text that appears in the yellow context help <br> window on top of the page when the user does not <br> modify a specific input control. |

## Modify page order

- To move the current page backward or forward, click the arrow on the right side of the page name, and select the desired option.


Delete pages

1. Do one of the following:

- In the Interface Designer toolbar, click Delete.
- At the bottom of the window, click the $\times$ Delete page button.

A confirmation dialog box appears and asks you whether you want to delete the current page.
2. Click Yes.

## Controls

Controls are the basic parts of an interface. The Interface Designer allows you to create two types of controls: input controls, which allow the user to enter information, and output controls, which display additional items in the interface.

NOTE The following only applies to Tedds for Word.

## See also

Groups (page 115)
Pages (page 107)

## Add controls

1. Do one of the following:

- On the Interface Designer toolbar, click the arrow on the right side of theInput or Output button, depending on which type of control you want to add.
a. In the list that appears, select the control that you want to add.

| Control | Description |
| :--- | :--- |
|  | Input controls |
| Button | A button that allows the user to <br> perform an operation, such as open a <br> data list. |
| Check Box | A box that the user can select to <br> perform an operation, such as include <br> a sketch with the output. |
| Drop List | A list of standard values that only <br> allows the user to select values in the <br> initial list. |
| Edit | An input field where the user can type <br> the desired value. |
| Edit Drop List | A list of standard values that allows <br> the user to enter values that are not <br> in the initial list. |
| Edit Up Down | An input box where the user can <br> enter a value, and adjust the value by <br> using up and down buttons. |
| Label | A field that displays a line of text. |
| List Box | A list box of standard values that only <br> allows the user to select values in the <br> in the initial list. |


| Control | Description |
| :--- | :--- |
|  | Output controls |
| Blank | A blank line used for separating <br> controls. |
| Data view | When using a custom page template, <br> the control allows you to show a <br> library item or a sketch within the <br> interface. |
|  | For more information, see Data views <br> (page 120). |
| Separator <br> Horizontal | A horizontal line that you can use for <br> separating areas of an interface page. |
| Separator <br> Vertical | A vertical line that you can use for <br> separating areas of an interface page. |
| Custom control | Allows you to create a custom control. |
| List view | Allows you to insert a list in your <br> interface. |

- At the top of the page, click Add Control.

A new control appears on the template.
2. In the property pane, define the control properties according to your needs.

Adjust control properties
NOTE The available properties may vary depending on the control type.
The property pane allows you to define and modify the properties of the selected control. To adjust the control properties, do the following:

- Click the control and go to the property pane.
- Adjust the control properties according to your needs.

| Edit Properties |  |  |  |
| :---: | :---: | :---: | :---: |
|  | Enable if |  | $\wedge$ |
|  | Hide if disabled | False |  |
|  | Info width | Auto |  |
|  | Description width | Resize |  |
|  | Name width | Auto |  |
|  | Value width | Auto |  |
|  | Unit width | Auto |  |
|  | Type | ab Edit |  |
| $\checkmark$ | Data |  |  |
|  | Default value |  |  |
|  | Disabled value |  |  |
|  | Units |  |  |
|  | Value type | Number |  |
| $\checkmark$ Events |  |  |  |
| V Validation Failed |  |  |  |
| $\rangle$ | Validation Succeeded |  |  |
| $>$ | Value changed |  |  |
| $\rangle$ | Value changing |  |  |
| $\checkmark$ | Validation |  |  |
|  | Expression |  |  |
| $>$ | Message |  |  |
|  | Min value |  |  |
|  | Max value |  |  |
| $\checkmark$ Information |  |  |  |
| $>$ | Information |  | $\checkmark$ |

In the following table, see the properties of controls in the property pane.

| Property name | Description |
| :--- | :--- |
| Appearance |  |\(\left.\left.| \begin{array}{l}The variable name for the input value <br>

when the calculation is run.\end{array}\right\} $$
\begin{array}{l}\text { Text that the interface views to clarify } \\
\text { what information is required in the } \\
\text { selected field. }\end{array}
$$\right\}\)

| Property name | Description <br> Enable if field, type the name of the <br> control on which the current control is <br> dependent. |
| :--- | :--- |
| Hide if disabled | Determines whether the control is <br> viewed in the interface when it is <br> disabled. |
| Info width | Determines how wide the area for the <br> information icon ( ) is. |
| Description width | Determines how wide the area for the <br> control description is. |
| Name width | Determines how wide the area for the <br> control name is. |
| Value width | Determines how wide the area for the <br> variable value is. |
| Tyit width | Determines how wide the area for the <br> variable unit is. |
| Default value | Allows you to select a type for the <br> control. |
| Disabled value | Determines the default value of the <br> variable, unless another value already <br> exists. |
| Units | A value that determines whether the <br> control is disabled. |
| Value type | Determines the units of the value. <br> TIP Units may require superscripts, <br> and many variables use Greek <br> characters or subscripts. <br> To format controls, you can use <br> the formatting buttons on the <br> right side of each property field. <br> In addition, you can click the ... <br> button on the right side of the <br> selected property field to format <br> controls. |
| Events |  |
| (number or string). |  |


| Property name | Description |
| :---: | :---: |
| Validation failed | A calculation that is performed when the validation of input controls on the page fails. |
| Validation succeeded | A calculation that is performed when the validation of input controls on the page succeeds. |
| Value changed | A calculation that is performed when the user has modified the input value. |
| Value changing | A calculation that is performed just before the variable is updated because the user has modified the input value. |
| Validation |  |
| Expression | Allows you to create an expression that determines whether the input value is valid or not. <br> If the value of the expression in the Expression field is True, the input value is valid. |
|  | TIP To consider all variable values as valid, leave the Expression field empty. |
| Message | Allows you to create a message that is viewed if the validation of the expression in the Expression field fails. |
| Min value | The minimum value of the variable. |
| Max value | The maximum value of the variable. |
| Information |  |
| Information | Text that appears in the yellow context help window on top of the page when the user does not modify a specific input control. |

## Delete controls

1. Select the control that you want to delete.
2. On the Interface Designer toolbar, click Delete.

## Groups

Groups allow you to group controls together in a logical way. Using groups provides two main benefits: related controls are located in the same area of the interface with their own title, and you can set whether the controls are enabled or not at the group level.

NOTE The following only applies to Tedds for Word.

## See also

Controls (page 110)
Pages (page 107)

## Add groups

1. At the top of the page, click Add Group.

A new row appears at the top of the current page.

| Click here to enter a group title |  |
| :--- | :--- |
| (a) Click here to enter a description | Ndd Control |
|  |  |

2. Name the group.
3. Define the group properties in the property pane according to your needs.
4. Add controls into the group according to your needs.

Adjust group properties
The property pane allows you to modify the selected group.

1. Click the group, and go to the property pane.
2. Adjust the properties according to your needs.

The group properties consist of the following components:

| Property name |  |
| :--- | :---: |
| Appearance |  |
| Title | Description |


| Property name | Description |
| :--- | :--- |
| Enable if | Determines whether the group is <br> enabled or not. |
| TIP To always enable the group, <br> leave the field empty. <br> To disable the group, type 0 in <br> the field. |  |
| Hide if disabled | To define a group or control on which <br> the current group is dependent, type <br> the name of the control or group in <br> the Enable if field. |
| Single page | Determines whether the group is <br> viewed in the interface when it is <br> disabled. |
|  | Determines whether the entire group <br> is placed on the same page of the <br> interface. |

## Delete groups

1. Select the group that you want to delete.
2. In the Interface Designer toolbar, click Delete.

## Page items

Page items, or page library items, display a calculation library item to assist the user during the calculation. Page items can be sketches, notes, or even calculations.

NOTE The following only applies to Tedds for Word.

## See also

Pages (page 107)
Data views (page 120)

## Add page items

1. In the Page properties property pane, go to Layout.
2. Click the ... button on the right side of the property field.

The Select Page Layout dialog box appears.

3. Select a page layout that allows page items. For example, layout 10 includes an area for page items.
4. On the page, double-click the area labeled Click to select page item.

The Select Calc Library dialog box appears.
5. Select the item that you want to display in the interface.
6. Click OK.

## View page item properties

To modify a page item and view its properties, see the following instructions.

1. Select the page item.
2. In the Page properties, click the arrow on the left side of the Page library items property.

| Page Properties |  |  |
| :--- | :--- | :--- |
| $\checkmark$ Appearance |  |  |
| Name |  |  |
| Title | Back Next Cancel |  |
| $\gg$ | Buttons | True |
| Undo on cancel |  |  |
| $\checkmark$ Library Items |  |  |
| $>$ | Notes library item |  |
|  | Page library items |  |
|  | Sketch library item |  |

3. Double-click the desired page item.

The properties of the page item appear.

| $\checkmark$ | Page library items | \$(UserLbrDir)Steel beam analysis.Ibr\|Example, \$ |
| :---: | :---: | :---: |
|  | $\checkmark$ Page library item 1 | \$(UserLbrDir)Steel beam analysis.Ibr\|Example |
|  | $\checkmark$ Display | Library item |
|  | Calculate as expression | False |
|  | $\checkmark$ Library | \$(UserLbrDir)Steel beam analysis.Ibr |
|  | Calculate as expression | False |
|  | $\checkmark$ Library item | Example |
|  | Calculate as expression | False |
|  | Update if |  |

See the different page item properties in the following table:

| Property name | Description |
| :--- | :--- |
| Display | Determines whether the item is a sketch, a beam analysis <br> sketch, a calculated library item, or a non-calculated <br> library item. |
| Library | Views and allows you to modify the library where the page <br> item is stored. |
| Library item | Views and allows you to modify the page item. |
| Calculate as <br> expression | Determines whether the value in the Display, Library, or <br> Library item field should be calculated as an expression. |
| TIPTo indicate that the property should be calculated as <br> an expression, you can type = in the field of the <br> property. |  |


| Property name | Description |
| :--- | :--- |
| Update if | Allows you to create an expression that determines <br> whether the page item view is updated when the user <br> modifies the values of input controls. <br> If the value of the expression in the Update if field is True, <br> the page item view is updated. |
| TIPTo always update the preview, leave the Update if <br> field empty. |  |

## Delete page items

1. Select the page item that you want to delete.
2. Click the arrow on the left side of Page library items property to view page item properties.
3. Clear the Library and Library item fields.

## Data views

Data views display a library item that assists the user during a calculation. Data views differ from page library items only in that data views can be displayed on custom templates, whereas page library items can only be displayed on standard template layouts. For more information on data views, see the following paragraphs.

## NOTE The following only applies to Tedds for Word.

## See also

Pages (page 107)
Page items (page 117)

## Add data views

1. In the Interface Designer toolbar, click the arrow on the right side of the Output button.
2. In the list that appears, select Data view.

## Adjust data view properties

- Use the property pane to define and modify a data view.

| Data View Properties |  |  |
| :---: | :---: | :---: |
| $\checkmark$ | Appearance |  |
|  | Name | Beam analysis data view |
| $>$ | Display | Library item |
|  | Update if |  |
|  | Update order | With output controls |
| $\checkmark$ Library Items |  |  |
| $>$ | Library | \$(UserLbrDir)Steel beam analysis.lbr |
| $>$ | Library item | Beam analysis example |

See the properties of the Data view properties property pane in the following table:

| Property name | Description |
| :---: | :---: |
| Appearance |  |
| Name | The name that you assign to the data view. |
| Display | Determines whether the item is a sketch, a beam analysis sketch, a calculated library item, or a noncalculated library item. |
| Update if | Allows you to create an expression that determines whether the data view is updated when the user modifies the values of input controls. |
|  | If the value of the expression in the Update if field is True, the data view is updated. |
|  | TIP To always update the preview, leave the Update if field empty. |
| Update order | Determines whether the preview of the data view is updated with input controls or output controls. |
| Library items |  |
| Library | Allows you to select the calculation library where the item is stored. |


| Property name | Description |
| :--- | :--- |
| Library item | Allows you to select the library item <br> that is viewed in the data view area. |

Delete data views

1. Select the data view that you want to delete.
2. On the Interface Designer toolbar, click Delete.

## Create a custom page template

If none of the standard page templates suits your needs, you can create a custom page template for your interface. In order to do so, see the following instructions.

NOTE The following only applies to Tedds for Word.

## See also

Pages (page 107)

## Open the Template Designer

1. In the interface, select the page for which you want to create a custom template.
2. In the Page properties property pane, set the value of Custom to True.
3. Go to the Layout.
4. Click the ... button on the right side of Layout.

The Template Designer dialog box opens.

## Modify page layout



NOTE The cells of the Template Designer dialog box represent and are referred to as control locations.

- Use the Tab order option to define the order in which the Tab key moves between the controls of the interface.

1. Click Tab order.
2. Click the control locations in the order which the Tab key should move between the controls.

A number indicating the ordinal number of the control appears on the right side of the row number.

TIP To change the ordinal number of a control, type the desired ordinal number in the box on the right side of Tab order.

- In the Columns box, define the number of columns in the layout according to your needs.


## Modify control locations

- To resize a control location, click the edge of the desired control location and drag it according to your needs.

- To move a control location, select the control location and drag it to the desired blank space.


NOTE The blank space must be at least as many columns wide as the control location that you want to move.

- To delete a control location, select the control location and press Delete.


## Create an example interface

The following images and instructions illustrate how you can create user interfaces in Tedds.

NOTE The following only applies to Tedds for Word.

## Example interface (SI units)



## Example interface (US units)



## 1. Create a new interface

1. In the Insert ribbon group, click User Interface.

The Manage User Interfaces dialog box appears.

2. Select where you want to insert the user interface and click New.

The Tedds Interface Designer window opens, displaying an empty interface template.
2. Define the interface title, page title, and buttons

1. Click the Interface Title field at the top left corner of the interface.
2. In the field, type Steel Section Tie.
3. Press Enter.
4. Click the Click here to enter a page title field at the top right corner of the interface.
5. In the field, type Design .
6. Press Enter.
7. Go to the property pane.
8. In Buttons, select the Back Finish Cancel option.

## 3. Select the page layout

The example interface only requires 5 controls, so you can use a single interface page with a basic layout. Do the following:

1. In the Page properties property pane, go to Layout.
2. Click the ... button on the right side of the Layout property. The Select Page Layout dialog box opens.
3. Double-click to select the $\mathbf{0}$ [14 Controls] option.

## 4. Create page description

1. Click the Click here to enter page information field.
2. In the field, type Enter tie details.

## 5. Create the first control

To create the example interface, you have to add five different controls. First, define the Minimum yield strength control. Do the following:

1. On the current interface page, click Add Control.
2. Click the Click here to enter a description field, and in the field, type Minimum yield strength
3. Press Enter.
4. In the Name field (either in the property pane or on the current page), type Fy.
5. To use subscript in the variable name, highlight the letter y and click the $\mathbf{X}_{\mathbf{2}}$ button on the right side of the Name field.

The variable is now $F_{y}$.
6. Press Enter.
7. Click Units on the right side of the Default field and then, click the u Units button.

A unit list appears.
8. Depending on the units that you want to use, in the unit list, do one of the following:
a. Go to SI Units --> Stress/pressure and select $\mathbf{N} / \mathbf{m m}^{\mathbf{2}}$.
b. Go to US units --> Stress/pressure and select ksi.
9. Click the Default field, and in the field, define the default value as 275 (for $\mathbf{N} / \mathbf{m m}^{\mathbf{2}}$ ) or 36 (for $\mathbf{k s i}$ ).

The first control should now appear as follows:
SI units:

US units:

## 6. Create the remaining controls

1. Create the remaining controls according to the 5. Create the first control instructions. The properties for the remaining 3 controls are the following:

| Descri <br> ption | Variable name | Units (SI) | Units (US) | Default value |
| :--- | :--- | :--- | :--- | :--- |
| Design <br> tension | $F_{t}$ | kN | kips | Not applicable |
| Design <br> compr <br> ession | $\mathrm{F}_{\mathrm{C}}$ | kN | kips | Not applicable |
| Slende <br> rness <br> limit | $\lambda_{\mathrm{L}}$ | TIPTo access <br> greek <br> characters, <br> click the <br> Name field <br> and then click <br> the $\alpha:$ button. | Not applicable | Not applicable |


| Descri <br> ption | Variable name | Units (SI) | Units (US) | Default value |
| :--- | :--- | :--- | :--- | :--- |
|  | In the Name <br> field, type the <br> corresponding <br> roman <br> character (in <br> this case, L). |  |  |  |

2. To create a check box, in the toolbar, click the arrow on the right side of Input.
3. In the menu that appears, select Check Box.
4. Define the check box properties as follows:

| Descri <br> ption | Variable name | Default value | Checked Value | Unchecked <br> Value |
| :---: | :--- | :--- | :--- | :--- |
| yieldin <br> g tie | yielding | 1 | 0 | 1 |

## 7. Change the tab order of controls

By default, the user interface tabs between controls in the order that they were created. To change the tab order, do the following:

1. Click the yielding tie control to adjust its properties.
2. On the toolbar, click Move up twice.

The yielding tie control moves above the Design compression control.

## 8. Condition the Design compression control

In the example, if the yielding tie check box is selected, the Design compression control should be disabled. To achieve this, do the following:

1. On the interface page, click the Design compression control.
2. Go to the property pane.
3. In the Enable if field, type the name of the check box that the control depends on (yielding).

## 9. Use a custom template

If necessary, you can create a custom template to adjust the interface layout according to your needs. For more information, see: Create a custom page template (page 122).

## 10. Test and finalize the interface

1. In the toolbar, click Close.
2. In the calculation document, select and calculate the interface.
3. Ensure that each control works as intended.

TIP If you need to modify the interface, do the following:
a. In the Insert ribbon group, click User Interface.

The Manage User Interfaces dialog box appears.
b. In the Existing list, select the interface that you want to modify.
c. Click Edit.

The Tedds Interface Designer window opens, displaying the selected interface.

## Sketch Viewer

The Sketch Viewer tool in Tedds for Word allows you to easily modify your sketches. The modified sketches can be pasted back into your calculation documents. When you paste the sketches in your calculations, the size and shape of the sketches are automatically maintained.

RESTRICTION The Sketch Viewer is only available in Tedds for Word.
Some calculations automatically produce sketches for you. The sketches of these calculations will be appear in the Sketch Viewer. According to your needs, you can either decide to insert the sketches in your calculations or leave them out.

In addition to opening the sketches of existing calculations, the Sketch Viewer allows you to create your own sketches and modify them.

You can start the Sketch Viewer in two different ways, depending on whether you want to open it without a sketch, or modify an existing sketch. See the following instructions:

## Open the Sketch Viewer empty

If you do not have a sketch which you want to modify, follow the instructions below.

- In the Tools ribbon group, click More --> Sketch Viewer.

The Sketch Viewer window opens.

## Open an existing sketch in the Sketch Viewer

1. In your calculation document, select the frame that contains the sketch.
2. In the Tools ribbon group, click More --> Sketch Viewer. Sketch Viewer displays the selected sketch in a new sketch window.

## See also

Components of the Sketch Viewer window (page 130)
Adjust the view of a sketch (page 133)
Transfer a sketch to the Sketch Viewer (page 132)
Copy a sketch to your calculations (page 134)
Open a new sketch window (page 132)
Close sketch windows (page 135)

## Components of the Sketch Viewer window

Knowing the main components of the Sketch Viewer window can help you work with the tool more efficiently. See the main components of the Sketch Viewer window in the following paragraphs.

NOTE The following only applies to Tedds for Word.


1. File menu
allows you to, among other things, create new sketches, open existing sketches, and save sketches.
2. Sketch Viewer toolbar
allows you to access the most common features of the Sketch Viewer with a single click.

For more information, see Sketch viewer toolbar.
3. Sketch windows
are windows that contain separate sketches.

## See also

Sketch Viewer (page 129)
Adjust the view of a sketch (page 133)
Transfer a sketch to the Sketch Viewer (page 132)
Copy a sketch to your calculations (page 134)
Open a new sketch window (page 132)
Close sketch windows (page 135)

## Open a new sketch window

You can open a new window that contains another sketch or another copy of a currently open sketch. In the latter case, you can manipulate each sketch independently. You can transfer each version of the sketch back to your calculation document without it affecting the other version. In order to open a new sketch window, see the following instructions.

NOTE The following only applies to Tedds for Word.

## - Click Paste new.

The Sketch Viewer opens a new window. The new window contains a copy of the current sketch.

## See also

Adjust the view of a sketch (page 133)
Transfer a sketch to the Sketch Viewer (page 132)
Close sketch windows (page 135)

## Transfer a sketch to the Sketch Viewer

With the Sketch Viewer, you can transfer and manipulate a file in the Windows Enhanced Metafile (EMF) format from either your document or a disc. In addition, you can transfer images from the clipboard to the Sketch Viewer, provided that the images are placed on the clipboard in the correct format.

NOTE The following only applies to Tedds for Word.

NOTE The transferred sketches must be in Windows Enhanced Metafile (EMF) format, and are exported from the Sketch Viewer in the same format.

## Transfer a picture from your document

1. Ensure that the Sketch Viewer is open.
2. In your document, select the frame containing the sketch that you want to transfer.
3. In the Tools ribbon group, click More --> Sketch Viewer.

The Sketch Viewer displays the selected sketch in a new sketch window.

## Transfer objects from your document

1. Ensure that the Sketch Viewer is open.
2. In your document, double-click the picture that you want to view.
3. Select the objects you want to place in the Sketch Viewer.
4. Right-click the objects and select Copy.
5. Click the Sketch Viewer window to activate it.
6. Do one of the following:

- To paste the objects to the currently open sketch, on the toolbar, click Paste.
- To paste the objects to a new sketch window, on the toolbar, click Paste new.

Tedds transfers the selected objects to the Sketch Viewer.

## Adjust the view of a sketch

When the Sketch Viewer opens or a new file is transferred to Sketch Viewer, the sketch is viewed completely filling the sketch window while maintaining the sketch's aspect ratio. However, you can adjust the view of a sketch according to your needs. For detailed instructions, see the following paragraphs.

NOTE The following only applies to Tedds for Word.

## Change the view option

- On the toolbar, select one of the following view options:
- Zoom to fit: returns the sketch window to its original display state, with the sketch at the maximum size at which it fits the window
- Zoom in
- Zoom out
- Zoom previous: returns the sketch window to the previous display state


## Change the background color

1. Click Settings.

The Options - Default dialog box opens.

2. Click Select...
3. Select the color that you want to use as the background color of sketches.
4. Click OK.

The background color is saved.

## Move the sketch

1. On the toolbar, ensure that the Move button is selected.
2. Move the mouse pointer to the point of the sketch that you want to move.
3. Hold down the left mouse button and drag the selected point to the desired location.
4. Release the left mouse button.

## Copy a sketch to your calculations

You may want to insert a copy of your sketch to your calculation document. To copy a sketch from the Sketch Viewer, see the following instructions.

NOTE The following only applies to Tedds for Word.

1. Adjust the view of the sketch according to your needs.
2. On the toolbar, click Copy.

A bitmap representation of the current view of your sketch is copied to the clipboard.
3. Paste the sketch to your calculation document.

## See also

Transfer a sketch to the Sketch Viewer (page 132)

## Close sketch windows

Once you are finished working with sketches, you can close the open sketch windows. For detailed instructions on how to close sketch windows, see the following paragraphs.

NOTE The following only applies to Tedds for Word.

## Close a sketch window

1. Select the sketch that you want to close.
2. Click $\mathbf{X}$ at the top right corner of the sketch tab.

## Close all sketch windows

- Click $\mathbf{X}$ at the top right corner of the Sketch Viewer window.


### 4.5 Configuring settings

This section covers a series of options that you can set to configure Tedds according to your needs. The options are available in the Options - Default dialog box.

To access the Options - Default dialog box, do one of the following:

## In the Tedds Application:

- On the Home tab, click Options.

In Tedds for Word:

- In the Tools ribbon group, click More --> Tedds options .


## Startup options

Startup options allow you to determine how Tedds starts. For more information, see the following paragraphs.

## Automatically start the most recently selected application

If you select this option, when you start Tedds, either Tedds or Tedds for Word starts automatically, depending on which version you have last used.

## When Tedds starts

The When Tedds starts option allows you to select how you want Tedds to start. The option does not apply to Tedds for Word.

- Select Open Start page to automatically display the Tedds Start Page.
- Select Select a new calculation to automatically display the Select calculation dialog box.
- Select Do nothing to simply open Tedds without displaying the Tedds Start Page or the Select calculation dialog box.


## Load method

NOTE To avoid any damage, do not modify the Load method option unless you are advised otherwise by the Tedds technical support team.

The Load method option allows you to change the method which is used to load the Tedds for Word add-in.

## Always load the Tedds loader in Word

WARNING To avoid any damage, do not modify the Always load the Tedds loader in Word option unless you are advised otherwise by the Tekla technical support team.

The Always load the Tedds loader in Word option allows you to use all Tedds commands when you open a Tedds for Word document in Microsoft Word, even when you do not start Tedds for Word separately.

## Always show the Tedds tab on the ribbon in Word

If you select the Always show the Tedds tab on the ribbon in Word option, Microsoft Word always displays the Tedds tab, even when you do not start Tedds for Word separately.

## Environment options

The environment options allow you to, for example, specify the default file location (in the Tedds Application), or view both SI and US units on the Tedds ribbon (Tedds for Word).

## Environment options (the Tedds Application)

The Default file location option sets the default location to which calculations will be saved.

The Recent Files option allows you to adjust the number of recent files displayed on the Tedds Start Page.
The Recent Calculations option allows you to adjust the number of recent calculations displayed on the Tedds Start Page.

## Environment options (Tedds for Word)

If you select the Show Tedds Developer tab option, you get access to the advanced applications and utilities that the Tedds development team uses.

WARNING Many Tedds developer tools require an extensive knowledge of writing Tedds calculations.
To avoid any damage, the Tedds developer tools should not be used by an unaccustomed user.

If you select the Show Tedds Template designer tab option, you get access to tools that enable creating and modifying calculation templates.

The Show both SI and US units on ribbon allows you to display both SI and US units on the Tedds ribbon, so that you can easily insert both units into your calculations.

## See also

## Document templates (page 71)

Create new calculation templates (page 78)
Modify the header or footer of a calculation template (page 75)

## Document options

Document options allow you to change the default document template, the default header logo, default company details, and the default date format. For further information on document options, see the following paragraphs.

## Template options

In Template options, you can change the default template and header logo of a document.

## Default Document Template

The Default Document Template option allows you to change the default template that you use for your calculation documents.

- Click Select... to browse the calculation template that you want to use as the default template.
- Click Use Current (Tedds for Word only) to use the current calculation template as the default template.
- Click Edit... to modify the selected default document template.


## Default Document Header Logo

The Default Document Header Logo option allows you to change the default logo of your documents, which is located in the document header.

In the Tedds Application, you must also select between the two following logo options (the Tedds Application only):

- Link to logo file: creates a link to your logo file, so that any changes to the logo are applied to the header as well.
- Embed logo in document: embeds the logo in the document, so that the current logo is maintained even if the source file changes.
The Scale option (the Tedds Application only) allows you to scale the logo to fit the template.


## Header options

In Header options, you can change the default company details and the default date format of your calculation documents.

## Default Header Properties

The fields under Default Header Properties allow you to type and change the default company details in your document header.

## Date Format

The Date Format option allows you to change the date format that is used in your calculation documents.

## View options (the Tedds Application only)

The view options in the Tedds Application settings allow you to adjust the way your calculations are displayed by default.

## Default to show

Select the options that you want to view in your calculation documents by default. The available options are:

- Hidden text
- Semicolons

For more information, see View hidden text, semicolons, or variables (page 62).

## Default zoom

This option allows you to adjust the default zoom level of calculation documents.
For more information, see Adjust the zoom level (page 63).

## Send To options (the Tedds Application only)

The send to options in the Tedds Application allow you to adjust the transfer of your Tedds calculations to Microsoft Word or Tedds for Word, or via email.

## Word page

Select how you want to send your calculations to Microsoft Word. The options are:

- New document: to create a new document for the calculation,
- Append to active document: the calculation is added to the end of the current document,
- Insert in active document: the calculation is placed within your current document at the position of the mouse pointer.

NOTE If you select Append to active document or Insert in active document, but have no document open, a new document will be created.

If the send to process needs to create a new document you can specify the Word template that you want it to use. If you don't select a specific template a blank document will be used.

NOTE Do not select a Tedds for Word template here, or the sent file will also require Tedds for Word to run.
If you do want to send a calculation from the Tedds Application to Tedds for Word, then use the Send To --> Tedds for Word command instead.

## TEDDS for Word page

Select which Tedds for Word template to use when you send your Tedds calculations to Tedds for Word. Ensure that you select a Tedds for Word template otherwise the Tedds for Word document will not contain the settings needed to run the calculations.

## Email page

NOTE The Embed header logo in document option is only effective if you have selected the Link to logo file option in the Document options (page 137).

- If you select Embed logo in document, Tedds embeds the logo in the calculation document before it sends the email.
- If you do not select this option, Tedds maintains the current link details. In this case, the recipient of the email will only see the logo if the logo file already exists in the same directory location on their computer as on yours.


## Save options

These determine the options used when saving PDF files (Tedds, Tedds for Word, batch design).

## Convert Enhanced Metafile Plus (vector images) to Bitmaps

Drawings created in Tedds calculations use the vector format Enhanced Metafile Plus (EMF+) which provides the richest feature set and quality. However when documents are saved in PDF format not all of the vector information which is supported by an EMF+ image can be converted accurately to PDF format. To ensure that the integrity of the image is maintained this option can be enabled which will convert the image to a raster bitmap at a fixed resolution. The disadvantage of enabling this option is that the original vector images will not be scaled according to the final print quality and therefore may in some circumstances appear pixelated.

## Bitmap quality

When Convert Enhanced Metafile Plus (vector images) to Bitmaps is enabled this option will determine the size of the bitmap image which is generated. The Low setting will create a drawing which is equivalent to 96 dpi. Good will increase the scale of images by 100\%, High will increase the scale of images by 200\%. When images are scaled the improved resolution comes at the expense of a larger PDF file.

## Calculating options

Calculating options allow you to control how Tedds performs calculations.

## See also

General calculating options (page 140)
Sketch options (page 142)
Result options (page 143)
Progress options (page 144)
Regional settings (page 145)
Error options (page 146)
Beam analysis options (page 146)
Calc item options (page 147)
Debugging options (page 147)

## General calculating options

General calculating options allow you to adjust the way in which Tedds performs certain calculations.

## See also

Dimensional analysis (page 519)
Data lists (page 414)
Data tables (page 419)
Data graphs (page 428)

## General

General options allow you to select whether Tedds performs dimensional checks and how Tedds reacts to different variable errors, calculation errors, and cancelling a calculation process.

- The Perform dimensional checks option allows you to select whether you want Tedds to perform dimensional analysis on your variables to ensure that they have the right dimensions.
- The Prompt on calculation error option allows you to select whether you want Tedds to display a dialog box notifying you about a calculation error whenever it encounters one.
- The Error on undefined variable option allows you to select whether you want Tedds to consider an undefined variable an error, or proceed with the calculations despite the undefined variable.
- The If calculating is cancelled option allows you to select how you want to proceed when calculating is cancelled.


## Tedds Input fields

Tedds Input fields options allow you to determine whether Tedds displays Input dialog boxes in your calculations or not.

- The Default option allows you to select the default action that is executed to Input dialog boxes unless you determine otherwise while creating a particular Input field.
- The Replace 'Display always' and 'Display only if variable not defined' with this default option option allows you to remove the opportunity to use some of the other display options, and replace the options with the Default option determined above.


## Engineering data tools

Engineering data tools options allow you to determine which engineering data tools are displayed in your calculations.

Select the boxes of the data tools that you want to view in your calculations. The options are:

## - Show Data lists

- Show Data tables
- Show Data graphs


## Sketch options

Sketch options allow you to adjust the settings that are connected to viewing and adding sketches in your calculations.

## See also

Sketch Viewer (page 129)
Copy a sketch to your calculations (page 134)

## Sketches

The options under Sketches allow you to change the alignment of sketches, and determine whether transparent fills are allowed in sketches.

## Alignment

The Alignment option allows you to select how sketches in Enhanced Metafile format should be aligned in your calculation documents.

## Transparent fills

Some printer drivers and PDF export tools may have difficulties handling transparent items, which may lead to poor quality sketches being output. The Transparent fills option allows you to determine whether Tedds should use transparent fills in sketches.

The options are:

- Allow
which is the default option, allowing transparent fills.
- Substitute solid transparent fills with hatch patterns
which replaces transparent fills with a hatch pattern. This option may resolve the problems of using transparent fills.
- Draw shape outline only
which ignores transparent fills, so only the outline of the shape is drawn.


## Maximum output size

The Maximum output size option allows you to determine when and how much Tedds should scale a sketch or a calc library item, so that it fits in your
calculation document. The Maximum output size indicates how many percent of the page the sketch or library item can occupy.

You can adjust the maximum output size by typing the appropriate percentages in the of page width and of page height boxes or by using the arrows on the right side of each box.

## Result options

Result options allow you to change the formatting of both intermediate and final results.

## See also

Result formats and precision (page 523)

## Results

In the Results section, you can select how Tedds views your results.

## Use paragraph style

Select the Use paragraph style option if you want results to look like the other text in the same paragraph of your calculations.

## Use following style

Select the Use paragraph style option if you want to define a distinctive style for the results in your calculations.
Using a distinctive style may be helpful in seeing exactly which parts of your calculations have been previously defined and which parts have been generated as a part of a calculation. To define a distinctive style for results, click Font.

## Intermediate results (=\#)

In the Intermediate results (=\#) section, you can adjust the format, precision, and levels of intermediate results.

## Default format

The Default format option allows you to select the default format in which you want Tedds to display the intermediate results of your calculations. For more information on result formats, see Result formats and precision (page 523).

## Default precision

The Default precision option allows you to select the default precision which you want Tedds to use for your intermediate results. For more information on result precision, see Result formats and precision (page 523).

## Show results up to [ N ] levels deep

The Show results up to [ $\mathbf{N}$ ] levels deep option allows you to determine how many levels of intermediate results you want to see in your calculations, providing that the calculations have multiple levels of intermediate results.

## Final results (=?)

In the Final results (=?) section, you can adjust the format and precision of final results, and determine whether final results are underlined in your documents.

## Default format

The Default format option allows you to select the default format in which you want Tedds to view the final results of your calculations.
For more information on result formats, see Result formats and precision (page 523).

## Default precision

The Default precision option allows you to select the default precision which you want Tedds to use in your final results.

For more information on result precision, see Result formats and precision (page 523).

## Underline result

Select the Underline result option if you want Tedds to underline all final results in your calculation documents.

## Progress options

Progress options allow you to determine how Tedds views the progress of calculations. See the possible options in the following paragraphs.

If you select the None option, Tedds does not view any information on the progress of your calculations.

If you select the Simple progress window option, Tedds views a simple progress bar that indicates how far through the calculations you are.


If you select the Detailed progress log window, Tedds will view the Progress Log. The Progress Log gives you brief details on the calculations during the calculation process.


- Clear when starting calculations

If you select this option, Tedds clears the Progress Log when it starts a new calculation process.

Otherwise, the Progress Log adds the details for new calculations to the end of the log.

- Hide when calculations have finished

If you select this option, Tedds only shows the Progress Log while calculations are running, and closes the Progress Log when the calculation process ends.

## See also

The Progress Log (page 377)

## Regional settings

Regional settings allow you to control the locale whose calculation settings, units, and number and expression formats you want to use.

## See also

Units (page 526)

## Locale

The Locale list allows you to select the locale whose calculations and data you want to use.

## Default calculation settings

The Default calculation settings allows you to select a country, so that Tedds can set the most appropriate defaults for particular calculations.
For example, if you select Ireland, Eurocode calculations will default to the Irish National Annex where appropriate.

## Base units

Depending on the locale that you have selected, the Base units option may allow you to select whether you want to use SI units or US units. The selected units are used in storing your variable values, and as default units for variable values.

NOTE You can use both SI units and US units in your calculations, regardless of which units you have selected as base units.

## Number and expression format

The Number and expression format option controls the characters that Tedds uses for the decimal symbol, the list separator, and the expression terminator.

WARNING If you change the Number and expression format option manually in the list, any existing calculations will most probably stop working. Instead, we recommend that you select the correct area in the Locale list.

## Error options

Error options allow you to determine how Tedds views errors in your calculations.

## Use paragraph style

Select the Use paragraph style option if you want calculation errors to look like the other text in the same paragraph of your calculations.

## Use following style

Using a distinctive style for your results helps you locate an error that has occurred in your calculations.
If you want to define a distinctive style for the errors in your calculations, select the Use following style option.
To define a style for errors, click Font.

## See also

Find errors (page 376)

## Beam analysis options

Beam analysis options allow you to select how the positive moment in bending moment diagrams in indicated.

The Draw bending moment diagrams showing positive bending option allows you to select how you want Tedds to indicate positive bending in bending moment diagrams.

According to your needs, select downwards or upwards.

## See also

2D analysis (page 434)

## Calc item options

Calc item options allow you to determine which properties of library calc items that Tedds inserts in your calculations.

The When calculating a library calc item a reference will usually be included at the end of the item's output which includes the following properties for that item option allows you to determine which properties Tedds inserts in your calculations.
The options are:

- None
- All
- Default
- Custom

The fields below the option illustrate which details of an item are displayed when you select an option.

## See also

Library Access System (page 81)

## Debugging options

These tools may be used by our support teams when resolving specific calculation issues.

Debugging

## Debug mode

Debug mode changes how some functions and calculations behave in order to assist the diagnosis of errors (bugs) when writing custom calculations. Some calculations may alter their behaviour when debug mode is enabled, therefore debug mode should always be disabled when producing final output calculations.

## Log all expressions

When calculating is in progress, tracing will log messages that help you to monitor the execution sequence of your calculations, to detect malfunctions. The messages that tracing produces appear in the Progress Log window therefore the Progress Log must be enabled to read the messages.

## Delete temporary variables when finished calculating

Normally when the calculation process has finished all variables which have the temporary attribute enabled will be automatically deleted, enableing this options prevents them from being deleted.

## Cache Calc Libraries

Normally during the calculation process when a Calc Library is opened it will remain open until the calculation process has finished in order to improve the speed of calculating. When a library is open in the cache it cannot be modified therefore if you want to to modify calculations whilst they are running you can disable this setting.

## Cache data lists

Normally during the calculation process to improve performance when a document is re-calculated data lists which are opened are retained in memory. This option should only be enabled when modifying data list files so that the changes are used when a document is next calculated.

## Use legacy steel section datalist files (.dls)

Normally during the calculation process steel section data lists are loaded from the steel section database and the data list is created in memory, the legacy .dls files are not used. Enabling this option will cause the steel section data lists to be loaded from the legacy .dls files. To ensure optimum performance this option should not normally be enabled.

## Calculation User Interfaces

## Enable progress log when calculating preview items

In calculation user interfaces which include a preview window for showing results the progress log is normally disabled whilst the preview window is updated, if you need to debug the calculations used to update the preview results then you can disable this setting.

## Show calculation options

When enabled a button is added to the toolbar in calculation user interfaces which allows you to access the calculation options dialog.

## Show QuickCalc

When enabled a button is added to the toolbar in calculation user interfaces which allows you to show the QuickCalc window. The QuickCalc window can be
used to execute expressions whilst the calculations user interface is running in order to query or modify the processing of the calculation.

## Dialog options

Dialog options allow you to adjust the Variables dialog box. You can determine which variable details you want to view, how the values of variables should be expressed, and how the variables should be sorted.

## Variables

The Variables options allow you to select which properties of variables you want to view.

## Show value type column

Select the Show value type column option if you want to include a column identifying the value type (number, string, or column) in the Variables dialog box.

## Show attributes column

Select the Show value type column option if you want to include a column identifying the attributes (temporary, hidden, or promoted) of the variable in the Variables dialog box.

TIP Having the Show attributes column option selected can be helpful when you try to find out why a particular calculation is not working correctly.

## Values

The Values options allow you to define the format and decimal places which you want to use when defining the values of variables.

## Format

The Format option allows you to select the format in which the values are viewed. For more information on result formats, see Result formats (page 523).

## Decimal places

The Decimal places option allows you to determine to how many decimal places the values are viewed.

## Sorting

The Sorting options allow you to determine whether Tedds takes into account the case and formatting of variable names in the Variables dialog box.

## Ignore case

The Ignore case option allows you to determine that Tedds considers variable names such as $B$ and $b$ the same variable.

## Ignore formatting (Greek/superscript/subscript)

The Ignore formatting (Greek/superscript/subscript) option allows you to determine that Tedds considers variable names such as $B 1$ and $B_{1}$ the same variable.

## Setup options

Setup options allow you to control various settings, such as where calc indexes and calc libraries are located and whether you want to download and install updates to Tedds.

## Application data options

Application Data options allow you to control the default location where System and User data is stored (settings files that affect the behavior of Tedds).

Application Data options contain two tabs, User and System. The System location is not editable and is only included for reference. Currently the only files stored in the User location are user defined system variable files which can be used to override the system defined system variables.

## Calc index options

Calc Index options allow you to control user indexes and view system indexes.
Calc Index options contain two tabs, User and System. Although both tabs contain the same options, you can only change the options on the User tab.

## See more

Library Access System settings (Tedds for Word only) (page 154)
System and user libraries (page 542)
Index directories
The Index directories option allows you to add or delete calc indexes.

## Name

The Name field allows you to change the name of the selected calc index.

## Directory

The Directory field allows you to determine where Tedds saves the user indexes that you want to use.
To change the directory, type the new directory in the box, or click Browse...

## Priority

The Priority option allows you to determine in which order the indexes appear in the Index directories list. The indexes whose priority is 1 appear the highest, the indexes whose priority is 2 appear the second highest, and so on.

## Merge all filed into a single set

Select the Merge all files in directory into a single set option if you want all of the items of the index to be in the same set.

## Calc library options

Calc library options allow you to change the location of user and system libraries.

## User

In the User field, you can specify the location of your user libraries. You can either type the new location in the field, or click Browse... to select the correct directory.

NOTE By having system and user libraries in different locations, you can easily avoid confusing the two library types. We do not recommend using the same location for your system and user libraries.

## System

To change the location of system libraries, see Frequently used procedures in creating system libraries (page 546).

## See also

Library Access System (page 81)
System and user libraries (page 542)
Library Access System settings (Tedds for Word only) (page 154)

## Calc project options

The Calc Projects options allow you to view and adjust the location where Calc Projects are stored (source files for writing calculations, e.g. Calc designer .cdd
flow chart files and Interface Designer .tid files), this setting is used by the Calc Designer, Interface Designer and the Library Access System.

## Calc document options

The calc document options allow you to view and adjust the location where Tedds saves your calculations documents.

## Calc Document Directory

In the Calc Document Directory field, you can determine where Tedds saves the calculation documents that you create.
You can either type the location in the field, or click Browse... to select the correct directory.

## Excel workbook options

Excel workbook options allow you to access Excel workbooks if you need them in your calculations in Tedds. In addition, Excel workbook options allow you to control the locations of the system and user Excel workbooks.

## User

In the User field, you can define the location of your user workbooks. You can either type the location directly in the User field, or click Browse... to select the correct directory.

NOTE We do not recommend using the same location for system and user workbooks.

## System

The System field displays the current location of the system workbook directory, which has been set automatically when installing Tedds.

## Update service options

Update service options allow you to define whether you want to download and install updates for Tedds, and how often Tedds checks for new updates.

## Enable update service

The Enable update service option defines whether you can update Tedds. If you only check the Enable update service option, you will have to update Tedds manually. To update Tedds manually, go to Help --> Check for updates.

## Check for updates when starting Tedds

If you select the Check for updates when starting Tedds option, Tedds will automatically check for critical updates every time you start the software.
If critical updates are available, Tedds will notify you, and you can select whether you want to install the updates.

## Only check once each day

If you select the Only check once each day option, Tedds will only check for critical updates once each day that you use the software.

## Check for non critical updates every [N] day(s)

The Check for non critical updates every [ $\mathbf{N}$ ] day(s) option allows you to define how often Tedds checks for non-critical updates. To define the number of days between each check, type the desired number in the field.

## Feedback options

Feedback options allow you to define whether you want to participate in improving Tedds. You can either give us direct feedback or allow us to collect data on your use of Tedds.

## Tedds Customer Experience Improvement Program

The Tedds Customer Experience Improvement Program option lets you define whether you want to allow us to collect information about your hardware and software configuration and how you use Tedds. The data is collected monthly, and used only to improve the quality, reliability, and performance of Tedds.

## NOTE The Update service option must be enabled so that you can participate in the Tedds Customer Experience Improvement Program.

## Feedback Survey

The Feedback Survey option allows you to determine whether you want to receive feedback surveys about Tedds or not. By default, we will automatically send you a feedback survey from time to time.

If you do not wish to receive feedback surveys, you can clear the Don't ask me again option.

If you have any concerns or suggestions in your mind, you can still click Start the Tedds feedback survey to give us feedback whenever you want to.

## Profile options

Profile options allow you to select whether you want to always use the same profile, or select a profile each time you start Tedds.

## Remember profile

The Remember profile option allows you to select whether Tedds remembers your user profile, or asks you to select a profile when you start Tedds.

- Select the Remember profile option to always use the same profile when you start Tedds.
- Clear the Remember profile to select a profile when you start Tedds.


## Library Access System settings (Tedds for Word only)

You can adjust Library Access System settings according to your needs. For more detailed information on Library Access System settings, see the following paragraphs.

NOTE The following only applies to Tedds for Word.

| Environment --> General settings |  |  |
| :---: | :---: | :---: |
| Setting | Effect in Simple mode | Effect in Advanced mode |
| Remember open sets | None | When selected, Library Access System opens the sets that you leave open the next time you start Library Access System. |
| Enable drag and drop | When selected, allows you to drag items from Library Access System and drop them into your documents. | When selected: <br> - Allows you to drag items from Library Access System and drop them into your documents. <br> - Allows you to use drag and drop when you create new sets, or modify existing ones. |
| Enable inplace editing of item names | None | When selected, allows you to rename a user library or a user set by double-clicking its name. |
| Confirm how to add solution and example items | When selected, adding a solution item (鱼) or an example item (른) displays the Insert Calc Item dialog box. |  |


| Environment --> General settings |  |  |
| :---: | :---: | :---: |
| Setting | Effect in Simple mode | Effect in Advanced mode |
|  | $\qquad$ <br> Choose Item <br> Choose how you want to inser document. <br> New document <br> Append to active document <br> Insert in active document <br> Add new Calc Sectio <br> Section properties $\square$ $\qquad$ that a calc in one section is section. <br> Don't ask me again <br> New document <br> Inserts the item document. <br> Append to acti <br> Inserts the item Word document <br> Insert in active <br> Inserts the item document at the <br> - Add new Calc S <br> Adds a new calc inserts the item <br> Insert page bre <br> Adds a page bre document imm | to a new Tedds for Word <br> document <br> the end of the current Tedds for <br> cument <br> the current Tedds for Word osition of the insertion point. <br> tion <br> ction where Tedds for Word <br> into your Tedds for Word ately before the new calc section. |
| Add items in a new paragraph | When selected, Ted break before and a calculation sheet. | for Word inserts a paragraph an item that it copies into your |
| Confirm selection in Word | None | When selected, Tedds for Word asks you to confirm that you have highlighted the correct part of your document when you are adding items into a library. |


| Environment --> General settings |  |  |
| :--- | :--- | :--- |
| Setting | Effect in Simple <br> mode | Effect in Advanced mode |
| Remove field <br> results in Word <br> before saving item <br> contents | None | When selected, adding your own <br> calculations to a library clears <br> any calculation results. Instead, <br> Tedds for Word only displays the <br> format settings. |
| Select format and <br> category of item <br> contents | None | When selected, adding your own <br> calculations to a library displays <br> the Paste special dialog box. In <br> the dialog box, you can select <br> which format you want to paste <br> the text in. |
| Update item <br> version from calc <br> set version | When selected, Tedds for Word updates the version of <br> an item to the same version as the calculation set that <br> it belongs to. |  |


| Environment --> Messages settings |  |  |
| :--- | :--- | :--- |
| Setting | Effect in Simple mode | Effect in Advanced <br> mode |
| Delete item from <br> set | None | When selected, <br> Tedds for Word asks <br> you to confirm that <br> you want to delete <br> the item from the <br> set. |
| Delete item from <br> library | None | When selected, <br> Tedds for Word asks <br> you to confirm that <br> you want to delete <br> an item from the <br> library. |


| Environment --> View settings |  |  |
| :--- | :---: | :---: |
| Setting | Effect in Simple mode | Effect in Advanced <br> mode |
| Font | Allows you to change the font used in the names of the <br> groups, items in your sets, or indexes. |  |
| NOTE If you select a font that does not contain all <br> the characters that a particular set / index <br> uses, any characters that are not in the font <br> are displayed as hollow boxes. |  |  |


| Setting | Effect in Simple mode | Effect in Advanced <br> mode |
| :--- | :--- | :--- |
| Information Tips | Allows you to select whether you want to see tips for <br> the icons used for calculation items, or further <br> information for a particular item. |  |
| Tedds for Word displays information tips when you <br> hover the mouse pointer over an icon or an item <br> name. <br> The setting also allows you to select the item tips that <br> you want to see. |  |  |
| Colours | Allows you to select colors for a specific elements in <br> the Library Access System window. <br> The elements are text, background, highlight text, and <br> highlight. The button on the right of each element <br> allows you to change the color. |  |


| Setup --> Calc index settings |  |  |
| :--- | :--- | :--- |
| Setting | Effect in Simple mode | Effect in Advanced <br> mode |
| Index directories | Displays a list of existing indexes. <br> When you click an entry in the Index directories list, <br> the dialog box displays its name, directory, and <br> priority. |  |
| Name | Displays the name of the selected index directory. |  |
| Directory | Displays the path of the directory that contains the <br> sets to be indexed. |  |
| Priority | Allows you to select the order in which items appear in <br> the list of indexes. |  |
| For instance, an item whose priority is 1 is higher in <br> the list of indexes than an item whose priority is 3. |  |  |
| directory into in a <br> single set | When selected, Library Access System creates a <br> single list of all the sets in the directory, showing the <br> root item in each set. |  |


| Setup --> Calculation libraries settings |  |  |
| :--- | :--- | :--- |
| Setting | Effect in Simple mode | Effect in Advanced <br> mode |
| User library <br> directory | The directory where Tedds for Word saves your user <br> libraries. <br> To change the location of user libraries, type the new <br> directory in the field, or click Browse.... |  |


| Setup --> Calculation libraries settings |  |  |
| :--- | :--- | :--- |
| Setting | Effect in Simple mode | Effect in Advanced <br> mode |
| System library <br> directory | The location of the system libraries, that was set when <br> Tedds for Word was installed. <br> To change the location of system libraries, see Change <br> the location of the System libraries directory <br> (page 548). |  |


| Setup --> Calc sets settings |  |  |
| :--- | :--- | :--- |
| Setting | Effect in Simple mode | Effect in Advanced <br> mode |
| User set directory | The directory where Tedds for Word saves your user <br> sets. <br> To change the directory, type the new directory in the <br> field, or click Browse... . |  |
| System set <br> directory | The location of the system libraries, which was set <br> when Tedds for Word was installed. <br> To change the directory, hold down Ctrl key and right- <br> click the dialog box twice. Then, type the new directory <br> in the field, or click Browse.... |  |


| Setup --> Update service settings |  |  |
| :--- | :--- | :--- |
| Setting | Effect in Simple mode | Effect in Advanced <br> mode |
| Enable update <br> service | When selected, Library Access System automatically <br> searches new updates to its libraries. |  |
| Check for updates <br> when starting <br> Tedds | When selected, Library Access System searches new <br> updates to the libraries each time you start Tedds or <br> Tedds for Word. |  |
| Only check once <br> each day | When selected, Library Access System searches new <br> updates once each day when you start Tedds or Tedds <br> for Word. |  |
| Check for non <br> critical updates <br> every [N] days | Allows you to set the frequency with which Library <br> Access System searches non critical updates to its <br> libraries. |  |

## Microsoft Word settings (Tedds for Word only)

To simplify creating your own calculations, we recommend that you adjust some Microsoft Word settings. See the detailed instructions for adjusting Microsoft Word settings in the following paragraphs.

NOTE The following only applies to Tedds for Word.

## Stop automatic capitalization

By default, Word capitalizes the first character of the first word of a paragraph or sentence. For calculations, this setting can be counter-productive. To stop automatic capitalization, follow the instructions below.

1. Go to File --> Options --> Proofing --> AutoCorrect options.
2. Ensure that the Capitalize first letter of sentences option is not selected.
3. Ensure that the Correct TWo INitial CApitals option is not selected.
4. Click OK.

## Set up AutoText

The AutoText feature of Word allows you to store and reuse formatted text (and graphics), accessing them through a few simple keystrokes. Therefore, AutoText may be useful when defining variable names and units.

1. Type the text that you want to save, and format it correctly. For example, $\mathrm{N} / \mathrm{mm}^{2}$
2. Highlight the formatted text.
3. Go to Insert --> Text --> Quick parts --> AutoText --> Save selection to AutoText gallery.

4. In the Name field, type the characters that you want to use to access the item.
5. Click Add.

To use the item, type the item name and press the F3 key.

## Use hidden text

Normally, the calculations that you type in your document are always visible. However, this may result in lengthy documents, since all intermediate calculations must be included for the calculations to work correctly. One solution to this problem is using hidden text in very simple calculations and commonly available items, such as section properties. Using hidden text may be challenging, and therefore, we recommend that you only hide calculations once you have tested them and are sure that they work correctly.

If you want to hide some of your calculations, you can use one of the predefined hidden paragraph styles such as Calc Script (Hidden) or Calc Script Heading (Hidden).
We recommend using the hidden paragraph styles to manage hidden text, because the Show/Hide --> Hidden Calcs does not effect any characters which you format individually.
To make any calculations using paragraph styles which end in the word Hidden visible, do the following:

- On the Tedds ribbon, click Show/Hide --> Hidden Calcs.

NOTE For the hidden text paragraphs to function as described, ensure that the following Word Options settings apply:

- The Display --> Hidden text option is not selected.
- The Display --> Print hidden text option is unselected.

If, at any point, you want to quickly identify all the text with the hidden text attribute applied:

- In Word Options, click Display and select the Hidden text option.

All hidden text will be displayed, with a dotted underline when the Hidden Calcs option is selected, and without underline when the Hidden Calcs option is not selected.

NOTE When you perform your calculations and they contain errors in a line of calculations that is hidden, you will not be able to find the erroneous calculations if the Hidden Calcs option is not selected.

If you need so to see hidden calculations, click Show/Hide --> Hidden Calcs, correct the error, and hide the calculations again.

### 4.6 Tekla Tedds Quick Start Guides

To get you up and running quickly, we recommend working through the Quick Start Guide appropriate to your locale. The aim is to have you creating your
own calculations in about an hour. After that, you will easily go from novice to expert, simply by using the 'Help' menu and the Product Guide.

- Quick start guide - US design examples (page 161)
- Quick start guide - Eurocode design examples (page 218)
- Quick start guide - Australian design examples (page 277)


## Quick start guide - US design examples

The Quick Start Guide comprises the following 5 exercises, which are best worked through in sequence:

- Using Tedds (page 161)
- Writing Tedds Calculations - Stage 1 (page 182)
- Using Library Calculations in Tedds for Word (page 194)
- Writing Tedds Calculations - Stage 2 (page 203)
- Enhancing Calculations (page 211)


## Using Tedds (US design example)

In this exercise you will design a steel beam in order to learn how to use any of the calculations in the extensive Tedds Engineering Library.
(1)

Allow about 15 minutes to complete this exercise.
Design information required for this exercise
We wish to check the following RHS steel beam:

| Design Information |  |  |
| :--- | :--- | :--- |
| Design Code | AISC 360 |  |
| Dimensions | Length | 16 ft |
|  | Effective length factor | 0.80 |
| Design Forces | Moment | 90 kips ft |
|  | Shear | 15 kips |
|  | Axial compression | 10 kips |
| Proposed section | Shape | Rectangular HSS <br> preferred |
|  | Steel grade | A500 Gr C50 |

## Running Tedds and locating calculations

You need to find an appropriate calculation, run it and enter the design information. You will see just how easy this is.

1. Launch Tedds from the Start Tedds icon on your desktop.
2. If this is the first time you are starting Tedds, or if you are updating from a previous version of Tedds, then you will see the Tedds Setup Wizard which allows you to configure Tedds with your company details and so on. Work through the various pages of the Setup Wizard and when you reach the end click Finish.
3. From the Tedds Start wizard click Tedds (as opposed to Tedds for Word) as the version to run.

4. Now you will see the Tedds Start Page:


NOTE For these exercises, the locale shown above can be set to either USA or Canada).
5. First, click the New tab.
6. Then, click New Document:

## $\square$ Projects

## New Project

## $\square$ Documents

## New Document

 2You will see the Select Calculation dialog box appropriate to your locale:

7. Click on the All folder.


- The instructions about using Tedds are displayed in the right hand panel.
- Every Tedds calculation is listed in the left hand panel.
- When you click on a calculation, notes relating to it are displayed on the right side.

NOTE If the Show Examples option is checked, you will also see all of the examples that are included in the library - these demonstrate the potential scope of each of the calculations, show you the typical output, and can be used to start your own designs.

To find a calculation - you could simply click on a folder in the list to open it, then click a heading to select a calculation. However for this example the Find in list feature will be used instead.
8. Type steel member design in the Find in list field.

NOTE Find in list will locate the first item title in the library that contains the exact text entered. Keywords in the item description are also considered provided the option to Find in item descriptions remains checked.
9. The first item in the library matching the entered text is selected - we are looking for the 'Steel member design (AISC360))' calculation. If necessary click Next until it is selected as shown below.


NOTE Note there is also a 'Steel beam analysis \& design (AISC360)' calculation available which will determine the design forces before proceeding to the design.
10. Click the Calculate button at the bottom right of the dialog: three things will happen:

- A new calculation document will open - you will see this in the background.
- The Interface for the chosen automated calculation will be displayed at the first page.
- Another window, titled the Progress Log will also be displayed - we will explain this shortly.


## Entering data in the automated calculation user interface

The user interfaces for all of the calculations in the Tedds engineering library use a consistent style which ensures they are easy to use. You select the design options you require and enter values for dimensions, loading etc. all of which are clearly explained. See the box below for more information.


| The General Automated Calculation Interface Explained |  |
| ---: | :--- |
| 1 | An '(i)' symbol to the left of a variable description shows that there is <br> more information available about this particular variable. The <br> information area (at the top of the dialog) displays any information <br> about the selected variable (if available). You can also see this <br> information by hovering the cursor over the '(i)' symbol. |
| 2 | Notes - display details about the calculations being performed. |
| 3 | Variables - lists all the current variables. Values can be selected from <br> here to enter into the current interface. |
| 4 | Feedback - this allows you to send feedback to the development <br> team. |
| 5 | Support - tells you how to obtain support in your region. <br> 6 |
| Data fields - enter information in these fields . Where appropriate, <br> variables may have validation which prevents invalid information <br> being entered. |  |
| 7 | Buttons... - allow you to enter more information or select a particular <br> item. |
| 8 | Next/Back/Cancel/Finish - continue to the next page / return to a <br> previous page /stop the calculations at the current point / return the <br> data to your calculation document. |

1. In this calculation all the values for design forces and section details can be specified on the first page of the interface and the calculation results are also displayed.


Note that additional design and output options are available by clicking the appropriate buttons.
Before we proceed to enter the data take a moment to review the design information given at the beginning of this exercise.
2. Enter the Design bending moment - major axis as 90 kips ft .
3. Enter the Design shear force - major axis as 15 kips.
4. Finally for the Axial load applied, click No axial strength required, change to Required compressive strength and enter a value of 10 kips .

NOTE With Preview results selected, as you change the values and options for your design the calculation results are immediately updated.
5. Now you need to choose a section to check, but you don't need to go off and find a list of section properties, since all the data required can be accessed within Tedds. In the Span details area, click the Selected section '...' button to display the Data List for steel sections.

## Data Lists

You are now looking at a Data List: a tool that allows you to choose a section and see its properties at the click of a button.


| Data Lists Explained |  |
| ---: | :--- |
| 3 | Details - click to see properties of the chosen selection. |
| 4 | Select - click to select the chosen selection. |

In this case, both a HSS $10 \times 6 \times 3 / 8$ and a HSS $12 \times 8 \times 1 / 4$ may prove adequate but which is the lighter?

1. Click the Rectangular HSS section type - this is known as the Data List page you require.
2. Select the size and thickness you require.
3. Click on the Details button to see all the properties of the selected section - (note that the details window updates instantaneously when you click on another section).

| Details - HSS 10x6x3/8 |  |  | $\times$ |
| :---: | :---: | :---: | :---: |
| NAME | Value | UNITS |  |
| Weight | 37.69 | $\mathrm{lbf} / \mathrm{ft}$ | $\wedge$ |
| A | 10.4 | $\mathrm{in}^{2}$ |  |
| d | 10 | in |  |
| $\mathrm{b}_{\mathrm{f}}$ | 6 | in |  |
| $\mathrm{t}_{\text {nom }}$ | 0.375 | in |  |
| t | 0.349 | in |  |
| $\mathrm{b}_{\text {¢- }}$ to_t | 14.2 |  |  |
| h_to_t | 25.7 |  |  |
| $\mathrm{I}_{\mathrm{g}}$ | 137 | in ${ }^{4}$ |  |
| $\mathrm{Z}_{3}$ | 33.8 | in ${ }^{3}$ |  |
| $S_{3}$ | 27.4 | $\mathrm{in}^{3}$ | , |


| Details - HSS 12x8x $1 / 4$ |  |  | $\times$ |
| :---: | :---: | :---: | :---: |
| NAME | VALUE | UNITS |  |
| Weight | 32.63 | $\mathrm{lbf} / \mathrm{ft}$ | $\wedge$ |
| A | 8.96 | $\mathrm{in}^{2}$ |  |
| d | 12 | in |  |
| $\mathrm{b}_{\mathrm{F}}$ | 8 | in |  |
| $\mathrm{t}_{\text {nom }}$ | 0.25 | in |  |
| t | 0.233 | in |  |
| $\mathrm{b}_{\mathrm{f}}$ to_t | 31.3 |  |  |
| h_to_t | 48.5 |  |  |
| $\mathrm{I}_{\text {g }}$ | 184 | in ${ }^{4}$ |  |
| $\mathrm{Z}_{8}$ | 36.6 | in ${ }^{3}$ |  |
| $S_{n}$ | 30.6 | in ${ }^{3}$ | $v$ |

4. Check the properties of both sections. The HSS $12 \times 8 \times 1 / 4$ section is lighter and may be preferred - choose this section and click Select to continue with the calculation using this section size.

NOTE You will find Data Lists for all kinds of engineering data throughout Tedds calculations; there are data lists for bolts, reinforcing bars, timber sections and much more. However, they all work in just the same simple and intuitive way.
5. The number next to 'Selected section' allows you to design beams using two or more sections. In this example a single section is sufficient so no change is required.
6. Set the steel grade to A500 Gr. C.
7. Enter 16 ft for major and minor axis and torsional restraint spacings.

| Span details |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Section selected | $1 \vee /$ | HSS $12 \times 8 \times 1 / 4$ | $\checkmark$ | $\ldots$ |
| Steel grade |  | A500 Gr.C | $\checkmark$ | $\ldots$ |
| Restraint spacing |  | Major axis | Minor axis |  |
| (i) Lateral restraint |  | 16 ft | 16 |  |
| (i) Torsional restraint |  | 16 ft |  |  |

8. Click the Design options... button to view another interface page for defining equivalent uniform moment factors etc.
9. Leave the default values as shown.

| Design code version |  |
| :--- | :--- |
| Design method | AISC360-16 |
| Steel section selection |  |
| Lateral-torsional buckling | USA (US units) |
| (i) LTB modification factor, $C_{b}$ | $\boxed{1}$ |

10. Click OK to return to the main page of the interface.

11. Click Preview results for design section s1 to see the calculation status and utilization ratios for the specified data.
12. Click Preview output... and scroll through the output, click Cancel when done.

13. You can now choose the level of output you require by clicking Output options... From here you can also give the calculation a title.


## 14. Click OK

## Automated calculations and library items

You have probably realized by now that this calculation caters for all kinds of steel sections, dimensions and loading. For each possibility and check, there is
an item in the Library - in fact this calculation has over 150 items. When you use a calculation like this, Tedds automatically chooses the appropriate items for your options and input, and puts them together to make up the complete design.

- To accept the results and continue, click the Finish


## The progress log

The progress log helps to keep you informed about a calculations progress during lengthy calculations, it is also used by some calculations to report the status of specific checks or other pertinent information. When writing your own custom calculations you can add information to the log or you can modify the default options to provide more detailed information about what your calculations is doing which can be helpful for resolving errors.

This particular calculation does not use the progress log to report any additional information.

## Examining finished calculations

OK, but how is your chosen section performing? The main interface displayed the design forces, capacities and utilizations but you may want to examine the results in more detail.

1. Scroll through the calculation and examine the flexural buckling check:

Flexural buckling of members with slender elements - Section E7

Elastic critical buckling stress - eq E3-4
Flexural buckling stress - eq E3-2
Width of stiffened compression element Imperfection Adjustment Factors - Table E7. 1

Elastic local buckling stress - eq. E7-5
Reduced effective height - eq. E7-3
Width of unstiffened compression element
$\mathrm{F}_{\mathrm{ex}}=\pi^{2} \times \mathrm{E} /\left(\mathrm{L}_{\text {cox }} / \mathrm{r}_{\mathrm{x}}\right)^{2}=159.3 \mathrm{ksi}$
$\mathrm{F}_{\sigma x}=\left[0.658^{\left.F_{y} / F_{e, ~}\right] \times \mathrm{F}_{y}=43.8 \mathrm{ksi}, ~}\right.$
$h=d-3 \times t=11.301$ in
$c_{1-\mathrm{h}}=0.20$
$C_{2 h}=1.38$
$F_{e d h}=\left(c_{2, h} \times \lambda_{\text {rwc }} /((d-3 \times t) / t)\right)^{2} \times F_{y}=46.1 \mathrm{ksi}$

$b=b_{r}-3 \times t=7.301$ in
2. There's another really important point to note about the calculations displayed - they don't just show you results, but how those results have been arrived at.

NOTE Tedds is not a 'black box' where all you can see is the result, and all you can do is accept it. In Tedds you can see exactly what's going on. You can see what checks Tedds does. What design method does it use? From where did that number come? The answers to all these questions are right there in front of you! This
is a major reason why Tedds is so popular with engineers the world over.

Furthermore, if you need an example of how to write your own calculations, then look no further. That's exactly what you are looking at - every calculation in the library is an example of how to write your own. How do I write a math expression in Tedds? How do I use logic or a math function in Tedds? Look again at the check shown above and you will see the answers to these questions. We will look more closely at how to write your own calculations in the next exercise Writing Tedds Calculations - Stage 1 (page 182)

## Re-calculating

Changes are a fact of life for engineers, they always have been, and they always will be! You need to be able to take account of any changes and update your calculations quickly. With Tedds this is no problem.

Say that your beam needs to be 1.0 ft longer since the beam which supports it needs to be moved, to avoid a clash. Is your section still OK?


1. Click Calculate on the Home tab (highlighted above).

The calculation will run again, but this time all the information you entered last time is remembered. It's a simple matter to change the required data.
2. Change the distances between restraints to 17 ft .
3. What is the effect of this change on the design? Check the Calculation results and/or the output to see.
Tedds makes it easy to update calculations - simply re-calculate and you can update your design quickly.

## Hidden text

All the calculations performed by Tedds are available in the output and in general so they are - but at times some intermediate calculations are hidden
to reduce the amount of output. It is simple to view these and to include them in your printout.

1. Open the application's View tab then use the Hidden Text option and examine the check again. You will see all the hidden text underlined with dashed lines.
2. In this example there are no hidden calculations but you will see the names of the Library items used in the output.

## Classification of web in flexure - Table B4.1b (case 19)

Width to thickness ratio
Limiting ratio for compact section

$$
\begin{aligned}
& (d-3 \times t) / t=48.50 \\
& \lambda_{\text {pwif }}=2.42 \times \sqrt{ }\left[E / F_{y}\right]=58.28 \\
& \lambda_{\text {rwi }}=5.70 \times \sqrt{ }\left[E / F_{y}\right]=137.27 \quad \text { Compact }
\end{aligned}
$$

Limiting ratio for compact section
Limiting ratio for non-compact section
Libraryitem: Class web fexure out .
Section is noncompact in flexure
Classification of flanges in uniform compression - Table B4.1a (case 6)

Width to thickness ratio
Limiting ratio for non-compact section
$\left(b_{r}-3 \times t\right) / t=31.33$
$\lambda_{\text {rfc }}=1.40 \times \sqrt{ }\left[E / F_{y}\right]=33.72 \quad$ Nonslender
Libraryitem: Class flange compression out.
Classification of web in uniform compression - Table B4.1a (case 6)

Width to thickness ratio
Limiting ratio for non-compact section
$(d-3 \times t) / t=48.50$
$\lambda_{\text {rwc }}=1.40 \times \sqrt{ }\left[E / F_{y}\right]=33.72$

Slender
Libraryitem: Class web compression out. Section is slender in compression
3. Select View/ Hidden Text again to hide the Library item names. Now let us consider how to print calculations.

## The header \& printing

Obviously you want professional looking printed output. You will see that you have a header region at the top of the calculations, but how do you set its details?


1. Click the Header button highlighted above - this opens a dialog where you can enter some project details in your header.

2. On the Company page you can define your own company details. Do this now, if you want to. If you don't, then remember to do so before you print your first "proper" set of calculations.
3. On the Template page you will see the Tedds template which your calculations will use and the logo file which Tedds will add to the template. You can change the template and logo if necessary - click this tab and check that its details are correct.
4. Maybe you would like to try a different style of template, there are a number of standard templates to choose. Click the Select... button to see these. Choose the template you want to use and you will see a preview of what calculations produced with that template will look like. When you have found the template you want to use click OK to use it.

5. If you have a copy of your company logo in electronic format, and the template style you select supports a logo, then you can add your logo to the template. Make sure that the logo is available on your computer, Browse to find it, and then click OK to add it to the template.
6. Click OK to exit the Header Properties dialog and view your finished calculation.
7. If the logo is not the right size open the Header Properties dialog once more and change the Scale of the logo to make it fit the template correctly.
8. Once the template and logo are correct click $\quad$ to display the file menu. From here you can Print the calculation to obtain a hard copy.
9. Congratulations, you have produced your first piece of work with Tedds!

To finish this example let's look at a few points about saving and outputting your results.

## Saving and output options

You can save every Tedds calculation to a unique file that you can recall and edit any time in the future. The file extension .ted is unique to Tedds.

1. Click to display the file menu.
2. Save your file and give it a name - it's a good idea to save all the examples you will produce in the course of completing the guide, for future reference.
3. The output you see in the document can be printed direct to a printer, but you have other options.
4. Click the drop-down button adjacent to Send To on the file menu to view these.
5. Choose the option of sending the output to Word and experiment with the other options if you wish. Once your output is in a Word document, you can edit it as much as you wish.
6. By clicking the drop-down button adjacent to Save As on the file menu you can also save the active document, or all documents in the active project to PDF.

## Performing a new calculation

How do you start a new calculation in Tedds?

- Click 8 to display the file menu; then click


The Select Calculation dialog will open, from where you can select and start a new calculation in a new document.

## Managing multiple related calculations

Can several calculations be saved in a single document?
As stated earlier, each calculation must be saved to a unique file - however multiple files can be collected together in a single project. They can then be organized as required using the Project Manager.

Benefits of projects include:

- you can specify a shared document header for all the project files,
- locating files is made easier - when you open the project all files within it are opened automatically,
- calculations can be placed into named groups, making them easier to manage.
To start a new project:

1. Click to display the file menu; then from the menu choose the New Project button.


A new empty project is created in the Project Manager.

## Project Manager

## Project

2. New or Existing Documents are then added and arranged into folders as required, either by right-clicking, or via the Project tab.

Project Manager

## ABC123

- Beam Designs

目 beam 001
目 beam 002

- Column Designs
column 001


## What next?

Congratulations! You have completed the first exercise and now know all you really need to make use of the wide range of calculations available in the Tedds Engineering Library and to begin using Tedds productively. Take a look through the index and try some more. How about:

- carrying out a wind load calculation?
- designing a retaining wall?
- designing an RC footing?
- analyzing and designing a timber rafter, beam or post...

The choice is yours, and all these calculations work in the same straightforward, intuitive way. Some calculations may also include Data tables which are designed to look like tables from printed references, so that you immediately feel at home with them. Indeed we hope you will find yourself recognizing them.

What can you do if the Library does not contain the exact calculation for which you are looking? You need to perform a number of calculations, and could do with a calculation to help you out with these. First of all, TELL US:

- if you are running a calculation, then you will see a Feedback button to the left-hand-side of the interface,
- if you are not running a calculation, then you can choose the Feedback... option from the Help menu.
We are constantly working to expand our Engineering Library and your input helps us do this!
But you don't have to wait until we produce these for you - you can write them yourself. We will look at this in the next exercise: Writing Tedds Calculations Stage 1 (page 182)


## Writing Tedds calculations - stage 1 (US design example)

Having looked at using calculations from the Tedds Library we can move on to look at one of the most exciting and powerful features of Tedds - the ability to create your own calculations. This is where an initial investment of time can give you huge returns later. Once you have invested time writing a calculation, you can use it over and over again, you can also update calculations in an instant, making further great savings. You can also customize and extend the Library of Tedds calculations to match the calculations that you use most frequently in your office.
In this exercise we will see that writing Tedds calculations simply uses the math and logic conventions with which you are already conversant. We start by looking briefly at very simple examples introducing the basics of calculating with Tedds for Word. We then create a "real-world" example, covering the main features of writing effective calculations in depth.

## (1)

Allow about $\mathbf{3 0}$ minutes to complete this exercise.

## Running Tedds for Word

To write calculations you need to use Tedds for Word.

1. Launch Tedds from the icon on your desktop.
2. Click the option to run Tedds for Word - Microsoft Word will now open with Tedds integrated. If this is the first time you've run Tedds for Word a Release Notes document and the Library Access System will open too.

NOTE It is important to realize that you are looking at Microsoft $®$ Word with the Tedds capabilities added. We only add to the functionality of Word, so you can do anything you would normally do in Word. Treat a Tedds Calculation Document just like you would any ordinary Word document. You can type reports, import files and text, embed spreadsheets and so on. And of course you
can add calculations to your reports; either straight out of the Tedds Engineering Library, just as you did in the previous exercise, or create your own.

## The Tedds interface

The commands you will need to use in this exercise can all be found on the Tedds Tab of the ribbon as highlighted below:


You will find a Word Document open, which looks very similar to the Tedds output document.

The document Header can be edited in a similar manner to that in Tedds by clicking the Edit Header button - this button is highlighted above.

- In this exercise two documents will be required, so open a new blank one by selecting File/ New Tedds Document

Now we are ready to begin writing our first calculation in Tedds.

## The basics

Writing calculations in Tedds for Word is easy. Tedds follows standard mathematical rules and uses standard mathematical operators. For example 1 +2 would add 1 to 2 . To write an equation use the $=$ sign, and to specify where you want to see the answer use the ? symbol. For example:

```
1+2 = ?
```

- Type the above anywhere in your document. When you calculate this equation the ? will be replaced with the answer.


## Calculating in Tedds for Word

To calculate equations in Tedds for Word you can use one of several Commands:

| $\begin{gathered} \Gamma_{=?} \\ \text { All } \end{gathered}$ | All - this will calculate the whole document. |
| :---: | :---: |
| 「面Calc Section | Calc Section - this will calculate the Calc. Section your cursor is in. |
| Telection | Selection - this will calculate only equations you have highlighted. |

1. In the Calculate ribbon group, click All to calculate your equation:
$1+2=3.000$
2. You should find the answer displayed in your document as shown above. if you have an error, take a look at the Errors and troubleshooting section below.

## Units in Tedds

Tedds automatically takes units into account, so you don't need to apply conversion factors to get the right answer. Tedds will also check that the units you are using are dimensionally correct and warn you if they aren't.

1. Type the following in your document using the same case as you see here:

$$
890 \mathrm{~mm}+1 \mathrm{ft}+8.5 \mathrm{in}=? \mathrm{~m}
$$

2. In the Calculate ribbon group, click All to calculate this equation:
$890 \mathrm{~mm}+1 \mathrm{ft}+8.5 \mathrm{in}=1.411 \mathrm{~m}$
3. You should find the answer displayed in your document as shown above. if you have an error, take a look at the Errors and troubleshooting section below.

## Defining and using input variables in Tedds

Defining variables is the key to writing effective Tedds calculations. We will use the following calculations to demonstrate this. Do not type this yet - we will show you how to enter the calculation below (in stages).

## ASD STEEL SECTION TIE DESIGN

Min. yield strength; $\quad \mathrm{Fy}=36 \mathrm{ksi}$
Allowable stress ;
$\mathrm{Fa}=0.6 \times \mathrm{Fy}=$ ? ksi
Tie force ;
$\mathrm{T}=100 \mathrm{kips}$
Min. gross section area;
$\mathrm{A}_{\mathrm{MIN}}=\mathrm{T} / \mathrm{Fa}=$ ? $\mathrm{in}^{2}$
Tie effective length ; $\quad \mathrm{L}_{\mathrm{e}}=16.75 \mathrm{ft}$
Slenderness limit ;
$\lambda_{L}=300$
Min. radius of gyration ;
$\mathrm{r}_{\mathrm{MIN}}=\mathrm{L}_{\mathrm{e}} / \lambda_{\mathrm{L}}=$ ? in

1. Close the current document, (because two documents were opened at the beginning of the exercise you should still have an empty one displayed).
2. Type in the following two paragraphs in the empty document.

## ASD STEEL SECTION TIE DESIGN

Min. yield strength; $\quad$ Fy $=36 \mathrm{ksi}$

The first paragraph is just a title for our calculation. The second paragraph is a standard Variable Definition which uses a superscript in its units.
3. Once you have finished typing, read the notes in the box below for an explanation of a standard variable definition, and to check you have typed it correctly.


Note the following:

- The expression defines the variable's unique name, current value and units.
- Variable names are case sensitive, cannot contain spaces or be function names (like sin for example). Other than that you can use pretty much anything you like as you can see, including Greek text and Subscripts.
- The semi-colon is important. It is a delimiter that separates an expression from text, or another expression in the same paragraph. If you omit delimiters in either of these cases, then you will get an error when you calculate your document.
- The equality sign '=' defines an expression. Without it no calculation will be performed.
- Spaces and Tabs are not significant in this, or any other, expression. Use as many or as few as you wish to make your calculations look presentable and easy to read.
- We will look at Units in more detail shortly but, for now, note that they are also case sensitive and have a correct syntax, that you must use (as shown above).

4. Now enter the following paragraph which uses this variable:

## Allowable stress ;

$$
\mathrm{Fa}=0.6 \times \mathrm{Fy}=? \mathrm{ksi}
$$

5. Use the Insert multiplication symbol ${ }^{\mathbf{X}}$ button to enter the $\times$ mathematical operator - do not use a lower-case x.
6. Check the notes in the box below for a detailed explanation of the components of this paragraph.
Mathematical Expressions Explained

Note the following:

- The same observations as before apply to delimiters, explanations, spaces and units.
- You cannot omit math operators in expressions: Tedds cannot calculate $0.6 F y$, you must type the expression as shown above, including the $\times$.
- The result field ? is used to tell Tedds where the result should be output when calculated the ? will be replaced with the result of the expression.
- The value of the result will be in the result unit you specify. Ensure this has the correct form and dimensions. Do not omit this.
- The expression contains a variable (Fy) that is defined in the calculations before (that is above) the point where it is used. Expressions should not contain variables that are not yet defined.
- The expression contains two equalities and performs two functions:
- calculates and displays the value we wish to know - the result.
- assigns this result to a variable named - $F a$
- It is not obligatory to always do this. You can write a valid expression to perform just one of these functions by either omitting the variable name and the first equality, or the second equality and the ? and unit.

7. In the Calculate ribbon group, click All.

Allowable stress ;

$$
\mathrm{Fa}=0.6 \times \mathrm{Fy}=21.600 \mathrm{ksi}
$$

8. Your expression has been calculated and the result has replaced the ? as before. if you have an error, take a look at the Errors and troubleshooting section below.
9. Here are the next two paragraphs of the calculation. The first paragraph is a standard variable definition, while the second uses both $T$ and $F a$ to determine the minimum section area and creates a variable $A_{\text {MIN }}$ with this value.

Tie force ; $\mathrm{T}=100 \mathrm{kips}$
Min. gross section area; $\quad \mathrm{A}_{\text {MIN }}=\mathrm{T} / \mathrm{Fa}=$ ? in ${ }^{2}$
10. Type the first paragraph, then follow the steps below to enter the second.
11. The second paragraph contains examples of the use of Subscript (often used for name suffixes) and Superscript (used for powers).
12. To type the variable name $A_{\text {MIN }}$, first type the $A$, then click the Subscript ${ }^{x_{2}}$ button.
13. Now type MIN, then click the button again to return to normal text.
14. To type the unit $i n^{2}$, first type in, then click the Superscript ${ }^{\mathbf{x}^{2}}$ button.
15. Now type 2, then click the button again to return to normal text.
16. Click Calculate All to calculate these expressions once you have entered them.

## Min. gross section area; $\quad \mathrm{A}_{\text {MIN }}=\mathrm{T} / \mathrm{Fa}=4.630 \mathrm{in}^{2}$

17. You should find the result displayed in the document - if you have an error, take a look at the Errors and troubleshooting section below.
18. Here are the final three paragraphs of the calculation. Follow the steps below to create these.
19. Here we define two new variables to be used in the expression in the final paragraph.

## Tie effective length ;

$\mathrm{L}_{\mathrm{e}}=16.75 \mathrm{ft}$
Slenderness limit;
Min. radius of gyration ;
$\lambda_{L}=300$
$r_{\text {MIN }}=L_{e} / \lambda_{L}=$ ? in
20. Type the first paragraph, entering the subscript for the name Le as you did before.
21. Follow the steps below to enter the second paragraph.
22. Use the Greek text $\alpha$ button to enter the name $\lambda_{\mathrm{L}}$
23. First click the button indicated, then type the Roman equivalent of the Greek letter - (l in this case for lambda).
24. Now click the button again to return to normal text, then enter the subscript suffix as you did above using the Subscript button.

NOTE A much easier way of entering Greek characters and more complex units is to use the Tedds Greek Characters, Tedds SI Units and Tedds US Units toolbars which can be selected from the Tedds Tab on the ribbon.
25. Use Copy and Paste to enter this name in the final expression.
26. Now click Calculate All to calculate these final expressions:
Min. radius of gyration ;

$$
r_{M I N}=L_{e} / \lambda_{L}=0.670 \text { in }
$$

27. You should find the result displayed in the document - if you have an error, take a look at the Errors and troubleshooting section below.

## Storing variables in Tedds

1. Click the Variables button.
2. The Variables dialog box will open, displaying the stored values.

| Variables - (US Units, $\mathrm{L}=\mathrm{ft}, \mathrm{M}=$ slugs, $\mathrm{T}=\mathrm{s}, \mathrm{D}={ }^{\circ} \mathrm{C}$ ) |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Manage | Document | System |  |  |
| Document Variables |  |  |  |  |
| Name | Value | Dimensions | Type | Attributes |
| $\mathrm{IMNA}^{\text {d }}$ | 0.056 | $L^{1}$ | Numb |  |
| $\mathrm{A}_{\text {MIN }}$ | 0.032 | $\mathrm{L}^{2}$ | Numb |  |
| Fa | 3110400 | $M^{1} L^{-1} T^{-2}$ | Numb |  |
| Fy | 5184000 | $M^{1} L^{-1} T^{-2}$ | Numb |  |
| $L_{\text {e }}$ | 16.75 | $L^{1}$ | Numb |  |
| T | 100000 | $M^{1} L^{1} T^{-2}$ | Numb |  |
| ${ }^{\text {L }}$ L | 300 |  | Numb |  |

3. You will note that we do not just store the variable name and value, but also the dimensions. This is how Tedds handles all the unit conversions for you.

NOTE You can Delete variables from this list if you wish:
4. Cancel from this dialog, and edit one of the values on the page - say the tie force to $T=150$ kips. Now check back in the stored variables and you will note the stored value has not changed.
5. Re-calculate the document and check back in the list of variables - the new value has now been stored.

NOTE An important observation - the stored value of a variable only changes when you re-calculate the definition, not when you just edit it on the page. If you edit the value of a variable you must recalculate the variable definition, and any calculations that use it to update them.

## More about units in Tedds

1. Change the tie force back to its original value $T=100 \mathrm{kips}$. Calculate again to store this new value.
2. Look again at the values displayed in the Variables dialog box. You will note that many of these values are not those displayed in the document.
3. The values in the dialog are in the Base Units in which Tedds performs all calculations and from which all the other units are derived. The base units are shown in the following table:

| Tedds Base Units |  |
| :--- | :--- |
|  | Metric |
| Length | m |
| Mass | kg |
| Time | S |
| Temp | ${ }^{\circ} \mathrm{C}$ |

NOTE If you hover over a variable name in the Variables dialog box a summary list is displayed showing the value of the variable in all applicable standard units.
4. Note that our calculation does not include any conversion factors.

NOTE Tedds' unit handling is a massive help - Tedds comes with a huge number of defined units and you can add more if needed.
Dimensional Checking - Tedds checks all dimensions in your calculation and will inform you if these are incorrect. This is why you should use units consistently throughout your calculations. Do so, and you can have total confidence that your calculations are dimensionally correct.
5. Save the document and give it a name - call it "Exercise 2" - as we wish to build on it later in the guide.
To complete this exercise, in the next section we will take a brief look at handling errors in calculations.

## Errors and troubleshooting

The problem with a lot of guides is they only show you the right way to do things, and then you have no idea what to do when something goes wrong! Let's look at a couple of errors and how to fix them.

- If you have an error in your calculations, Tedds will inform you when you calculate your document and the error is encountered. The first thing you should do is Interrupt the calculation process.
- If you have jumped to this section because you have encountered an error previously, then click the Interrupt button in the dialog (see step 11 below), review the details and then return to fix the error in your calculations and continue with the exercise.

If your previous calculations were error free, then you will have had no need to look at this section. We shall therefore create some calculations which do have errors so that we can see how to handle them.

1. Open a new blank document for this example.
2. Click the Tedds options ${ }^{\circ}$ button (on the More menu).
3. The Options dialog box will open, click on the Calculating / General page.

4. Make sure that the options above are checked and then click OK. We can now proceed to create some calculations with errors.
5. Enter the following 2 paragraphs as they appear here - see if you can spot any errors as you do, but don't fix them yet!

$$
\begin{aligned}
& \mathrm{wL}=90 \mathrm{psf} \quad \mathrm{wD}=50 \mathrm{psf} \\
& \mathrm{w} T=\mathrm{wL}+\mathrm{WD}=? \mathrm{psf}
\end{aligned}
$$

6. Now click the Calculate All button to calculate the calculations - you should see the Expression Error dialog:

| Expression Error dialog Explained |  |
| :---: | :---: |
|  | Expression Error <br> The following error: invalid expression <br> has occurred in the expression: $w \mathrm{~L}=90 \text { psf } w D=50 \text { pse; }$ <br> Therefore the resuits for this expression can not be calculated. <br> Problem <br> Tedds cannor determine what this expression means. <br> Common causes and solutions <br> (1) Equations and text are not separated eg. <br> $1 \mathrm{n}+2 \mathrm{in}=2 \mathrm{ft}$ Here is some more text Tedds will interpret this all as one equation (that doesn't make sense). Use a semicolon or new paragraph to separate equations and text e.z. |
| This is the specific error. |  |
|  | This line is the one that Tedds cannot evaluate, so look here to spot the error. |
|  | This is an explanation of the error, together with some typical causes. |
|  | This is the button you should generally click, |

7. Tedds flags the first error, and gives you some help in fixing it.
8. When you are ready, click the Interrupt button. Tedds highlights the error for you in the document as shown below: Once we fix the problem and recalculate, this error message will automatically disappear.
9. Check the rule about delimiters (see The Standard Variable Definition Explained info box earlier in this topic). There should be a semi-colon between the expressions to separate them. Add this in and re-calculate the entire document.

$$
\mathrm{wL}=90 \mathrm{psf} ; \mathrm{wD}=50 \mathrm{psf}
$$

10. Now we will get the next error - the variable WD is not defined. We have typed $W D$ instead of $w D$ and variable names are case-sensitive.
11. Click the Interrupt button to stop the calculation.
12. Correct the variable name on the page to $w D$ and re-calculate. The calculations should now complete with no problems. Tedds automatically deletes all error messages from the page.

## What next?

Congratulations! You have completed your first Tedds calculation. You can now begin writing effective calculations in Tedds for Word. There are more great features that make such calculations even more powerful, and we will show you these later.

Now we are going to look at using calculations from the Engineering Library in Tedds for Word: Using Library Calculations in Tedds for Word (page 194)

## Using library calculations in Tedds for Word (US design example)

We have shown that you can write your own calculations in Tedds for Word, but you can also use the Library Calculations. The advantage of this is that you can add additional text to your output easily, because it is already in a Word document. You can also combine more than one calculation in a document, add pictures and tables - anything you need to create a polished report. And if you need to update the calculations you can do it directly in the document.
Sometimes, of course, you just need an answer right now and the polishing can wait. That's why we have Tedds too. With the two modes, you have both bases covered.
In this exercise we will use the Seismic Force calculation to show you how to run a typical calculation from the extensive Engineering Library in Tedds for Word.
(4)

Allow about 15 minutes to complete this exercise.

Information required for this exercise

| Design Information |  |  |
| :--- | :--- | :--- |
| Use the following information for the calculation. |  |  |
| Code version | ASCE 7-10 |  |
| Override R value for IBC | No |  |
| Risk Category | II |  |
| Site Class | D |  |
| Short Period | 0.2 |  |
| 1 sec Period | 0.3 |  |
| Determine SDC from <br> Table 11/6-1 alone | No |  |
| Include vertical load <br> distribution | No |  |
| Building height | 40 ft |  |
| Effective seismic wt | 5000 kips |  |
| Structure is regular and <br> less than 5 stories | Yes |  |
| Lateral Force System | Steel Frame (eccentrically braced) |  |
| System Type | Building Frame Systems | (selected in Data Table) |
| Basic seismic-force- <br> resisting system | Type 1. - Steel <br> eccentrically braced <br> frames | (selected in Data Table) |
| Override approximate <br> fundamental period | No |  |
| Long-period transition <br> period | 8 sec |  |

## Buttons used in this exercise

The new commands you will be introduced to in this exercise are located on the Tedds tab as shown below:


## Using Calculation Sections in Tedds for Word

As stated, one of the reasons for running library calculations in Tedds for Word is so that you can combine a number of calculations in a single document. In this case, each calculation should be placed in a separate Calculation Section, so we will start off by introducing one of these. Calculation Sections will be explained in more detail later in this exercise.

1. Open a new Tedds document.
2. Insert a New Calc Section by clicking the appropriate button.
3. The following dialog will appear - enter a name for the section. This will form the title for the calculation in the document.

4. Click OK and this will enter a Calculation Section Title in the document. We place a calculation below this title and thus within the section. You should note that your cursor is now on the line below the section title.

## Selecting calculations from the library

All the library calculations are available from the Library Access System. To use a calculation we retrieve it from the Library, place it in our document and calculate it.

1. If it is not open already, launch the Library Access System. 国

2. Click the Index button if the index is not displayed and ensure you have the Tedds calculations (US Units) index option selected.
3. To open a folder in the index simply double-click it. Open the Loading folder, then the Seismic forces (ASCE7) folder, then select (click on) the Seismic forces (ASCE7) item
4. To place this calculation in the document, click the Execute button in the library. (You can also double-click on the selected item to do this.) In both cases you will see the Insert Calc Item dialog.

5. This dialog allows you to control where the item will be added. Simply choose the options as above then click OK and the item will be pasted at the cursor position in the document.

NOTE Note that one of the options in the dialog is to add a new Calc Section. In this example we have already added one manually, so as shown above, on this occasion the option should be unchecked.
6. You should now have the following in your document.

## BUILDING A - SEISMIC FORCE CALCULATIONS

## Seismic forces (ASCE7);

7. We can now close the Library - there is no need to have it open while a calculation is running.
8. Click the Calculate Section button to start the calculation.

Calc Section

9. The Interface for the calculation will now be displayed, along with the Progress Log. You are now in familiar territory as everything from this point works exactly as you learned in the first exercise - Using Tedds (page 161)
10. Click the Notes button and briefly look at the notes before proceeding.

11. You will be comfortable with entering information in the interface by now, so we won't show every input step in detail. The data to be entered is given at the start of this exercise.
12. When you get to enter the Site Class (= D), click on the down arrow at the side of the information pane (as shown below) to see all the help information available for this input.

13. When you are ready, click on the up arrow (to which the down arrow has changed) to reduce the information pane, and continue on to the next page.

NOTE Information about a particular item will also appear adjacent to your cursor if you hover over the information symbol associated with that item.
14. Continue to enter the information required by the interface. When specifying the Response modification factor you will find that a Data Table will be displayed.

## Using Data Tables

Data tables are designed to look like tables from printed references, so that you immediately feel at home with them. Indeed we hope you will find yourself recognizing them.


For Helb, press F1
Search $\square$ Select Zoom 100\% n/a

1. When the table displays, note the four tabs at the bottom: Table, Variables, Notes and Sketches (the latter tab being dimmed because there are no sketches associated with this particular table).
2. Take a look at the variables for the table by clicking on the Variables tab. This informs us which variables still need selecting before the design coefficients and factors can be determined and copied back to the calcs.
3. Return to the Table tab and select the required System Type by clicking on a heading in the first column of the table. Also ensure an appropriate
Basic Seismic-Force Resisting System is selected in the second column.
4. When you are ready to continue the calculation, exit the table by clicking the Copy to calcs button or hitting Enter on your keyboard. DO NOT close the table using either of the X buttons to the top right of the window this will abort the calculation!
5. The Copy to calcs button will enable when you have made a selection. Click this or hit the enter key to continue when you are ready and the calculation will be completed.
6. Enter the rest of the design information, then click Finish - the calculation will be completed.
7. Close the Progress Log and examine the calculations - they are of the same form as the ones you saw in Tedds, and they show you exactly how the results have been determined.

## Viewing hidden text in Tedds for Word

There is a slightly different way of viewing Hidden Text in Tedds for Word.

1. Check the Hidden Calcs box to view any hidden text.
2. Uncheck the button to re-hide.

NOTE This particular calculation has no hidden text, although it is worth pointing out that some do.

## Re-calculating in Tedds for Word

This is accomplished in a similar manner to Tedds.

1. Click the Calculate Section button.
2. The calculation will now run again - try changing some of the input data in the interface.
3. DO NOT overtype values on the page prior to re-calculating - this is not the way to change input data when using our library calculations (as distinct from ones you have written yourself in the manner shown in the previous section of the guide) in Tedds for Word.

## Adding another calculation to the document

To start a new calculation in this document create a new Calculation Section.

1. Place your cursor below your existing calculations.
2. Click the Add New Calc Section button.
3. Type a name for the new section - this will be the title of your next calculation. Then click OK.
4. A new calculation should be placed below this title and thus within the section.
5. Retrieve another calculation from the library and place it within this section
6. To calculate just one section, we place our cursor within the section and use the Calculate Section button.

| Calculation Sections Explained |
| :--- |
| Refer back to the section Storing variables in Tedds (page 189). You will note |
| that here we have just one list of saved variables, known as Document |
| variables, as we have not used Calculation Sections. When we |
| use Calculation Sections, Tedds for Word saves the variables for each |
| calculation in a separate list unique to each section. These are knows as |
| Section variables. This ensures that all your input values are retained |
| separately from those for another calculation. |
| When you need to update a single calculation within a document that |
| contains many calculations, simply place your cursor within that section and |
| use the Calculate Section command. Place your cursor within the first |
| section in your document, and click the Variables button to view the unique |
| list for this part of the document. |
| Tedds for Word also has commands which enable you to manipulate the |
| calculation sections in your document. You can delete a calculation section, |
| copy it, paste it into a new location in your document and change it's name. |

## What next?

Congratulations! You have completed the third exercise of the guide and learned all you need to run calculations from the Library in Tedds for Word.

You can now save the document and re-use it as appropriate.
In the next section you will learn how you can make your own calculations even more powerful: Writing Tedds Calculations - Stage 2 (page 203)

## Writing Tedds calculations - stage 2 (US design example)

In this exercise we will investigate the use of math and data functions to build on the stage 1 calculation, extending its capabilities and introducing some more Tedds features.

## (1)

Allow about 30 minutes to complete this exercise.

## Buttons used in this exercise

The new commands you will be introduced to in this exercise are located on the Library and Show/Hide groups of the Tedds tab as shown below:


## Defining input variables

Here are the new calculations we will add to the document you created in exercise 2 in order to check the adequacy of an actual section.

## Check section

Try a Channel 9" x 20 "
Section properties; A = $5.88 \mathrm{in}^{2} ; \mathrm{r}_{\mathrm{x}}=3.22 \mathrm{in} ; \mathrm{r}_{\mathrm{y}}=0.642 \mathrm{in}$ Design radius of gyration; $\quad r_{d}=\min \left(r_{x}, r_{y}\right)=$ ? in Actual stress;
Actual slenderness;
$\mathrm{f}_{\mathrm{a}}=\mathrm{T} / \mathrm{A}=$ ? ksi
$\lambda=L_{e} / r_{d}=$ ? $f 1$

1. Type the first two paragraphs, which are just text, below the existing calculation.
2. Type the third paragraph and note that here we are defining three input variables which are properties of the section we are checking. Ensure you separate the text and all the expressions using delimiters (;) as shown.

## Section properties;

$$
\mathrm{A}=5.88 \mathrm{in}^{2}
$$

$r_{x}=3.22 \mathrm{in} ;$

## Tedds math functions

1. Now type the fourth paragraph. Note how the Tedds math function min is used here.

## Design radius of gyration; $\quad r_{d}=\min \left(r_{x}, r_{y}\right)=$ ? in

NOTE A math function is always followed directly by its argument(s) in parentheses as shown here. There are many more such functions available in Tedds for Word. For full details of this and other functions, consult the Mathematical functions topic, or refer to the Writing your own custom calculations Index item in the Library Access System, where all functions are completely documented.
2. Now type the fifth paragraph - this is a simple expression that determines and displays the actual stress in the section and assigns the result to the variable $\mathrm{f}_{\mathrm{a}}$.

## Actual stress; $\mathrm{f}_{\mathrm{a}}=\mathrm{T} / \mathrm{A}=$ ? ksi

## Result accuracy and formats

It is sufficient to display the slenderness to one decimal place. To do this we use a format string to override the default result setting of three decimal places.

1. Now type the last paragraph of the new calculations as follows. Use the Greek text button as you did earlier for the variable name $\lambda$.

## Actual slenderness;

$$
\lambda=L_{e} / r_{d}=? f 1
$$

2. The characters $f 1$ following the ? are the format string. The format string must immediately follow the ? with no space in between as shown. See below for a fuller explanation.
3. Once you have finished typing this last expression, check the new paragraphs carefully. Have you included all the delimiters? Have you used subscripts correctly? Have you used the correct case for variable names and units?
4. When you are satisfied that everything is correct, click Calculate All.
5. If you have an Error, then Interrupt and take a look at Errors and troubleshooting (page 191). Fix any errors until your calculation works fully.
6. Review your results and look at the last paragraph to see how the format string we used has operated:
7. Click the Variables button to examine the list of saved variables and check the stored value for this variable:

## Document Variables



| Result Format Strings Explained |
| :--- |
| You can override the default result setting, and reduce or increase the |
| number of decimal places for a displayed result, by using a result format |
| string after the ? result field. For example typing ?f2 will display the result to |
| two decimal places. It is important that there is no space between the format |
| string and the ?. The format string characters signify the following: |
| f = fixed format, and 2 = result to be displayed to 2 decimal places (can be |
| from 0-15) |
| Note that format strings only control the precision of the result displayed in |
| the document, not any result that is stored by Tedds. |
| For full details of this and other result formats, consult the topic Result |
| formats and precision (page 523). |

## Using data functions in calculations

The calculation as written is very useful, but we can enhance it further. One big improvement is to include a Data List in the calculation, making the properties of a huge number of section types and sizes instantly available.

1. First edit the two paragraphs underneath the heading Check Section as follows:
2. Delete the following text for the section name - Try a Channel 9"x20". Leave an empty line here.
3. Next delete just the values for the properties of the section. Replace them with a ? result field. You should end up with the following:

## Place cursor here

## Check section;

Section properties; $\quad A=$ ? $i^{2} ; \quad r_{x x}=$ ? in; $\quad r_{y y}=$ ? in
4. Finally, place your cursor as shown at the very end of the heading.

## Retrieving Data Lists from the library

1. Click the button to Launch the Tedds Engineering Data. This opens a special Set in the Library where all the Data Lists and Data Tables are accessed. There is a lot of data in this set. We wish to find a Data List that includes steel channels suitable for this calculation.
We will use the Find facility to help us locate such a table.
2. 
3. Each item in the set has both a short and a long name, we are going to find by the short name, so ensure View/Long Names is unchecked before continuing.
4. Now select the Group we want to search in - US standards. Select Edit/ Find in the library, and type in channel as shown.

5. The Library Access System finds the first item containing the find text, this is not the item we require so click the green down arrow to find the next item until the required item shown below is located, which is also highlighted above. Channel section (LRFD 3-US)
6. Now to bring this item into your calculation, either double click the item, or click the Execute... button. You should find the following has been entered in your document.

## Check section;

## Try section - C $15 \times 50$;

Section properties; $\quad A=$ ? in ${ }^{2} ; \quad r_{x}=$ ? in; $\quad r_{y}=$ ? in
7. This text inserted is a Tedds Data List Field which launches the specified Data List (further details on Tedds Fields are given below),
8. Close the library once you have retrieved the Tedds Data List Field.
9. Now click Calculate All to calculate the document again.
10. The Data List will now be displayed when the Tedds Data List Field is calculated:
11. Select the C9x20 channel section then click on the Details button to examine the variables defined in the table.


NOTE Note that we have used exactly the same names for the properties in our calculation as those defined by the Data List - A, $r_{x}$ and $r_{y}$. This is the key to integrating all Data Functions with your calculations. Remember that variable names are case-sensitive.
12. Click the Select button to return these variables to your calculations - you will see that the section's properties from the Data List replace the ? fields in your document and the Tedds Field displays the choice you made in the Data List.

## Try section - C 9x20

Section properties; $\quad A=5.87 \mathrm{in}^{2} ; \quad r_{x x}=\mathbf{3 . 2 2} \mathrm{in} ; \quad r_{y y}=0.64 \mathrm{in}$
13. The Data List is now integrated with your calculation. Re-calculate a few times, each time changing your selection of channel size in the Data List, to test this.
14. Click the Variables button and you will see that all the variables defined by the Data List are listed and are thus available to be used in calculations.
15. Save the calculation at this stage, as we will build on it in the final exercise.

NOTE Whilst in this exercise the Data List was inserted into the calculation via the Tedds Engineering Data button, it could have been inserted via the Tedds Field button instead. The use of Tedds Fields is covered in the next exercise Enhancing Calculations.

## Tedds Fields

1. Check the Field Codes box.
2. Look at the Tedds Field in your document and you will see the following:

Check section;
\{ =CSC|CALL Datalist("aiscUSus.dls", "Channels", "C 9(20)", "Try section - ", "", "Current_section") \};
3. The command that runs the Data List is now revealed. Uncheck the Field Codes box again to return to the normal view of the document.

## Tedds Fields Explained

Field Codes enable you to see and thus edit the hidden commands which are Tedds Fields. These commands run special functions in Tedds like the Data Lists. We will see some more Tedds Fields shortly. A Tedds Field will run when it is calculated, like any normal expression. We hide the Tedds field, since you would not want it to appear in a printed report. The Field Codes button reveals the Tedds Fields. Tedds Fields should be treated like expressions, and separated from text and other expressions in the same paragraph using semi-colons.

## What next?

Congratulations! You have completed the fourth exercise and learned everything you really need to write powerful Tedds calculations. Maybe now would be the time to have a go at writing a calculation of your own. It's a good idea to start with something simple and build on the complexity as you become more familiar with Tedds.

The next step in the guide, Enhancing Calculations (page 211) is about making Tedds calculations still easier to work with, and is especially relevant if you envisage writing calculations for others to use. Even if your calculations are for
your own use you may find these further features beneficial so we recommend that you review them. You might like to leave this step until you have had a go at writing a calculation of your own using what you have learned so far.

## Enhancing calculations (US design example)

There is even more functionality available for our calculations than we have seen so far. Whether you use these enhancements depends both on the purpose of the calculation, and on the time you have available. Certainly these features are very useful when you are writing calculations which others will use (as we do at Trimble). Hence the Tedds library is packed with examples which use these features, and you have already seen many of them when running our calculations.

In this exercise we will enhance the previous calculation and you will see what we are talking about.

Allow about 15 minutes to complete this exercise.

## Buttons used in this exercise

The only new command you will be introduced to in this exercise is located on the Insert group of the Tedds Calcs ribbon as shown below:


## Tedds Input Fields

The Tedds Input Field speeds up the editing and often the creating of input variables. We will replace all the existing variable definitions in the calculation:

1. Delete the entire definition for the Min. yield strength, Fy, from your page. Leave your cursor on the empty line.
2. Click the Tedds Field button.
3. The following dialog will appear.


| Tedds Input Field |  |
| :--- | :--- |
| Prompt | tells the user what the variable is and <br> appears on the page |
| Name | the unique name of the variable |
| Units | if the property has dimensions then <br> enter a unit here |
| Default value | this value will be displayed initially for <br> user to edit or accept |
| Format | the format displayed on the page |
| No. of decimal places | the number of decimal places <br> displayed on the page |

4. Enter the details shown to define the input for this variable:

Prompt $=$ Min. yield strength
Name $=$ Fy
Units $=k s i$
Default value $=36$
Format = Fixed
No. of decimal places $=0$
5. Accept the defaults for other options and click OK when you have everything entered.

NOTE We do not put a value in this dialog - this is entered when the statement is calculated.
6. The following will appear on the line containing your cursor:
; Min. yield strength; $\quad$ Fy = ?F0 ksi;
7. With the Field Codes button on you will see the following Tedds Input Field preceding the text on the line.

\{ =CSC|CALL Input("Min. yield strength","Fy","ksi","36",1) \}; Min. yield strength;

8. Calculate your document to run it.


The Set Variable Value dialog appears, as shown above.
9. Because we already have a value defined for this variable it is displayed in the input. You can accept it, or edit it as required. There is no need to find and edit the variable value on the page, as it is automatically updated when you enter a value in the Set Variable Value dialog.
10. Delete and replace the 3 remaining variable definitions in the same manner - the table below shows what you need to enter in the Insert Tedds Field dialog for each of the three variables in order from left to right. When you have done this, recalculate your document to ensure that your definitions are correct.

| Insert Tedds Field Properties |  |  |  |
| :--- | :--- | :--- | :--- |
| Input | $\mathbf{T}_{\mathbf{f}}$ | $\mathbf{L}_{\mathbf{e}}$ | $\boldsymbol{\lambda}_{\mathbf{L}}$ |
| Prompt | Tie force | Tie effective <br> length | Slenderness <br> limit |
| Name | T | Le | $\lambda_{\mathrm{L}}$ |
| Units | kips | ft |  |
| Default value |  |  | 300 |
| Format | fixed | fixed | fixed |
| No. of decimal places | 2 | 3 | 0 |

NOTE To enter Greek characters in the Insert Tedds Field dialog for variable names like $\lambda$ simply click the Greek character button
( $\boldsymbol{\alpha}$ ) and then type in the equivalent Roman character, in this case you need to type I (i.e. lowercase letter L) to get $\lambda$. To enter Subscript or Superscript characters simply click the Subscript or

Superscript button ( ${ }^{\mathbf{x}_{2}}, \mathbf{x}^{2}$ ) and then continue and type in the subscript or superscript. Once you have reached its end click the button again to switch back to typing normal text.

The Default value is entirely optional. If you enter one it will be displayed the first time a calculation is run, otherwise the input box will be empty. Delete the stored variables and re-calculate to see the defaults in operation.

| Tedds Interface Designer |
| :--- |
| Although The Tedds Input Field can be used to create all the variables |
| required in a calculation, if you would like to give your calculations a slicker |
| appearance we would strongly recommend using the Tedds Interface |
| Designer instead. This easy to use tool allows you to place all the input |
| variables on a single interface along with sketches and notes if required. For a |
| worked example and further details of how to use the Tedds Interface |
| Designer refer to the Tedds Help. |

## Tedds Show Fields

The final thing we would like the calculation to do is automatically assess our section and report in the document whether our chosen section is passing or failing and, if it is failing, why. We use a Tedds Show Field to do this.

1. Enter the following two paragraphs after your existing calculations:

Check stress;
Check slenderness;
check_stress $=\mathrm{f}_{\mathrm{a}} / \mathrm{Fa}=$ ?
check_slender $=\lambda / \lambda_{L}=$ ?
2. These last two values help us assess the utilization of the section for the two checks. Assigning them to output variables will help us with creating Tedds Show Fields. Calculate your document once you have written them to ensure they are working properly before proceeding.
3. Place your cursor beneath these paragraphs and click the Insert Tedds Field button.
4. Select the Show tab. The Show Field we want to create will test whether the section is failing stress and output a message to give the status of the check.
5. Select the Condition type option and input the following information:

Insert Tedds Field ? $\times$
Show
Insert a Tedds field that when calculated will show text in your document.

6. The output of the Tedds Show Field consists of two text messages known as output strings. Only one output string is displayed in the document depending on the status of the condition.
7. Check your input carefully, then click OK to enter the Tedds Show Field in the document.
8. When you have OK'd the input, click the Field Codes button to view the resulting Tedds Show Field. It should be as shown below. If your Tedds Show Field is incorrect, the best thing to do at this stage is to delete it and run through the Insert Tedds Field dialog again.

## $\{=C S C \mid C A L L$ Show (ificheck__stress > 1,"Section fails stress check","Section OK for stress"), Show, True, True ) \};

## Using logic In Tedds

Take a close look at this Tedds Show field, and you can see how we use a simple logic statement to output one of two pieces of text using the if logical operator.

```
if(check_stress > 1, "Section fails stress check" , "Section OK for
stress")
```

The general form of this logic expression is as follows:

```
if(condition, true_output, false_output)
```

NOTE You can use this kind of expression to define variables using a condition. The outputs can be values, expressions or further logic expressions.
For example:

$$
a=i f(b>c, 10,20)=\text { ? }
$$

Check the table of Logic Functions in the Mathematics (page 502) topic for full details.

1. Now calculate your document to calculate the Tedds Show Field. You should find you have something similar to the following in your Progress Log and you will also see the output text on the page where you placed the Tedds Show Field.

2. Change some of your input values and re-calculate a few times to test your full calculation and both the pass and fail output of the Tedds Show Field.

## Tedds Data List Fields

In the previous exercise we inserted a Data List Field into the calculation using the Engineering Data button. However, it could have been inserted more easily using the Tedds Field button:

1. With the Field Codes button on you will see the following Tedds Data List Field:

## \{=CSC|CALL DataList( "aiscUSus.dls", "Channels", "C 9(20)", "', "', "Current_section", "'" "'", "', "Try section" ) \};

2. Delete the entire definition of this field from your page. Leave your cursor on the empty line.
3. Click the Tedds Field button.
4. Select the Data List option and scroll down to select the same .dls file name as that shown in the line you just deleted above.
5. Input the Prompt as Select Section.
6. To input the Default page and Default item click the ellipsis button () and then select the page and section size that you want to appear as the default.
7. Accept the defaults for other options and click OK when you have everything entered.
8. Calculate your document to run it once more.

## What next?

Congratulations! You have completed the final exercise in the guide and are ready to begin using Tedds to its full potential.

Here are a few things you could try next:

- Create another Tedds Show Field similar to that above for the slenderness check - following is the logic statement you would use for this:

Condition
check_slender > 1

- Create a Tedds Show Field to give the overall status of the section, checking both slenderness and stress. Try the following:

Condition

Yes
No

Section fails!

- Take a look at Tedds Message Fields. The input for these is the same as Tedds Show Fields but their output is displayed in a Message box, rather
than in the document. You will see examples of their use in the Tedds Engineering Library Calculations.
- Try creating Messages using the Value of Variable option to show the values of the minimum area and radius of gyration in the Log before the Data List is displayed.
Of course there's much more for you to discover. We wish you an enjoyable and productive time in using the program in your day-to-day work, and exploring its capabilities more fully.
If you would like to read up on further information about Tedds, then we recommend the Tedds Help system, which you can access in the usual way.
Some Tedds dialogs have context sensitive help. To see this simply click the Help button in the dialog.
We also run training courses in most locales, for further information on availability contact the Tedds support team in your region, simply click the Support icon in any of Tedds' automated calculations.


## Quick start guide - Eurocode design examples

The Quick Start Guide comprises the following 5 exercises, which are best worked through in sequence:

- Using Tedds (page 218)
- Writing Tedds Calculations - Stage 1 (page 239)
- Using Library Calculations in Tedds for Word (page 251)
- Writing Tedds Calculations - Stage 2 (page 261)
- Enhancing Calculations


## Using Tedds (Eurocode design example)

In this exercise you will design a steel beam in order to learn how to use any of the calculations in the extensive Tedds Engineering Library.

## (2)

Allow about 15 minutes to complete this exercise.

## Design information required for this exercise

We wish to check the following RHS steel beam:

| Design Information |  |  |
| :--- | :--- | :--- |
| Design Code | EN1993 |  |
| Dimensions | Length | 5.0 m |
|  | Effective length factors | 0.85 |


| Design Information |  |  |
| :--- | :--- | :--- |
| Design Forces | Moment | 135 kNm |
|  | Shear | 60.0 kN |
|  | Axial compression | 40.0 kN |
| Proposed section | Shape | RHS preferred |
|  | Steel grade | S275H |

## Running Tedds and locating calculations

You need to find an appropriate calculation, run it and enter the design information. You will see just how easy this is.

1. Launch Tedds from the Start Tedds icon on your desktop.
2. If this is the first time you are starting Tedds, or if you are updating from a previous version of Tedds, then you will see the Tedds Setup Wizard which allows you to configure Tedds with your company details and so on. Work through the various pages of the Setup Wizard and when you reach the end click Finish.
3. From the Tedds Start wizard click Tedds (as opposed to Tedds for Word) as the version to run.

4. Now you will see the Tedds Start Page:


NOTE For these exercises, the locale shown above should be set appropriate to your region ( UK, Europe, or Asia).
5. First, click the New tab.
6. Then, click New Document:

## Open

## $\square$ Projects

## New Project

## $\square$ Documents

New Document
2

You will see the Select Calculation dialog box appropriate to your locale:

7. Click on the All folder.


- The instructions about using Tedds are displayed in the right hand panel.
- Every Tedds calculation is listed in the left hand panel.
- When you click on a calculation, notes relating to it are displayed on the right side.

NOTE If the Show Examples option is checked, you will also see all of the examples that are included in the library - these demonstrate the potential scope of each of the calculations, show you the typical output, and can be used to start your own designs.

To find a calculation - you could simply click on a folder in the list to open it, then click a heading to select a calculation. However for this example the Find in list feature will be used instead.
8. Type steel member design in the Find in list field.

NOTE Find in list will locate the first item title in the library that contains the exact text entered. Keywords in the item description are also considered provided the option to Find in item descriptions remains checked.
9. The first item in the library matching the entered text is selected - we are looking for the 'Steel member design (EN1993)' calculation. If necessary click Next until it is selected as shown below.


NOTE Note there is also a 'Steel beam analysis \& design (EN1993)' calculation available which will determine the design forces before proceeding to the design.
10. Click the Calculate button at the bottom right of the dialog: three things will happen:

- A new calculation document will open - you will see this in the background.
- The Interface for the chosen automated calculation will be displayed at the first page.
- Another window, titled the Progress Log will also be displayed - we will explain this shortly.


## Entering data in the automated calculation user interface

The user interfaces for all of the calculations in the Tedds engineering library use a consistent style which ensures they are easy to use. You select the
design options you require and enter values for dimensions, loading etc. all of which are clearly explained. See the box below for more information.


| The General Automated Calculation Interface Explained |  |
| :---: | :--- |
| 7 | Buttons... - allow you to enter more information or select a particular <br> item. |
| 8 | Next/Back/Cancel/Finish - continue to the next page / return to a <br> previous page /stop the calculations at the current point / return the <br> data to your calculation document. |

1. In this calculation all the values for design forces and section details can be specified on the first page of the interface and the calculation results are also displayed.


Note that additional design and output options are available by clicking the appropriate buttons.
Before we proceed to enter the data take a moment to review the design information given at the beginning of this exercise.
2. Enter the Design bending moment - major axis as 135 kNm .
3. Enter the Design shear force - major axis as 60 kN .
4. Finally for the Axial load applied, click No applied axial force, change to Design axial compression force and enter a value of 40 kN .
5. Click Preview results

NOTE With Preview results selected, as you change the values and options for your design the calculation results are immediately updated.
6. Now you need to choose a section to check, but you don't need to go off and find a list of section properties, since all the data required can be accessed within Tedds. In the Span details area, click the Selected section '...' button to display the Data List for steel sections.

## Data Lists

You are now looking at a Data List: a tool that allows you to choose a section and see its properties at the click of a button.


| Data Lists Explained |  |
| ---: | :--- |
| 3 | Details - click to see properties of the chosen selection. |
| 4 | Select - click to select the chosen selection. |

1. Click the Rectangular Hollow Section section type - this is known as the Data List page you require.
2. Select the size and thickness you require.
3. Click on the Details button to see all the properties of the selected section - (note that the details window updates instantaneously when you click on another section). In this case, both a $250 \times 100 \times 10$ RHS and a $300 \times 200 \times 6$ RHS may prove adequate but which is the lighter?

| Details - RHS 250x100×10.0 |  |  | $\times$ |
| :---: | :---: | :---: | :---: |
| Name | Value | Units |  |
| Mass | 50.96768779 | kg/m | $\wedge$ |
| A | 64.92699082 | $\mathrm{cm}^{2}$ |  |
| $\mathrm{I}_{\mathrm{xI}}$ | 4732.712023 | $\mathrm{cm}^{4}$ |  |
| \% ${ }^{3}$ | 1072.089827 | $\mathrm{cm}^{4}$ |  |
| $\mathrm{r}_{\mathrm{xx}}$ | 8.537729719 | cm |  |
| ${ }^{1} \mathrm{yy}$ | 4.063525131 | cm |  |
| $Z_{\text {z }}$ | 378.6169619 | $\mathrm{cm}^{3}$ |  |
| $Z_{\text {g }}$ | 214.4179654 | $\mathrm{cm}^{3}$ |  |
| $\mathrm{S}_{\text {x }}$ | 490.684362 | $\mathrm{cm}^{3}$ |  |
| c | 251 วว10วกล | -m 3 |  |


| Details - RHS 300x200x6.0 |  |  | $\times$ |
| :---: | :---: | :---: | :---: |
| Name | Value | Units |  |
| Mass | 45.6663676 | kg/m | $\wedge$ |
| A | 58.17371669 | $\mathrm{cm}^{2}$ |  |
| $\mathrm{I}_{\mathrm{xI}}$ | 7486.264375 | $\mathrm{cm}^{4}$ |  |
| $\mathrm{I}_{\mathrm{y}}$ | 4012.540318 | $\mathrm{cm}^{4}$ |  |
| ${ }^{\text {r }}$ m | 11.34407722 | cm |  |
| ${ }^{\prime} y$ | 8.305127399 | cm |  |
| $Z_{z}$ | 499.0842917 | $\mathrm{cm}^{3}$ |  |
|  | 401.2540318 | $\mathrm{cm}^{3}$ |  |
| $\mathrm{S}_{\mathrm{zz}}$ | 595.7506974 | $\mathrm{cm}^{3}$ |  |
| c | 451 ว0211ว |  |  |

4. Check the properties of both sections. The $300 \times 200 \times 6.0$ RHS section is lighter and may be preferred - choose this section and click Select to continue with the calculation using this section size.

NOTE You will find Data Lists for all kinds of engineering data throughout Tedds calculations; there are data lists for bolts, reinforcing bars, timber sections and much more. However, they all work in just the same simple and intuitive way.
5. The number next to 'Selected section' allows you to design beams using two or more sections. In this example a single section is sufficient so no change is required.
6. Set the steel grade to $\mathbf{S 2 7 5 H}$.
7. Enter a restraint spacing of 5000 mm for both the major and minor axes.

| Restraint spacing | Major axis | Minor axis |
| :--- | :--- | :--- |
| Lateral restraint | 5000 | mm |
| Torsional restraint | 0000 | mm |
|  |  | mm |

8. Click Design options... to view another interface page for defining equivalent uniform moment factors etc.
9. Leave the default values as shown.

10. Click OK to return to the main page of the interface.
11. Click Preview results for design section s1 to see the calculation status and utilization ratios for the specified data.

12. Click Preview output... and scroll through the output, click Cancel when done.

13. You can now choose the level of output you require by clicking Output options... From here you can also give the calculation a title.


## 14. Click OK

## Automated calculations and library items

You have probably realised by now that this calculation caters for all kinds of steel sections, dimensions and loading. For each possibility and check, there is
an item in the Library - in fact this calculation has over 150 items. When you use a calculation like this, Tedds automatically chooses the appropriate items for your options and input, and puts them together to make up the complete design.

- To accept the results and continue, click Finish


## The Progress Log

The progress log helps to keep you informed about a calculations progress during lengthy calculations, it is also used by some calculations to report the status of specific checks or other pertinent information. When writing your own custom calculations you can add information to the log or you can modify the default options to provide more detailed information about what your calculations is doing which can be helpful for resolving errors.

This particular calculation does not use the progress log to report any additional information.

## Examining finished calculations

OK, but how is your chosen section performing? The main interface displayed the design forces, capacities and utilisations but you may want to examine the results in more detail.

1. Scroll through the calculation and examine the $y-y$ axis flexural buckling resistance check:

Check y-y axis flexural buckling resistance - Section 6.3.1.1

Buckling curve - Table 6.2
Imperfection factor - Table 6.1
Buckling reduction determination factor
Buckling reduction factor - eq 6.49
Design buckling resistance - eq 6.47
$N_{E d} / N_{\text {by. }, R d}=0.027$
a
$\alpha_{y}=0.21$
$\phi_{y}=0.5 \times\left(1+\alpha_{y} \times\left(\bar{\lambda}_{y}-0.2\right)+\bar{\lambda}_{y}{ }^{2}\right)=0.661$
$\gamma_{y}=\min \left(1 /\left(\phi_{y}+\sqrt{ }\left(\phi_{y}{ }^{2}-\bar{\lambda}_{y}{ }^{2}\right)\right), 1\right)=0.922$
$\mathrm{N}_{\text {b, }, \mathrm{Rd}}=\gamma_{y} \times \mathrm{A} \times \mathrm{f}_{y} / \gamma_{\mathrm{M} 1}=1474.8 \mathrm{kN}$

PASS - Design buckling resistance excet
2. There's another really important point to note about the calculations displayed - they don't just show you results, but how those results have been arrived at.

NOTE Tedds is not a 'black box' where all you can see is the result, and all you can do is accept it. In Tedds you can see exactly what's going on. You can see what checks Tedds does. What design method does it use? From where did that number come? The answers to all these questions are right there in front of you! This
is a major reason why Tedds is so popular with engineers the world over.

Furthermore, if you need an example of how to write your own calculations, then look no further. That's exactly what you are looking at - every calculation in the library is an example of how to write your own. How do I write a math expression in Tedds? How do I use logic or a math function in Tedds? Look again at the check shown above and you will see the answers to these questions. We will look more closely at how to write your own calculations in the next exercise Writing Tedds Calculations - Stage 1 (page 239)

## Re-calculating

Changes are a fact of life for engineers, they always have been, and they always will be! You need to be able to take account of any changes and update your calculations quickly. With Tedds this is no problem.

Say that your beam needs to be 0.1 m longer since the beam which supports it needs to be moved, to avoid a clash. Is your section still OK?


1. Click Calculate on the Home tab (highlighted above).

The calculation will run again, but this time all the information you entered last time is remembered. It's a simple matter to change the required data.
2. Change the distances between restraints to 5100 mm .
3. What is the effect of this change on the design? Check the Calculation results and/or the output to see.
Tedds makes it easy to update calculations - simply re-calculate and you can update your design quickly.

## Hidden Text

All the calculations performed by Tedds are available in the output and in general so they are - but at times some intermediate calculations are hidden
to reduce the amount of output. It is simple to view these and to include them in your printout.

1. Open the application's View tab then use the Hidden Text option and examine the check again. You will see all the hidden text underlined with dashed lines.
2. In this example there are no hidden calculations but you will see the names of the Library items used in the output.

Internal compression parts subject to bending and compression - Table 5.2 (sheet 1 of 3 )
Width of section

$$
\begin{aligned}
& c=h-3 \times t=282 \mathrm{~mm} \\
& \left.\alpha=\min \left(h / 2+N_{E_{0}} /\left(2 \times 2 \times t \times f_{y}\right)-3 \times t / 2\right] / c, 1\right)=0.521 \\
& c / t=47=50.8 \times \varepsilon<=396 \times \varepsilon /(13 \times \alpha-1) \quad \text { Class } 1
\end{aligned}
$$

Libraryitem: Int bend comp olass out
Internal compression parts subject to compression - Table 5.2 (sheet 1 of 3 )
Width of section

$$
\begin{aligned}
& c=b-3 \times t=182 \mathrm{~mm} \\
& c / t=30.3=32.8 \times \varepsilon \leqslant=33 \times \varepsilon \quad \text { Class } 1
\end{aligned}
$$

3. Select View/ Hidden Text again to hide the Library item names. Now let us consider how to print calculations.

## The header \& printing

Obviously you want professional looking printed output. You will see that you have a header region at the top of the calculations, but how do you set its details?


1. Click the Header button highlighted above - this opens a dialog where you can enter some project details in your header.

2. On the Company page you can define your own company details. Do this now, if you want to. If you don't, then remember to do so before you print your first "proper" set of calculations.
3. On the Template page you will see the Tedds template which your calculations will use and the logo file which Tedds will add to the template. You can change the template and logo if necessary - click this tab and check that its details are correct.
4. Maybe you would like to try a different style of template, there are a number of standard templates to choose. Click the Select... button to see these. Choose the template you want to use and you will see a preview of what calculations produced with that template will look like. When you have found the template you want to use click OK to use it.

5. If you have a copy of your company logo in electronic format, and the template style you select supports a logo, then you can add your logo to the template. Make sure that the logo is available on your computer, Browse to find it, and then click OK to add it to the template.
6. Click OK to exit the Header Properties dialog and view your finished calculation.
7. If the logo is not the right size open the Header Properties dialog once more and change the Scale of the logo to make it fit the template correctly.
8. Once the template and logo are correct click $\quad$ to display the file menu. From here you can Print the calculation to obtain a hard copy.
9. Congratulations, you have produced your first piece of work with Tedds!

To finish this example let's look at a few points about saving and outputting your results.

## Saving and output options

You can save every Tedds calculation to a unique file that you can recall and edit any time in the future. The file extension .ted is unique to Tedds.

1. Click to display the file menu.
2. Save your file and give it a name - it's a good idea to save all the examples you will produce in the course of completing the guide for future reference.
3. The output you see in the document can be printed direct to a printer, but you have other options.
4. Click the drop-down button adjacent to Send To on the file menu to view these.
5. Choose the option of sending the output to Word and experiment with the other options if you wish. Once your output is in a Word document, you can edit it as much as you wish.
6. By clicking the drop-down button adjacent to Save As on the file menu you can also save the active document, or all documents in the active project to PDF.

## Performing a new calculation

How do you start a new calculation in Tedds?

- Click 8 to display the file menu; then click


The Select Calculation dialog will open, from where you can select and start a new calculation in a new document.

## Managing multiple related calculations

Can several calculations be saved in a single document?
As stated earlier, each calculation must be saved to a unique file - however multiple files can be collected together in a single project. They can then be organised as required using the Project Manager.

Benefits of projects include:

- you can specify a shared document header for all the project files,
- locating files is made easier - when you open the project all files within it are opened automatically,
- calculations can be placed into named groups, making them easier to manage.
To start a new project:

1. Click to display the file menu; then from the menu choose the New Project button.


A new empty project is created in the Project Manager.

## Project Manager

Project
2. New or Existing Documents can then be added and arranged into folders as required either by right-clicking, or via the Project tab.

Project Manager

## ABC123

- Beam Designs

目 beam 001
目 beam 002

- Column Designs
column 001


## What next?

Congratulations! You have completed the first exercise and now know all you really need to make use of the wide range of calculations available in the Tedds Engineering Library and to begin using Tedds productively. Take a look through the index and try some more. How about:

- carrying out a wind load calculation?
- designing a retaining wall?
- designing an RC footing?
- analysing and designing a timber rafter, beam or post...

The choice is yours, and all these calculations work in the same straightforward, intuitive way. Some calculations may also include Data tables which are designed to look like tables from printed references, so that you immediately feel at home with them. Indeed we hope you will find yourself recognising them.

What can you do if the Library does not contain the exact calculation for which you are looking? You need to perform a number of calculations, and could do with a calculation to help you out with these. First of all, TELL US:

- if you are running a calculation, then you will see a Feedback button to the left-hand-side of the interface,
- if you are not running a calculation, then you can choose the Feedback... option from the Help menu.
We are constantly working to expand our Engineering Library and your input helps us do this!
But you don't have to wait until we produce these for you - you can write them yourself. We will look at this in the next exercise: Writing Tedds Calculations Stage 1 (page 239)


## Writing Tedds calculations - stage 1 (Eurocode design example)

Having looked at using calculations from the Tedds Library we can move on to look at one of the most exciting and powerful features of Tedds - the ability to create your own calculations. This is where an initial investment of time can give you huge returns later. Once you have invested time writing a calculation, you can use it over and over again, you can also update calculations in an instant, making further great savings. You can also customise and extend the Library of Tedds calculations to match the calculations that you use most frequently in your office.
In this exercise we will see that writing Tedds calculations simply uses the math and logic conventions with which you are already conversant. We start by looking briefly at very simple examples introducing the basics of calculating with Tedds for Word. We then create a "real-world" example, covering the main features of writing effective calculations in depth.

## (1)

Allow about $\mathbf{3 0}$ minutes to complete this exercise.

## Running Tedds for Word

To write calculations you need to use Tedds for Word.

1. Launch Tedds from the icon on your desktop.
2. Click the option to run Tedds for Word - Microsoft Word will now open with Tedds integrated. If this is the first time you've run Tedds for Word a Release Notes document and the Library Access System will open too.

NOTE It is important to realise that you are looking at Microsoft $®$ Word with the Tedds capabilities added. We only add to the functionality of Word, so you can do anything you would normally do in Word. Treat a Tedds Calculation Document just like you would any ordinary Word document. You can type reports, import files and text, embed spreadsheets and so on. And of course you
can add calculations to your reports; either straight out of the Tedds Engineering Library, just as you did in the previous exercise, or create your own.

## The Tedds interface

The commands you will need to use in this exercise can all be found on the Tedds Tab of the ribbon as highlighted below:


You will find a Word Document open, which looks very similar to the Tedds output document.

The document Header can be edited in a similar manner to that in Tedds by clicking the Edit Header button - this button is highlighted above.

- In this exercise two documents will be required, so open a new blank one by selecting File/ New Tedds Document

Now we are ready to begin writing our first calculation in Tedds.

## The basics

Writing calculations in Tedds for Word is easy. Tedds follows standard mathematical rules and uses standard mathematical operators. For example 1 +2 would add 1 to 2 . To write an equation use the $=$ sign, and to specify where you want to see the answer use the ? symbol. For example:

```
1+2 = ?
```

- Type the above anywhere in your document. When you calculate this equation the ? will be replaced with the answer.


## Calculating in Tedds for Word

To calculate equations in Tedds for Word you can use one of several Commands:

| $\begin{gathered} \Gamma_{=?} \\ \text { All } \end{gathered}$ | All - this will calculate the whole document. |
| :---: | :---: |
| 「面Calc Section | Calc Section - this will calculate the Calc. Section your cursor is in. |
| Telection | Selection - this will calculate only equations you have highlighted. |

1. In the Calculate ribbon group, click All to calculate your equation:
$1+2=3.000$
2. You should find the answer displayed in your document as shown above. if you have an error, take a look at the Errors and troubleshooting section below.

## Units in Tedds

Tedds automatically takes units into account, so you don't need to apply conversion factors to get the right answer. Tedds will also check that the units you are using are dimensionally correct and warn you if they aren't.

1. Type the following in your document using the same case as you see here:

$$
890 \mathrm{~mm}+1 \mathrm{ft}+8.5 \mathrm{in}=? \mathrm{~m}
$$

2. In the Calculate ribbon group, click All to calculate this equation:
$890 \mathrm{~mm}+1 \mathrm{ft}+8.5 \mathrm{in}=1.411 \mathrm{~m}$
3. You should find the answer displayed in your document as shown above. if you have an error, take a look at the Errors and Troubleshooting section below.

## Defining and using input variables in Tedds

Defining variables is the key to writing effective Tedds calculations. We will use the following calculations to demonstrate this. Do not type this yet - we will show you how to enter the calculation below (in stages).

## STEEL SECTION TIE DESIGN

## Min. yield strength; <br> Fy $=275 \mathrm{~N} / \mathrm{mm}^{2}$

Design strength;
$\mathrm{Fa}=0.6 \times \mathrm{Fy}=? \mathrm{~N} / \mathrm{mm}^{2}$
Tie force;
$\mathrm{Tf}=450 \mathrm{kN}$
Min gross section area; $\mathrm{A}_{\text {MIN }}=\mathrm{Tf} / \mathrm{Fa}=$ ? $\mathrm{cm}^{2}$
Tie effective length; $\quad L_{e}=5 \mathrm{~m}$
Slenderness limit; $\quad \lambda_{L}=300$
Min. radius of gyration; $r_{M I N}=L_{e} / \lambda_{L}=$ ? cm

1. Close the current document, (because two documents were opened at the beginning of the exercise you should still have an empty one displayed).
2. Type in the following two paragraphs in the empty document.

## STEEL SECTION TIE DESIGN

## Min. yield strength; <br> Fy $=275 \mathrm{~N} / \mathrm{mm}^{2}$

The first paragraph is just a title for our calculation. The second paragraph is a standard Variable Definition which uses a superscript in its units.
3. To type the unit $\mathrm{N} / \mathrm{mm}^{2}$, first type $\mathrm{N} / \mathrm{mm}$, then click the Superscript button.
4. Now type 2, then click the button again to return to normal text. Once you have finished typing, read the notes in the box below for an explanation of a standard variable definition, and to check you have typed it correctly.


Note the following:

- The expression defines the variable's unique name, current value and units.
- Variable names are case sensitive, cannot contain spaces or be function names (like sin for example). Other than that you can use pretty much anything you like as you can see, including Greek text and Subscripts.
- The semi-colon is important. It is a delimiter that separates an expression from text, or another expression in the same paragraph. If you omit delimiters in either of these cases, then you will get an error when you calculate your document.
- The equality sign '=' defines an expression. Without it no calculation will be performed.
- Spaces and Tabs are not significant in this, or any other, expression. Use as many or as few as you wish to make your calculations look presentable and easy to read.
- We will look at Units in more detail shortly but, for now, note that they are also case sensitive and have a correct syntax, that you must use (as shown above).

5. Now enter the following paragraph which uses this variable:

## Design strength;

$$
\mathrm{Fa}=0.6 \times \mathrm{Fy}=? \mathrm{~N} / \mathrm{mm}^{2}
$$

6. Use the Insert multiplication symbol ${ }^{\mathbf{X}}$ button to enter the $\times$ mathematical operator - do not use a lower-case x.
7. Check the notes in the box below for a detailed explanation of the components of this paragraph.


Note the following:

- The same observations as before apply to delimiters, explanations, spaces and units.
- You cannot omit math operators in expressions: Tedds cannot calculate 0.6 Fy, you must type the expression as shown above, including the $\times$.
- The result field ? is used to tell Tedds where the result should be output when calculated the ? will be replaced with the result of the expression.
- The value of the result will be in the result unit you specify. Ensure this has the correct form and dimensions. Do not omit this.
- The expression contains a variable (Fy) that is defined in the calculations before (that is above) the point where it is used. Expressions should not contain variables that are not yet defined.
- The expression contains two equalities and performs two functions:
- calculates and displays the value we wish to know - the result.
- assigns this result to a variable named - Fa
- It is not obligatory to always do this. You can write a valid expression to perform just one of these functions by either omitting the variable name and the first equality, or the second equality and the ? and unit.

8. In the Calculate ribbon group, click AII.
9. Your expression has been calculated and the result has replaced the ? as before. if you have an error, take a look at the Errors and troubleshooting section below.
10. Here are the next two paragraphs of the calculation. The first paragraph is a standard variable definition, while the second uses both Tf and Fa to determine the minimum section area and creates a variable $A_{\text {MIN }}$ with this value.

# Tie force; $\mathrm{Tf}=450 \mathrm{kN}$ <br> Min gross section area; $\mathrm{A}_{\mathrm{MIN}}=\mathrm{Tf} / \mathrm{Fa}=? \mathrm{~cm}^{2}$ 

11. Type the first paragraph, then follow the steps below to enter the second.
12. The second paragraph contains examples of the use of Subscript (often used for name suffixes) and Superscript (used for powers).
13. To type the variable name $A_{\text {MIN }}$, first type the $A$, then click the Subscript
$\mathrm{x}_{2}$ button.
14. Now type MIN, then click the button again to return to normal text.
15. To type the unit $\mathrm{cm}^{2}$, first type cm , then click the Superscript $\mathbf{x}^{2}$ button.
16. Now type 2, then click the button again to return to normal text.
17. Click Calculate All to calculate these expressions once you have entered them.

## Min gross section area; $\mathrm{A}_{\text {MIN }}=\mathrm{Tf} / \mathrm{Fa}=27.273 \mathrm{~cm}^{2}$

18. You should find the result displayed in the document - if you have an error, take a look at the Errors and troubleshooting section below.
19. Here are the final three paragraphs of the calculation. Follow the steps below to create these.
20. Here we define two new variables to be used in the expression in the final paragraph.

Tie effective length; $\quad L_{e}=5 \mathrm{~m}$
Slenderness limit; $\quad \lambda_{\mathrm{L}}=300$
Min. radius of gyration; $r_{M I N}=L_{e} / \lambda_{L}=$ ? cm
21. Type the first paragraph, entering the subscript for the name Le as you did before.
22. Follow the steps below to enter the second paragraph.
23. Use the Greek text ${ }^{\alpha}$ button to enter the name $\lambda_{L}$
24. First click the button indicated, then type the Roman equivalent of the Greek letter - (l in this case for lambda).
25. Now click the button again to return to normal text, then enter the subscript suffix as you did above using the Subscript button.

NOTE A much easier way of entering Greek characters and more complex units is to use the Tedds Greek Characters, Tedds SI Units and Tedds US Units toolbars which can be selected from the Tedds Tab on the ribbon.
26. Use Copy and Paste to enter this name in the final expression.
27. Now click Calculate All to calculate these final expressions:

## Min. radius of gyration; $r_{M I N}=L_{e} / \lambda_{L}=1.667 \mathrm{~cm}$

28. You should find the result displayed in the document - if you have an error, take a look at the Errors and troubleshooting section below.

## Storing variables in Tedds

1. Click the Variables button.
2. The Variables dialog box will open, displaying the stored values.

| Variables |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Manage | Document | System |  |  |
| Document Variables |  |  |  |  |
|  | Value | Dimensions | Type | Attributes |
| $\mathrm{Im}_{\mathrm{M} / \mathrm{N}}$ | 0.017 | ${ }^{1}$ | Numb |  |
| $\mathrm{A}_{\mathrm{M}} \mathrm{M} \mathrm{N}$ | 0.003 | $L^{2}$ | Numb |  |
| Fa | $1.650 \times 10^{8}$ | $\mathrm{M}^{1} \mathrm{~L}^{-1}{ }^{-2}$ | Numb |  |
| Fy | $2.750 * 10^{8}$ | $M^{1} L^{-1} T^{-2}$ | Numb |  |
| Le | 5 | $L^{1}$ | Numb |  |
| If | 450000 | $\mathrm{M}^{1} \mathrm{~L}^{1}{ }^{-2}$ | Numb |  |
| ${ }^{\text {L }}$ L | 300 |  | Numb |  |

3. You will note that we do not just store the variable name and value, but also the dimensions. This is how Tedds handles all the unit conversions for you.

NOTE You can Delete variables from this list if you wish:
4. Cancel from this dialog, and edit one of the values on the page - say the tie force to $T f=600 \mathrm{kN}$. Now check back in the stored variables and you will note the stored value has not changed.
5. Re-calculate the document and check back in the list of variables - the new value has now been stored.

NOTE An important observation - the stored value of a variable only changes when you re-calculate the definition, not when you just edit it on the page. If you edit the value of a variable you must recalculate the variable definition, and any calculations that use it to update them.

## More about units in Tedds

1. Change the tie force back to its original value $T f=450 \mathrm{kN}$. Calculate again to store this new value.
2. Look again at the values displayed in the Variables dialog box. You will note that many of these values are not those displayed in the document.
3. The values in the dialog are in the Base Units in which Tedds performs all calculations and from which all the other units are derived. The base units are shown in the following table:

| Tedds Base Units |  |
| :--- | :--- |
|  | Metric |
| Length | m |
| Mass | kg |
| Time | S |
| Temp | ${ }^{\circ} \mathrm{C}$ |

NOTE If you hover over a variable name in the Variables dialog box a summary list is displayed showing the value of the variable in all applicable standard units.
4. Note that our calculation does not include any conversion factors.

NOTE Tedds' unit handling is a massive help - Tedds comes with a huge number of defined units and you can add more if needed.
Dimensional Checking - Tedds checks all dimensions in your calculation and will inform you if these are incorrect. This is why you should use units consistently throughout your calculations.

Do so, and you can have total confidence that your calculations are dimensionally correct.
5. Save the document and give it a name - call it "Exercise 2" - as we wish to build on it later in the guide.
To complete this exercise, in the next section we will take a brief look at handling errors in calculations.

## Errors and troubleshooting

The problem with a lot of guides is they only show you the right way to do things, and then you have no idea what to do when something goes wrong! Let's look at a couple of errors and how to fix them.

- If you have an error in your calculations, Tedds will inform you when you calculate your document and the error is encountered. The first thing you should do is Interrupt the calculation process.
- If you have jumped to this section because you have encountered an error previously, then click the Interrupt button in the dialog (see step 11 below), review the details and then return to fix the error in your calculations and continue with the exercise.

If your previous calculations were error free, then you will have had no need to look at this section. We shall therefore create some calculations which do have errors so that we can see how to handle them.

1. Open a new blank document for this example.
2. Click the Tedds options button (on the More menu).
3. The Options dialog box will open, click on the Calculating / General page.

4. Make sure that the options above are checked and then click OK. We can now proceed to create some calculations with errors.
5. Enter the following 2 paragraphs as they appear here - see if you can spot any errors as you do, but don't fix them yet!

$$
\begin{aligned}
& \mathrm{wL}=4.5 \mathrm{kN} / \mathrm{m}^{2} \quad \mathrm{wD}=2.5 \mathrm{kN} / \mathrm{m}^{2} \\
& \mathrm{wT}=\mathrm{wL}+\mathrm{WD}=? \mathrm{kN} / \mathrm{m}^{2}
\end{aligned}
$$

6. Now click the Calculate All button to calculate the calculations - you should see the Expression Error dialog:

| Expression Error dialog Explained |  |
| :---: | :---: |
|  | Expression Efror <br> The following error invalid expression <br> 1 <br> has occurred in the expression: $w L=4.5 \mathrm{kN} / \mathrm{m} 2 \mathrm{wD}=2.5 \mathrm{kN} / \mathrm{m} 2 ;$ <br> Therefore the results for this expression can not be calculated. <br> Problem <br> Tedds cannot determine what this expression means. <br> Common causes and solutions <br> (1) Equations and text are not separated es <br> $1 \mathrm{~m}+2 \mathrm{in}=$ ? ft Here 25 some more sext Tedds will interpret this all as one equation (that doesn't make sense). Use a semicolon or new paragraph to separate equations and text e ? |
| This is the specific error. |  |
|  | This line is the one that Tedds cannot evaluate, so look here to spot the error. |
|  | This is an explanation of the error, together with some typical causes. |
| This is the button you should generally click, |  |

7. Tedds flags the first error, and gives you some help in fixing it.
8. When you are ready, click the Interrupt button. Tedds highlights the error for you in the document as shown below: Once we fix the problem and recalculate, this error message will automatically disappear.

# $w L=4.5 \mathrm{kN} / \mathrm{m}^{2} \quad \mathrm{wD}=2.5 \mathrm{kN} / \mathrm{m}^{2}<$ Error: invalid expression><interrupted by user> 

9. Check the rule about delimiters (see The Standard Variable Definition Explained info box earlier in this topic). There should be a semi-colon between the expressions to separate them. Add this in and re-calculate the entire document.

$$
\mathrm{wL}=4.5 \mathrm{kN} / \mathrm{m}^{2} ; \mathrm{wD}=2.5 \mathrm{kN} / \mathrm{m}^{2}
$$

10. Now we will get the next error - the variable WD is not defined. We have typed $W D$ instead of $w D$ and variable names are case-sensitive.
11. Click the Interrupt button to stop the calculation.
12. Correct the variable name on the page to $w D$ and re-calculate. The calculations should now complete with no problems. Tedds automatically deletes all error messages from the page.

## What next?

Congratulations! You have completed your first Tedds calculation. You can now begin writing effective calculations in Tedds for Word. There are more great features that make such calculations even more powerful, and we will show you these later.
Now we are going to look at using calculations from the Engineering Library in Tedds for Word: Using Library Calculations in Tedds for Word (page 251)

## Using library calculations in Tedds for Word (Eurocode design example)

We have shown that you can write your own calculations in Tedds for Word, but you can also use the Library Calculations. The advantage of this is that you can add additional text to your output easily, because it is already in a Word document. You can also combine more than one calculation in a document, add pictures and tables - anything you need to create a polished report. And if you need to update the calculations you can do it directly in the document.
Sometimes, of course, you just need an answer right now and the polishing can wait. That's why we have Tedds too. With the two modes, you have both bases covered.

In this exercise we will use the Timber member analysis \& design (EN1995) calculation to show you how to run a typical calculation from the extensive Engineering Library in Tedds for Word.

Allow about 15 minutes to complete this exercise.

Information required for this exercise

| Analysis Information |  |  |
| :--- | :--- | :--- |
| Use the following information for the calculation. |  |  |
| Beam span | Length | 3000 mm |
| Supports: | Pinned |  |
| Loading | 1 | $2 \mathrm{kN} / \mathrm{m}$ |
| Self Weight factor | Full UDL | $3 \mathrm{kN} / \mathrm{m}$ |
| Dead Load | Full UDL | Imposed Load |
| Load Combination 1 | $1.35 \times$ Dead +1.5 x Imposed |  |


| Design Information |  |
| :--- | :--- |
| Use the following information for the calculation. |  |
| Type of beam | Flitch |
| Breadth of timber members | 44 mm |
| Depth of timber members | 195 mm |
| Number of timber sections | 2 |
| Timber grade stresses | C24 |
| Service class of timber | 1 |
| Breadth of steel members | 8 mm |
| Depth of steel members | 190 mm |
| Number of steel members | 1 |
| Steel design stress | $235 \mathrm{~N} / \mathrm{mm} 2$ |
| Bolt diameter | 12 mm |
| Characteristic tensile strength | $400 \mathrm{~N} / \mathrm{mm}{ }^{2}$ |
| Length of bearing | 100 mm |
| Compressive edge of beam | Restrained |
| Duration of loading | Long term |
| Maximum allowable deflection | $0.004 \times$ span |

## Buttons used in this exercise

The new commands you will be introduced to in this exercise are located on the Tedds tab as shown below:


## Using Calculation Sections in Tedds for Word

As stated, one of the reasons for running library calculations in Tedds for Word is so that you can combine a number of calculations in a single document. In this case, each calculation should be placed in a separate Calculation Section, so we will start off by introducing one of these. Calculation Sections will be explained in more detail later in this exercise.

1. Open a new Tedds document.
2. Insert a New Calc Section by clicking the appropriate button.
3. The following dialog will appear - enter a name for the section. This will form the title for the calculation in the document.

4. Click OK and this will enter a Calculation Section Title in the document. We place a calculation below this title and thus within the section. You should note that your cursor is now on the line below the section title.

## Selecting calculations from the library

All the library calculations are available from the Library Access System. To use a calculation we retrieve it from the Library, place it in our document and calculate it.

1. If it is not open already, launch the Library Access System. 国
2. Click the Index button if the index is not displayed and ensure you have the Tedds calculations index option selected.

3. To open a folder in the index simply double-click it. Open the Beams folder, then the Timber member analysis \& design (EN1995) folder, then select (click on) the Timber member analysis \& design (EN1995) item.

4. To place this calculation in the document, click the Execute button in the library. (You can also double-click on the selected item to do this.) In both cases you will see the Insert Calc Item dialog.

5. This dialog allows you to control where the item will be added. Simply choose the options as above then click OK and the item will be pasted at the cursor position in the document.

NOTE Note that one of the options in the dialog is to add a new Calc Section. In this example we have already added one manually, so as shown above, on this occasion the option should be unchecked.
6. You should now have the following in your document.

## FLITCH BEAM DESIGN

## Timber member analysis \& design - EN1995

7. We can now close the Library - there is no need to have it open while a calculation is running.
8. Click the Calculate Section button to start the calculation.
9. The Interface for the calculation will now be displayed, along with the Progress Log. You are now in familiar territory as everything from this point works exactly as you learned in the first exercise - Using Tedds (page 218)
10. Click the Notes button and briefly look at the notes before proceeding.

11. You will be comfortable with entering information in the interface by now, so we won't show every input step in detail. The data to be entered is given at the start of this exercise.
12. Click the Design options... button, enter the bolt diameter and tensile strength. Take a moment to review the other inputs asked for on this page, then click OK
13. Click the Geometry... button, enter the span and support data then in the Section box, click Select...
14. Check the Flitch box, then enter the timber and steel plate properties.
15. In the droplist at the top of the dialog, select Timber (EC5) to display the timber strength classes datalist, and from there click Softwood species, C24 and Select
16. Click OK to close the Section dialog.
17. Click the Loading tab and then on the right side of the dialog click + Add to add a Beam member load. Enter this as a Permanent Load Case UDL of $2 \mathrm{kN} / \mathrm{m}$ in Global Z.
18. In in the next row enter a second Beam member load, this time an Imposed Load Case UDL of $3 \mathrm{kN} / \mathrm{m}$ in Global $Z$.
19. Click on the Load Combinations tab - as the factors are the those we require, simply click OK.
20. Select the nominal yield strength for the steel plates.
21. At this point you can review the force and deflection diagrams if required.
22. Click the Deflection criteria... button, enter choose span/250, enter a deflection limit of 12 mm then click OK
23. Click OK to return to the previous page of the interface and you will see the calculations have been performed and utilisation ratios determined while you are still in the interface.

24. If the design is not satisfactory it is a simple matter to use the Member details... button to adjust the section to achieve a satisfactory design. You should find that the flitch beam passes all the checks so click Finish to close the interface and place the calculations into the document.
25. Close the Progress Log and examine the calculations - they are of the same form as the ones you saw in Tedds, and they show you exactly how the results have been determined.

## Viewing Hidden Text in Tedds for Word

Some calculations are hidden however. There is a slightly different way of viewing Hidden Text in Tedds for Word.

1. Check the Hidden Calcs box to view any hidden text.
2. Uncheck the button to re-hide.

## Re-calculating in Tedds for Word

This is accomplished in a similar manner to Tedds.

1. Click the Calculate Section button.
2. The calculation will now run again - try changing some of the input data in the interface.
3. DO NOT over-type values on the page prior to re-calculating - this is not the way to change input data when using our library calculations (as distinct from ones you have written yourself in the manner shown in the previous section of the guide) in Tedds for Word.

## Adding another calculation to the document

To start a new calculation in this document create a new Calculation Section.

1. Place your cursor below your existing calculations.
2. Click the Add New Calc Section button.
3. Type a name for the new section - this will be the title of your next calculation. Then click OK.
4. A new calculation should be placed below this title and thus within the section.
5. Retrieve another calculation from the library and place it within this section
6. To calculate just one section, we place our cursor within the section and use the Calculate Section button.

## Calculation Sections Explained

Refer back to the section Storing Variables in Tedds. You will note that here we have just one list of saved variables, known as Document variables, as we have not used Calculation Sections. When we
use Calculation Sections, Tedds for Word saves the variables for each calculation in a separate list unique to each section. These are knows as Section variables. This ensures that all your input values are retained separately from those for another calculation.
When you need to update a single calculation within a document that contains many calculations, simply place your cursor within that section and use the Calculate Section command. Place your cursor within the first

| Calculation Sections Explained |
| :--- |
| section in your document, and click the Variables button to view the unique |
| list for this part of the document. |
| Tedds for Word also has commands which enable you to manipulate the |
| calculation sections in your document. You can delete a calculation section, |
| copy it, paste it into a new location in your document and change it's name. |

## What next?

Congratulations! You have completed the third exercise of the guide and learned all you need to run calculations from the Library in Tedds for Word.
You can now save the document and re-use it as appropriate.
In the next section you will learn how you can make your own calculations even more powerful: Writing Tedds calculations - stage 2 (page 261)

## Writing Tedds calculations - stage 2 (Eurocode design example)

In this exercise we will investigate the use of math and data functions to build on the stage 1 calculation, extending its capabilities and introducing some more Tedds features.

## (1)

## Allow about 30 minutes to complete this exercise.

## Buttons used in this exercise

The new commands you will be introduced to in this exercise are located on the Library and Show/Hide groups of the Tedds tab as shown below:


## Defining input variables

Here are the new calculations we will add to the document you created in exercise 2 in order to check the adequacy of an actual section.

## Check section:

## Try a $152 \times 89 \times 24$ Rolled Steel Channel

Section properties; $\quad A=30.42 \mathrm{~cm}^{2} ; \quad r_{x x}=6.20 \mathrm{~cm} ; \quad r_{y y}=2.66 \mathrm{~cm}$
Design radius of gyration; $r_{d}=\min \left(r_{x}, r_{y y}\right)=$ ? cm
Actual stress; $\mathrm{f}_{\mathrm{a}}=\mathrm{Tf} / \mathrm{A}=$ ? $\mathrm{N} / \mathrm{mm}^{2}$
Actual slenderness; $\lambda=L_{e} / r_{d}=? f 1$

1. Type the first two paragraphs, which are just text, below the existing calculation.
2. Type the third paragraph and note that here we are defining three input variables which are properties of the section we are checking. Ensure you separate the text and all the expressions using delimiters (;) as shown.

Section properties;

$$
A=30.42 \mathrm{~cm}^{2} ; \quad r_{x x}=6.20 \mathrm{~cm} ; \quad r_{y y}=2.66 \mathrm{~cm}
$$

## Tedds math functions

1. Now type the fourth paragraph. Note how the Tedds math function min is used here.

$$
\text { Design radius of gyration; } \quad r_{d}=\min \left(r_{x x}, r_{y y}\right)=? \mathrm{~cm}
$$

NOTE A math function is always followed directly by its argument(s) in parentheses as shown here. There are many more such functions available in Tedds for Word. For full details of this and other functions, consult the Mathematical functions topic, or refer to the Writing your own custom calculations Index item in the Library Access System, where all functions are completely documented.
2. Now type the fifth paragraph - this is a simple expression that determines and displays the actual stress in the section and assigns the result to the variable $f_{a}$.

## Actual stress; $\mathrm{f}_{\mathrm{a}}=\mathrm{Tf} / \mathrm{A}=$ ? $\mathrm{N} / \mathrm{mm}^{2}$

## Result accuracy and formats

It is sufficient to display the slenderness to one decimal place. To do this we use a format string to override the default result setting of three decimal places.

1. Now type the last paragraph of the new calculations as follows. Use the Greek text button for the variable name $\lambda$.

## Actual slenderness;

$$
\lambda=L_{e} / r_{d}=? f 1
$$

2. The characters $f 1$ following the ? are the format string. The format string must immediately follow the ? with no space in between as shown. See below for a fuller explanation.
3. Once you have finished typing this last expression, check the new paragraphs carefully. Have you included all the delimiters? Have you used subscripts correctly? Have you used the correct case for variable names and units?
4. When you are satisfied that everything is correct, click the Calculate All button. A math function is always followed directly by its argument(s) in parentheses as shown here. There are many more such functions available in Tedds for Word. For full details of this and other functions, consult the Tedds Help system topic Mathematics, or refer to the Writing your own custom calculations Index item in the Library Access System, where all functions are completely documented.
5. If you have an Error, then Interrupt and see Errors and troubleshooting (page 248). Fix any errors until your calculation works fully.
6. Review your results and look at the last paragraph to see how the format string we used has operated:

## Actual slenderness;

$$
\lambda=L_{e} / r_{d}=188.0
$$

7. Click the Variables button to examine the list of saved variables and check the stored value for this variable:

| Name | Value | Dimensions | Type | Attributes |
| :---: | :---: | :---: | :---: | :---: |
| ${ }^{2} \mathrm{~L}$ | 300 |  | Number |  |
| $\lambda$. | 187.97 |  | Number |  |
|  | Result Format Strings Explained |  |  |  |
|  | You can override the default result setting, and reduce or increase the number of decimal places for a displayed result, by using a result format string after the ? result field. For example typing ?f2 will display the result to two decimal places. It is important that there is no space between the format string and the ?. The format string characters signify the following: |  |  |  |
|  | $\mathrm{f}=$ fixed format, and $2=$ result to be displayed to 2 decimal places (can be from 0-15) |  |  |  |
|  | Note that format strings only control the precision of the result displayed in the document, not any result that is stored by Tedds. |  |  |  |
|  | For full details of this and other result formats, consult the topic Result formats and precision (page 523). |  |  |  |

## Using data functions in calculations

The calculation as written is very useful, but we can enhance it further. One big improvement is to include a Data List in the calculation, making the properties of a huge number of section types and sizes instantly available.

1. First edit the two paragraphs underneath the heading Check Section; as follows:
2. Delete the following text for the section name - Try a $152 \times 89 \times 24$ Rolled Steel Channel. Leave an empty line here.
3. Next delete just the values for the properties of the section. Replace them with a ? result field. You should end up with the following:

## Place cursor here

## Check section;

Section properties; $\quad A=? \mathrm{~cm}^{2} ; \quad \mathrm{r}_{\mathrm{xx}}=$ ? $\mathrm{cm} ; \quad \mathrm{r}_{\mathrm{yy}}=$ ? cm
4. Finally, place your cursor as shown at the very end of the heading.

## Retrieving Data Lists from the Library

1. Click the button to Launch the Tedds Engineering Data
2. This opens a special Set in the Library where all the Data Lists and Data Tables are accessed. There is a lot of data in this set. We wish to find a Data List that includes steel RSCs suitable for this calculation. We will use the Find facility to help us locate such a table.
3. Each item in the set has both a short and a long name, we are going to find by the short name, so ensure View/Long Names is unchecked before continuing.
4. Now select the Group we want to search in - Eurocodes.

5. Select Edit/ Find in the library, and type in steel as shown.

6. Library Access System finds the first item containing steel, this is not the item we require so click find next until the European steel sections item shown below is highlighted.

7. Now to bring this item into your calculation, either double click the item, or click the Execute... button. You should find the following has been entered in your document.

## Check section;

## Try UB 127x76x13;

Section properties; $\quad A=? \mathrm{~cm}^{2} ; \quad \mathrm{r}_{\mathrm{xx}}=$ ? $\mathrm{cm} ; \quad \mathrm{r}_{\mathrm{yy}}=$ ? cm
8. This text inserted is a Tedds Data List Field which launches the specified Data List (further details on Tedds Fields are given below),
9. Close the library once you have retrieved the Tedds Data List Field.
10. Now click Calculate All to calculate the document again.
11. The Data List will now be displayed when the Tedds Data List Field is calculated.
12. Select the $152 \times 89 \times 24$ channel section then click on the Details button to examine the variables defined in the table.


NOTE Note that we have used exactly the same names for the properties in our calculation as those defined by the Data List - A, $r_{x x}$ and $r_{y y}$. This is the key to integrating all Data Functions with your calculations. Remember that variable names are casesensitive.
13. Click the Select button to return these variables to your calculations - you will see that the section's properties from the Data List replace the ? fields in your document and the Tedds Field displays the choice you made in the Data List.

Try RSC 152x89x24;
Section properties;

$$
A=30.418 \mathrm{~cm}^{2} ; r_{x x}=6.198 \mathrm{~cm} ; \quad r_{y y}=2.663 \mathrm{~cm}
$$

14. The Data List is now integrated with your calculation. Re-calculate a few times, each time changing your selection of channel size in the Data List, to test this.
15. Click the Variables button and you will see that all the variables defined by the Data List are listed and are thus available to be used in calculations.
16. Save the calculation at this stage, as we will build on it in the final exercise.

NOTE Whilst in this exercise the Data List was inserted into the calculation via the Tedds Engineering Data button, it could have been inserted via the Tedds Field button instead. The use of Tedds Fields is covered in the next exercise Enhancing Calculations.

## Tedds Fields

1. Check the Field Codes box.
2. Look at the Tedds Field in your document and you will see the following:

Check section;
\{ =CSC|CALL DataList("EuroECsi-xø dls", "Rolled Steel Channels", "152(89(24))", "Try", "", "selectedSection", "selectedPage") \}
3. The command that runs the Data List is now revealed. Uncheck the Field Codes box again to return to the normal view of the document.

## Tedds Fields Explained

Field Codes enable you to see and thus edit the hidden commands which are Tedds Fields. These commands run special functions in Tedds like the Data Lists. We will see some more Tedds Fields shortly. A Tedds Field will run when it is calculated, like any normal expression. We hide the Tedds field, since you would not want it to appear in a printed report. The Field Codes button reveals the Tedds Fields. Tedds Fields should be treated like expressions, and separated from text and other expressions in the same paragraph using semi-colons.

## What next?

Congratulations! You have completed the fourth exercise and learned everything you really need to write powerful Tedds calculations. Maybe now would be the time to have a go at writing a calculation of your own. It's a good idea to start with something simple and build on the complexity as you become more familiar with Tedds.
The next step in the guide, Enhancing Calculations is about making Tedds calculations still easier to work with, and is especially relevant if you envisage writing calculations for others to use. Even if your calculations are for your own use you may find these further features beneficial so we recommend that
you review them. You might like to leave this step until you have had a go at writing a calculation of your own using what you have learned so far.

## Enhancing calculations (Eurocode design example)

There is even more functionality available for our calculations than we have seen so far. Whether you use these enhancements depends both on the purpose of the calculation, and on the time you have available. Certainly these features are very useful when you are writing calculations which others will use (as we do at Trimble). Hence the Tedds library is packed with examples which use these features, and you have already seen many of them when running our calculations.

In this exercise we will enhance the previous calculation and you will see what we are talking about.
(4)

Allow about 15 minutes to complete this exercise.

## Buttons used in this exercise

The only new command you will be introduced to in this exercise is located on the Insert group of the Tedds Calcs ribbon as shown below:


## Tedds Input Fields

The Tedds Input Field speeds up the editing and often the creating of input variables. We will replace all the existing variable definitions in the calculation:

1. Delete the entire definition for the Min. yield strength, Fy, from your page. Leave your cursor on the empty line.
2. Click the Tedds Field button.
3. The following dialog will appear.


| Tedds Input Field |  |
| :--- | :--- |
| Prompt | tells the user what the variable is and <br> appears on the page |
| Name | the unique name of the variable |
| Units | if the property has dimensions then <br> enter a unit here |
| Default value | this value will be displayed initially for <br> user to edit or accept |
| Format | the format displayed on the page |
| No. of decimal places | the number of decimal places <br> displayed on the page |

4. Enter the details shown to define the input for this variable:

Prompt $=$ Min. yield strength
Name $=$ Fy
Units $=N / m m^{2}$ (type the main part of the unit, click the superscript button and then type 2)
Default value $=275$
Format = Fixed
No. of decimal places $=0$
5. Accept the defaults for other options and click OK when you have everything entered.

NOTE We do not put a value in this dialog - this is entered when the statement is calculated.
6. The following will appear on the line containing your cursor:

## Min. yield strength;

$\mathrm{Fy}=$ ? $\mathrm{FO} \mathrm{N} / \mathrm{mm}^{2}$;
7. With the Field Codes button on you will see the following Tedds Input Field preceding the text on the line.
$\{=C S C \mid C A L L$ Input("Min. yield strength","Fy","N/mm^(2)","275",1)\},Min. yield strength; Fy = ?FO N/mm²
8. Calculate your document to run it.


The Set Variable Value dialog appears, as shown above.
9. Because we already have a value defined for this variable it is displayed in the input. You can accept it, or edit it as required. There is no need to find and edit the variable value on the page, as it is automatically updated when you enter a value in the Set Variable Value dialog.
10. Delete and replace the 3 remaining variable definitions in the same manner - the table below shows what you need to enter in the Insert Tedds Field dialog for each of the three variables in order from left to right. When you have done this, recalculate your document to ensure that your definitions are correct.

| Insert Tedds Field Properties |  |  |  |
| :--- | :--- | :--- | :--- |
| Input | $\mathbf{T}_{\mathbf{f}}$ | $\mathbf{L}_{\mathbf{e}}$ | $\boldsymbol{\lambda}_{\mathbf{L}}$ |
| Prompt | Tie force | Tie effective <br> length | Slenderness <br> limit |
| Name | Tf | $\mathrm{L}_{\mathbf{e}}$ | $\boldsymbol{\lambda}_{\mathrm{L}}$ |
| Units | kN | m |  |
| Default value |  |  | 300 |
| Format | fixed | fixed | fixed |
| No. of decimal places | 2 | 3 | 0 |

NOTE To enter Greek characters in the Insert Tedds Field dialog for variable names like $\lambda$ simply click the Greek character button
( $\boldsymbol{\alpha}$ ) and then type in the equivalent Roman character, in this case you need to type I (i.e. lowercase letter L) to get $\lambda$. To enter Subscript or Superscript characters simply click the Subscript or
Superscript button ( ${ }^{\mathbf{x}_{2}}, \mathbf{x}^{2}$ ) and then continue and type in the subscript or superscript. Once you have reached its end click the button again to switch back to typing normal text.

The Default value is entirely optional. If you enter one it will be displayed the first time a calculation is run, otherwise the input box will be empty. Delete the stored variables and re-calculate to see the defaults in operation.

| Tedds Interface Designer |
| :--- |
| Although The Tedds Input Field can be used to create all the variables |
| required in a calculation, if you would like to give your calculations a slicker |
| appearance we would strongly recommend using the Tedds Interface |
| Designer instead. This easy to use tool allows you to place all the input |
| variables on a single interface along with sketches and notes if required. For a |
| worked example and further details of how to use the Tedds Interface |
| Designer refer to the Tedds Help. |

## Tedds Show Fields

The final thing we would like the calculation to do is automatically assess our section and report in the document whether our chosen section is passing or failing and, if it is failing, why. We use a Tedds Show Field to do this.

1. Enter the following two paragraphs after your existing calculations:

Check stress;
Check slenderness;
check_stress $=\mathrm{f}_{\mathrm{a}} / \mathrm{Fa}=$ ?
check_slender $=\lambda / \lambda_{L}=$ ?
2. These last two values help us assess the utilisation of the section for the two checks. Assigning them to output variables will help us with creating Tedds Show Fields. Calculate your document once you have written them to ensure they are working properly before proceeding.
3. Place your cursor beneath these paragraphs and click the Insert Tedds Field button.
4. Select the Show tab. The Show Field we want to create will test whether the section is failing stress and output a message to give the status of the check.
5. Select the Condition type option and input the following information:

Insert Tedds Field ? $\times$
Show
Insert a Tedds field that when calculated will show text in your document.

6. The output of the Tedds Show Field consists of two text messages known as output strings. Only one output string is displayed in the document depending on the status of the condition.
7. Check your input carefully, then click OK to enter the Tedds Show Field in the document.
8. When you have OK'd the input, click the Field Codes button to view the resulting Tedds Show Field. It should be as shown below. If your Tedds Show Field is incorrect, the best thing to do at this stage is to delete it and run through the Insert Tedds Field dialog again.

## $\{=$ CSCCCALL Show (ifcheck_ stress $>1$ 1,"Section fails stress check, "Section OK for stress"), Show, True, Tue ) \};

## Using logic in Tedds

Take a close look at this Tedds Show field, and you can see how we use a simple logic statement to output one of two pieces of text using the if logical operator.

```
if(check_stress > 1, "Section fails stress check" , "Section OK for
stress")
```

The general form of this logic expression is as follows:

```
if(condition, true_output, false_output)
```

NOTE You can use this kind of expression to define variables using a condition. The outputs can be values, expressions or further logic expressions.
For example:

$$
a=i f(b>c, 10,20)=?
$$

Check the table of Logic Functions in the Mathematics (page 502) topic for full details.

1. Now calculate your document to calculate the Tedds Show Field. You should find you have something similar to the following in your Progress Log and you will also see the output text on the page where you placed the Tedds Show Field.

2. Change some of your input values and re-calculate a few times to test your full calculation and both the pass and fail output of the Tedds Show Field.

## Tedds Data List Fields

In the previous exercise we inserted a Data List Field into the calculation using the Engineering Data button. However, it could have been inserted more easily using the Tedds Field button:

1. With the Field Codes button on you will see the following Tedds Data List Field:

## Check section;

## \{ =CSC|CALL DataList("euro.dls", "Rolled Steel Channels", "152(89(24))", "Try ") \};

2. Delete the entire definition of this field from your page. Leave your cursor on the empty line.
3. Click the Tedds Field button.
4. Select the Data List option and scroll down to select the same .dls file name as that shown in the line you just deleted above.
5. Input the Prompt as Select Section.
6. To input the Default page and Default item click the ellipsis button ( ) and then select the page and section size that you want to appear as the default.
7. Accept the defaults for other options and click OK when you have everything entered.
8. Calculate your document to run it once more.

## What next?

Congratulations! You have completed the final exercise in the guide and are ready to begin using Tedds to its full potential.

Here are a few things you could try next:

- Create another Tedds Show Field similar to that above for the slenderness check - following is the logic statement you would use for this:


## Condition

check_slender >
1

- Create a Tedds Show Field to give the overall status of the section, checking both slenderness and stress. Try the following:

Condition

- Take a look at Tedds Message Fields. The input for these is the same as Tedds Show Fields but their output is displayed in a Message box, rather than in the document. You will see examples of their use in the Tedds Engineering Library Calculations.
- Try creating Messages using the Value of Variable option to show the values of the minimum area and radius of gyration in the Log before the Data List is displayed.
Of course there's much more for you to discover. We wish you an enjoyable and productive time in using the program in your day-to-day work, and exploring its capabilities more fully.
If you would like to read up on further information about Tedds, then we recommend the Tedds Help system, which you can access in the usual way.
Some Tedds dialogs have context sensitive help. To see this simply click the Help button in the dialog.

We also run training courses in most locales, for further information on availability contact the Tedds support team in your region, simply click the Support icon in any of Tedds' automated calculations.

## Quick start guide - Australian design examples

The Quick Start Guide comprises the following 5 exercises, which are best worked through in sequence:

- Using Tedds (page 277)
- Writing Tedds Calculations - Stage 1 (page 298)
- Using Library Calculations in Tedds for Word
- Writing Tedds Calculations - Stage 2
- Enhancing Calculations


## Using Tedds (Australian design example)

In this exercise you will design a steel beam in order to learn how to use any of the calculations in the extensive Tedds Engineering Library.

## (1)

## Allow about 15 minutes to complete this exercise.

## Design information required for this exercise

We wish to check the following RHS steel beam:

| Design Information |  |
| :--- | :--- |
| Design Code | AS 4100 |


| Design Information |  |  |
| :--- | :--- | :--- |
| Dimensions | Length | 5.0 m |
|  | Effective length factors | 0.85 |
| Design Forces | Moment | 135 kNm |
|  | Shear | 60.0 kN |
|  | Axial compression | 40.0 kN |
| Proposed section | Shape | RHS preferred |
|  | Steel grade | C450 |

## Running Tedds and locating calculations

You need to find an appropriate calculation, run it and enter the design information. You will see just how easy this is.

1. Launch Tedds from the Start Tedds icon on your desktop.
2. If this is the first time you are starting Tedds, or if you are updating from a previous version of Tedds, then you will see the Tedds Setup Wizard which allows you to configure Tedds with your company details and so on. Work through the various pages of the Setup Wizard and when you reach the end click Finish.
3. From the Tedds Start wizard click Tedds (as opposed to Tedds for Word) as the version to run.

4. Now you will see the Tedds Start Page:

5. First, click the New tab.
6. Then, click New Document:


You will see the Select Calculation dialog box:

7. Click on the All folder (indicated above).


- The instructions about using Tedds are displayed in the right hand panel.
- Every Tedds calculation is listed in the left hand panel.
- When you click on a calculation, notes relating to it are displayed on the right side.

NOTE If the Show Examples option is checked, you will also see all of the examples that are included in the library - these demonstrate
the potential scope of each of the calculations, show you the typical output, and can be used to start your own designs.

To find a calculation - you could simply click on a folder in the list to open it, then click a heading to select a calculation. However for this example the Find in list feature will be used instead.
8. Type steel member design in the Find in list field.

NOTE Find in list will locate the first item title in the library that contains the exact text entered. Keywords in the item description are also considered provided the option to Find in item descriptions remains checked.
9. The first item in the library matching the entered text is selected - we are looking for the 'Steel member design (AS4100)' calculation. If necessary click Next until it is selected as shown below.


NOTE Note there is also a 'Steel beam analysis \& design (AS4100)' calculation available which will determine the design forces before proceeding to the design.
10. Click the Calculate button at the bottom right of the dialog: three things will happen:

- A new calculation document will open - you will see this in the background.
- The Interface for the chosen automated calculation will be displayed at the first page.
- Another window, titled the Progress Log will also be displayed - we will explain this shortly.


## Entering data in the automated calculation user interface

The user interfaces for all of the calculations in the Tedds engineering library use a consistent style which ensures they are easy to use. You select the design options you require and enter values for dimensions, loading etc. all of which are clearly explained. See the box below for more information.

|  | (1) The General Automated Calculation Interface Explained |
| :---: | :---: |
|  |  |
|  | An '(i)' symbol to the left of a variable description shows that there is more information available about this particular variable. The information area (at the top of the dialog) displays any information about the selected variable (if available). You can also see this information by hovering the cursor over the '(i)' symbol. |
|  | Notes - display details about the calculations being performed. |
|  | Variables - lists all the current variables. Values can be selected from here to enter into the current interface. |
|  | Feedback - this allows you to send feedback to the development team. |


| (1) The General Automated Calculation Interface Explained <br> 5Support - tells you how to obtain support in your region. <br> 6Data fields - enter information in these fields. Where appropriate, <br> variables may have validation which prevents invalid information <br> being entered. |  |
| ---: | :--- |
| 7 | Buttons... - allow you to enter more information or select a particular <br> item. |
| 8 | Next/Back/Cancel/Finish - continue to the next page / return to a <br> previous page /stop the calculations at the current point / return the <br> data to your calculation document. |

1. In this calculation all the values for design forces and section details can be specified on the first page of the interface and the calculation results are also displayed.


Note that additional design and output options are available by clicking the appropriate buttons.
Before we proceed to enter the data take a moment to review the design information given at the beginning of this exercise.
2. Enter the Design bending moment - major axis as 135 kNm .
3. Enter the Design shear force - major axis as 60 kN .
4. Finally for the Axial load applied, click No applied axial force, change to Design Axial Compression force and enter a value of 40 kN .


NOTE As you change the values and options for your design the calculation results are immediately updated.
5. Now you need to choose a section to check, but you don't need to go off and find a list of section properties, since all the data required can be accessed within Tedds. Click the '...' button in the Span details area to display the Data List for steel sections.

## Data Lists

You are now looking at a Data List: a tool that allows you to choose a section and see its properties at the click of a button.


| (1) Data Lists Explained |  |
| :--- | :--- |
| $\mathbf{( 1 )}$ | Choose the shape from the left hand pane. |
| $\mathbf{( 2 )}$ | Choose the size from the right hand pane. |
| $\mathbf{( 3 )}$ | Details - click to see properties of the chosen selection. |
| $\mathbf{( 4 )}$ | Select - click to select the chosen selection. |

1. Click the Rectangular Hollow Section section type - this is known as the Data List page you require.
2. Select the size and thickness you require.
3. Click on the Details button to see all the properties of the selected section - (note that the details window updates instantaneously when you click on another section).
In this case, both a $250 \times 150 \times 8$ RHS and a $300 \times 200 \times 6$ RHS may prove adequate but which is the lighter?

| Details - $250 \times 150 \times 8$ RHS C450 |  |  | $\times$ |
| :---: | :---: | :---: | :---: |
| NAME | Value | UNITS |  |
| Mass | 46.51 | kg/m | $\wedge$ |
| $\mathrm{Ag}_{\mathrm{g}}$ | 5924 | $\mathrm{mm}^{2}$ |  |
| d | 250 | mm |  |
| b | 150 | mm |  |
| t | 8 | mm |  |
| $\mathrm{I}_{8}$ | $4.886 \mathrm{E}+07$ | $\mathrm{mm}^{4}$ |  |
| $\mathrm{S}_{\mathrm{n}}$ | $4.822 \mathrm{E}+05$ | $\mathrm{mm}^{3}$ |  |
| $\mathrm{Z}_{8}$ | $3.909 \mathrm{E}+05$ | $\mathrm{mm}^{3}$ |  |
| $\mathrm{r}_{\mathrm{g}}$ | 90.81 | mm |  |
| $I_{y}$ | $2.219 \mathrm{E}+07$ | $\mathrm{mm}^{4}$ |  |
| $S_{\text {y }}$ | $3.396 \mathrm{E}+05$ | $\mathrm{mm}^{3}$ |  |
| $Z_{y}$ | $2.959 \mathrm{E}+05$ | $\mathrm{mm}^{3}$ | $\checkmark$ |


| Details - $300 \times 200 \times 6$ RHS C450 |  |  | $\times$ |
| :---: | :---: | :---: | :---: |
| NAME | Value | UNITS |  |
| Mass | 45 | kg/m | $\wedge$ |
| $\mathrm{Ag}_{\mathrm{g}}$ | 5732 | $\mathrm{mm}^{2}$ |  |
| d | 300 | mm |  |
| b | 200 | mm |  |
| t | 6 | mm |  |
| $\mathrm{I}_{\mathrm{g}}$ | $7.3 \mathrm{E}+07$ | $\mathrm{mm}^{4}$ |  |
| $\mathrm{S}_{\mathrm{n}}$ | $5.832 \mathrm{E}+05$ | $\mathrm{mm}^{3}$ |  |
| $\mathrm{Z}_{8}$ | $4.867 \mathrm{E}+05$ | $\mathrm{mm}^{3}$ |  |
| $\mathrm{r}_{8}$ | 112.9 | mm |  |
| $\mathrm{I}_{1}$ | $3.931 \mathrm{E}+07$ | $\mathrm{mm}^{4}$ |  |
| $\mathrm{S}_{\text {y }}$ | $4.43 \mathrm{E}+05$ | $\mathrm{mm}^{3}$ |  |
| $\mathrm{Z}_{\mathrm{y}}$ | $3.931 \mathrm{E}+05$ | $\mathrm{mm}^{3}$ | $\checkmark$ |

4. Check the properties of both sections. The $300 \times 200 \times 6.0$ RHS section is lighter and may be preferred - choose this section and click Select to continue with the calculation using this section size.

NOTE You will find Data Lists for all kinds of engineering data throughout Tedds calculations; there are data lists for bolts, reinforcing bars, timber sections and much more. However, they all work in just the same simple and intuitive way.
5. The number next to 'Selected section' allows you to design beams using two or more sections. In this example a single section is sufficient so no change is required.
6. Set the steel grade to C450.
7. Enter a restraint spacing of 5000 mm for both the major and minor axes.

| Lateral restraint | Major axis | Minor axis |
| :--- | :--- | :--- |
| Lateral restraint spacing | 5000 | mm |
|  | mm |  |
| i Effective length factors | $0.85 \vee$ | $0.85 \vee$ |

8. Click the Design options... button to view another interface page for defining equivalent uniform moment factors etc.
9. Leave the default values as shown.

Steel section selection

## Australia

## Fabrication details

(i) Cold formed sections are stress relieved

## Amplification factor

(i) Include moment amplification factor for 2nd order effects

## Moment capacity factors

(i) Moment modification factor
(i) Ratio of end moments

Net area of cross-section
(i) Cross-sectional area of holes

$$
\begin{aligned}
& \alpha_{m_{-} s 1} \\
& \beta_{m_{-} s 1} \\
& \\
& \hline-1
\end{aligned}
$$

$$
A_{h_{-} s 1} 00 \mathrm{~mm}^{2}
$$

10. Click OK to return to the main page of the interface.

11. Then click Preview results

|  |  | Capacity | Maximum | Utilisation |
| :---: | :---: | :---: | :---: | :---: |
| Compression resistance | kN | 1621.8 | 40.0 | 0.025 |
| Bending capacity ( $x-x$ ) | kNm | 183.1 | 135.7 | 0.741 |
| Shear resistance ( $x-x$ ) | kN | 812.7 | 60 | 0.074 |

12. You can now choose the level of output you require by clicking Output options... From here you can also give the calculation a title.


## Automated calculations and library items

You have probably realised by now that this calculation caters for all kinds of steel sections, dimensions and loading. For each possibility and check, there is an item in the Library - in fact this calculation has over 150 items. When you use a calculation like this, Tedds automatically chooses the appropriate items for your options and input, and puts them together to make up the complete design.

- Accept the results and continue, click the Finish button when done:


## The progress log

The progress log helps to keep you informed about a calculations progress during lengthy calculations, it is also used by some calculations to report the status of specific checks or other pertinent information. When writing your own custom calculations you can add information to the log or you can modify the default options to provide more detailed information about what your calculations is doing which can be helpful for resolving errors.

This particular calculation does not use the progress log to report any additional information.

## Examining finished calculations

OK, but how is your chosen section performing? The main interface displayed the design forces, capacities and utilizations but you may want to examine the results in more detail.

1. Scroll through the calculation and examine the $y$ - $y$ axis flexural buckling resistance check:

Design for major ( $\mathbf{x}-\mathrm{x}$ ) axis bending moment - Section 5.1

Unequal moments factor
Member elastic buckling load- cl.4.6.2
Moment amplification factor - cl.4.4.2.2
Design bending moment
$c_{m}=1.000$
$N_{\text {amb }}=\pi^{2} \times \mathrm{E} \times \mathrm{I}_{\mathrm{x}} /\left(\mathrm{k}_{\mathrm{e}, \mathrm{x}} \times \mathrm{L}_{\mathrm{x}_{-}=1}\right)^{2}=7977.6 \mathrm{kN}$
$\delta_{b}=\max \left(\mathrm{c}_{\mathrm{m}} /\left(1-\left(\mathrm{N}^{*} / \mathrm{N}_{\text {amb }}\right)\right), 1\right)=1.005$
$\mathrm{M}^{*} \mathrm{x}=\delta_{\mathrm{b}} \times 135 \mathrm{kNm}=135.7 \mathrm{kNm}$
2. There's another really important point to note about the calculations displayed - they don't just show you results, but how those results have been arrived at.

NOTE Tedds is not a 'black box' where all you can see is the result, and all you can do is accept it. In Tedds you can see exactly what's going on. You can see what checks Tedds does. What design method does it use? From where did that number come? The answers to all these questions are right there in front of you! This is a major reason why Tedds is so popular with engineers the world over.

Furthermore, if you need an example of how to write your own calculations, then look no further. That's exactly what you are looking at - every calculation in the library is an example of how to write your own. How do I write a math expression in Tedds? How do I use logic or a math function in Tedds? Look again at the check shown above and you will see the answers to these questions. We will look more closely at how to write your own calculations beginning with Writing Tedds calculations - stage 1 (Eurocode design example) (page 239)

## Re-calculating

Changes are a fact of life for engineers, they always have been, and they always will be! You need to be able to take account of any changes and update your calculations quickly. With Tedds this is no problem.

Say that your beam needs to be 0.1 m longer since the beam which supports it needs to be moved, to avoid a clash. Is your section still OK?


1. Click Calculate on the Home tab (highlighted above).

The calculation will run again, but this time all the information you entered last time is remembered. It's a simple matter to change the required data.
2. Change the distances between restraints to 5100 mm .
3. What is the effect of this change on the design? Check the Calculation results and/or the output to see.

Tedds makes it easy to update calculations - simply re-calculate and you can update your design quickly.

## Hidden text

All the calculations performed by Tedds are available in the output and in general so they are - but at times some intermediate calculations are hidden to reduce the amount of output. It is simple to view these and to include them in your printout.

1. Open the application's View tab then use the Hidden Text option and examine the check again.

Design for major ( $\mathbf{x}-\mathrm{x}$ ) axis bending moment - Section 5.1

Unequal moments factor
Member elastic buckling load-cl.4.6.2
Moment amplification factor - cl.4.4.2.2
Design bending moment
$\mathrm{c}_{\mathrm{m}}=1.000$
$N_{\text {amb }}=\pi^{2} \times \mathrm{E} \times \mathrm{I}_{\mathrm{x}} /\left(\mathrm{k}_{\mathrm{e}, \mathrm{x}} \times \mathrm{L}_{\mathrm{x}-\mathrm{s} 1}\right)^{2}=7977.6 \mathrm{kN}$
$\delta_{b}=\max \left(\mathrm{c}_{\mathrm{m}} /\left(1-\left(\mathrm{N}^{*} / \mathrm{N}_{\text {amb }}\right)\right), 1\right)=1.005$
$M^{*}=\delta_{\mathrm{b}} \times 135 \mathrm{kNm}=135.7 \mathrm{kNm}$

If there is any hidden text it will be underlined with dashed lines, however, in this example there are no hidden calculations.
2. Select View/ Hidden Text again to hide the Library item names. Now let us consider how to print calculations.

## The header \& printing

Obviously you want professional looking printed output. You will see that you have a header region at the top of the calculations, but how do you set its details?


1. Click the Header button highlighted above - this opens a dialog where you can enter some project details in your header.

2. On the Company page you can define your own company details. Do this now, if you want to. If you don't, then remember to do so before you print your first "proper" set of calculations.
3. On the Template page you will see the Tedds template which your calculations will use and the logo file which Tedds will add to the template. You can change the template and logo if necessary - click this tab and check that its details are correct.

4. Maybe you would like to try a different style of template, there are a number of standard templates to choose. Click the Select... button to see these. Choose the template you want to use and you will see a preview of what calculations produced with that template will look like. When you have found the template you want to use click OK to use it.
5. If you have a copy of your company logo in electronic format, and the template style you select supports a logo, then you can add your logo to the template. Make sure that the logo is available on your computer, Browse to find it, and then click OK to add it to the template.
6. Click OK to exit the Header Properties dialog and view your finished calculation.
7. If the logo is not the right size open the Header Properties dialog once more and change the Scale of the logo to make it fit the template correctly.
8. Once the template and logo are correct click to display the file menu. From here you can Print the calculation to obtain a hard copy.
9. Congratulations, you have produced your first piece of work with Tedds!

To finish this example let's look at a few points about saving and outputting your results.

## Saving and output options

You can save every Tedds calculation to a unique file that you can recall and edit any time in the future. The file extension .ted is unique to Tedds.

1. Click $\&$ to display the file menu.
2. Save your file and give it a name - it's a good idea to save all the examples you will produce in the course of completing the guide, for future reference.
3. The output you see in the document can be printed direct to a printer, but you have other options.
4. Click the drop-down button adjacent to Send To on the file menu to view these.
5. Choose the option of sending the output to Word and experiment with the other options if you wish. Once your output is in a Word document, you can edit it as much as you wish.
6. By clicking the drop-down button adjacent to Save As on the file menu you can also save the active document, or all documents in the active project to PDF.

## Performing a new calculation

How do you start a new calculation in Tedds?

- Click $\&$ to display the file menu; then click $\overbrace{0} \overbrace{0}^{\text {yew... }}$

The Select Calculation dialog will open, from where you can select and start a new calculation in a new document.

## Managing Multiple Related Calculations

Can several calculations be saved in a single document?
As stated earlier, each calculation must be saved to a unique file - however multiple files can be collected together in a single project. They can then be organised as required using the Project Manager.
Benefits of projects include:

- you can specify a shared document header for all the project files,
- locating files is made easier - when you open the project all files within it are opened automatically,
- calculations can be placed into named groups, making them easier to manage.
To start a new project:

1. Click to display the file menu; then from the menu choose the New Project button.


A new empty project is created in the Project Manager.

## Project Manager

## Project

2. New or Existing Documents are then added and arranged into folders as required via the Project tab.

Project Manager

## ABC123

-     - Beam Designs

目 beam 001
目 beam 002

- Column Designs
column 001


## What next?

Congratulations! You have completed the first exercise and now know all you really need to make use of the wide range of calculations available in the Tedds Engineering Library and to begin using Tedds productively. Take a look through the index and try some more. How about:

- carrying out a wind load calculation?
- designing a retaining wall?
- designing an RC footing?
- analysing and designing a timber rafter, beam or post...

The choice is yours, and all these calculations work in the same straightforward, intuitive way. Some calculations may also include Data tables which are designed to look like tables from printed references, so that you immediately feel at home with them. Indeed we hope you will find yourself recognising them.
What can you do if the Library does not contain the exact calculation for which you are looking? You need to perform a number of calculations, and could do with a calculation to help you out with these. First of all, TELL US:

- if you are running a calculation, then you will see a Feedback button to the left-hand-side of the interface,
- if you are not running a calculation, then you can choose the Feedback... option from the Help menu.
We are constantly working to expand our Engineering Library and your input helps us do this!

But you don't have to wait until we produce these for you - you can write them yourself. We will look at this in the next example: Writing Tedds Calculations Stage 1 (page 298)

## Writing Tedds calculations - stage 1 (Australian design example)

Having looked at using calculations from the Tedds Library we can move on to look at one of the most exciting and powerful features of Tedds - the ability to create your own calculations. This is where an initial investment of time can give you huge returns later. Once you have invested time writing a Calculation, you can use it over and over again, you can also update calculations in an instant, making further great savings. You can also customize and extend the Library of Tedds calculations to match the calculations that you use most frequently in your office.
In this exercise we will see that writing Tedds calculations simply uses the math and logic conventions with which you are already conversant. We start by looking briefly at very simple examples introducing the basics of calculating with Tedds for Word. We then create a "real-world" example, covering the main features of writing effective calculations in depth.

## (1)

## Allow about 30 minutes to complete this exercise.

## Running Tedds for Word

To write calculations you need to use Tedds for Word.

1. Launch Tedds from the icon on your desktop.
2. Click the option to run Tedds for Word - Microsoft Word will now open with Tedds integrated. If this is the first time you've run Tedds for Word a Release Notes document and the Library Access System will open too.

NOTE It is important to realize that you are looking at Microsoft® Word with the Tedds capabilities added. We only add to the functionality of Word, so you can do anything you would normally do in Word. Treat a Tedds Calculation Document just like you would any ordinary Word document. You can type reports, import files and text, embed spreadsheets and so on. And of course you can add calculations to your reports; either straight out of the Tedds Engineering Library, just as you did in the previous exercise, or create your own.

## The Tedds interface

The commands you will need to use in this exercise can all be found on the Tedds Tab of the ribbon as highlighted below:


You will find a Word Document open, which looks very similar to the Tedds output document.

The document Header can be edited in a similar manner to that in Tedds by clicking the Edit Header button - this button is highlighted above.

- In this exercise two documents will be required, so open a new blank one by selecting File/ New Tedds Document

Now we are ready to begin writing our first calculation in Tedds.

## The basics

Writing calculations in Tedds for Word is easy. Tedds follows standard mathematical rules and uses standard mathematical operators. For example 1 +2 would add 1 to 2 . To write an equation use the $=$ sign, and to specify where you want to see the answer use the ? symbol. For example:
$1+2$ = ?

- Type the above anywhere in your document. When you calculate this equation the ? will be replaced with the answer.


## Calculating in Tedds for Word

To calculate equations in Tedds for Word you can use one of several Commands:

| $\begin{gathered} \square=? \\ \text { All } \end{gathered}$ | All - this will calculate the whole document. |
| :---: | :---: |
|  | Calc Section - this will calculate the Calc. Section your cursor is in. |
| - Selection $^{\text {a }}$ | Selection - this will calculate only equations you have highlighted. |

1. In the Calculate ribbon group, click All to calculate your equation:
$1+2=3.000$
2. You should find the answer displayed in your document as shown above. if you have an error, take a look at the Errors and troubleshooting section later in this topic.

## Units in Tedds

Tedds automatically takes units into account, so you don't need to apply conversion factors to get the right answer. Tedds will also check that the units you are using are dimensionally correct and warn you if they aren't.

1. Type the following in your document using the same case as you see here:
$890 \mathrm{~mm}+1 \mathrm{ft}+8.5 \mathrm{in}=? \mathrm{~m}$
2. In the Calculate ribbon group, click All to calculate this equation:
$890 \mathrm{~mm}+1 \mathrm{ft}+8.5 \mathrm{in}=1.411 \mathrm{~m}$
3. You should find the answer displayed in your document as shown above. if you have an error, take a look at the Errors and troubleshooting section later in this topic.

## Defining and using input variables in Tedds

Defining variables is the key to writing effective Tedds calculations. We will use the following calculations to demonstrate this. Do not type this yet - we will show you how to enter the calculation below (in stages) in the following couple of pages.

## STEEL SECTION TIE DESIGN

Yield strength;

## Design strength;

Tie force;
$\mathrm{fu}=430 \mathrm{MPa}$
$\mathrm{fy}=0.8 \times \mathrm{fu}=$ ? MPa
$\mathrm{N}=675.0 \mathrm{kN}$

Min. gross section area; $A_{\text {min }}=N / f y=$ ? $\mathrm{mm}^{2}$
Tie effective length; $\mathrm{L}_{\mathrm{e}}=5 \mathrm{~m}$ Slenderness limit; $\lambda_{\mathrm{L}}=300$
Min. radius of gyration; $r_{\text {min }}=L_{e} / \lambda_{L}=$ ? mm

1. Close the current document, (because two documents were opened at the beginning of the exercise you should still have an empty one displayed).
2. Type in the following two paragraphs in the empty document.

## STEEL SECTION TIE DESIGN

Yield strength;
$\mathrm{fu}=430 \mathrm{MPa}$

The first paragraph is just a title for our calculation. The second paragraph is a standard Variable Definition which uses a superscript in its units.
3. To type the unit $\mathrm{N} / \mathrm{mm}^{2}$, first type $\mathrm{N} / \mathrm{mm}$, then click the Superscript $\mathbf{x}^{2}$ button.
4. Now type 2, then click the button again to return to normal text. Once you have finished typing, read the notes in the box below for an explanation of a standard variable definition, and to check you have typed it correctly.

|  |  |
| :---: | :---: |
|  |  |
| - The expression defines the variable's unique name, current value and units. |  |
| - Variable names are case sensitive, cannot contain spaces or be function names (like sin for example). Other than that you can use pretty much anything you like as you can see, including Greek text and Subscripts. |  |
| - The semi-colon is important. It is a delimiter that separates an expression from text, or another expression in the same paragraph. If you omit delimiters in either of these cases, then you will get an error when you calculate your document. |  |
|  | e equality sign '=' defines an expression. Without it no calculation will performed. |
|  | paces and Tabs are not significant in this, or any other, expression. Use s many or as few as you wish to make your calculations look presentable and easy to read. |
|  | We will look at Units in more detail shortly but, for now, note that they are also case sensitive and have a correct syntax, that you must use (as shown above). |

5. Now enter the following paragraph which uses this variable:

## Design strength;

$$
\mathrm{fy}=0.8 \times \mathrm{fu}=? \mathrm{MPa}
$$

6. Use the Insert multiplication symbol ${ }^{\mathbf{X}}$ button to enter the $\times$ mathematical operator - do not use a lower-case x.
7. Check the notes in the box below for a detailed explanation of the components of this paragraph.


Note the following:

- The same observations as before apply to delimiters, explanations, spaces and units.
- You cannot omit math operators in expressions: Tedds cannot calculate $0.8 F u$, you must type the expression as shown above, including the $\times$.
- The result field ? is used to tell Tedds where the result should be output when calculated the ? will be replaced with the result of the expression.
- The value of the result will be in the result unit you specify. Ensure this has the correct form and dimensions. Do not omit this.
- The expression contains a variable (fy) that is defined in the calculations before (that is above) the point where it is used. Expressions should not contain variables that are not yet defined.
- The expression contains two equalities and performs two functions:
- calculates and displays the value we wish to know - the result.
- assigns this result to a variable named - fy
- It is not obligatory to always do this. You can write a valid expression to perform just one of these functions by either omitting the variable name and the first equality, or the second equality and the ? and unit.

8. In the Calculate ribbon group, click All.

## Design strength;

$$
\mathrm{Fa}=0.6 \times \mathrm{Fy}=165.000 \mathrm{~N} / \mathrm{mm}^{2}
$$

9. Your expression has been calculated and the result has replaced the ? as before. if you have an error, take a look at the Errors and troubleshooting section later in this topic.
10. Here are the next two paragraphs of the calculation. The first paragraph is a standard variable definition, while the second uses both $N$ and $f y$ to determine the minimum section area and creates a variable $A_{\text {min }}$ with this value.

## Tie force;

## $\mathrm{N}=675.0 \mathrm{kN}$

Min. gross section area; $A_{\text {min }}=N / f y=$ ? mm ${ }^{2}$
11. Type the first paragraph, then follow the steps below to enter the second.
12. The second paragraph contains examples of the use of Subscript (often used for name suffixes) and Superscript (used for powers).
13. To type the variable name $A_{\text {min }}$, first type the $A$, then click the Subscript $x_{2}$ button.
14. Now type min, then click the button again to return to normal text.
15. To type the unit $\mathrm{cm}^{2}$, first type cm , then click the Superscript $\mathbf{x}^{2}$ button.
16. Now type 2, then click the button again to return to normal text.
17. Click Calculate All to calculate these expressions once you have entered them.

## Min. gross section area; $A_{\text {min }}=N / f y=1962.209 \mathrm{~mm}^{2}$

18. You should find the result displayed in the document - if you have an error, take a look at the Errors and troubleshooting section later in this topic.
19. Here are the final three paragraphs of the calculation. Follow the steps below to create these.
20. Here we define two new variables to be used in the expression in the final paragraph.
Tie effective length; $L_{e}=5 \mathrm{~m}$ Slenderness limit; $\lambda_{L}=300$
Min. radius of gyration; $r_{\text {min }}=L_{e} / \lambda_{L}=$ ? mm
21. Type the first paragraph, entering the subscript for the name Le as you did before.
22. Follow the steps below to enter the second paragraph.
23. Use the Greek text ${ }^{\alpha}$ button to enter the name $\lambda_{L}$
24. First click the button indicated, then type the Roman equivalent of the Greek letter - (l in this case for lambda).
25. Now click the button again to return to normal text, then enter the subscript suffix as you did above using the Subscript button.

NOTE A much easier way of entering Greek characters and more complex units is to use the Tedds Greek Characters, Tedds SI Units and Tedds US Units toolbars which can be selected from the Tedds Tab on the ribbon.
26. Use Copy and Paste to enter this name in the final expression.
27. Now click Calculate All to calculate these final expressions:

## Min. radius of gyration; $r_{\text {min }}=L_{e} / \lambda_{L}=16.667 \mathrm{~mm}$

28. You should find the result displayed in the document - if you have an error, take a look at the Errors and troubleshooting section later in this topic.

## Storing variables in Tedds

1. Click the Variables button.
2. The Variables dialog box will open, displaying the stored values.

| Name | Value | Dimensions | Type | Attributes |
| :--- | :--- | :--- | :--- | :--- |
| fu | $4.300^{*} 10^{8}$ | $\mathrm{M}^{1} \mathrm{~L}^{-1} \mathrm{~T}^{-2}$ | Number |  |
| fy | $3.440^{*} 10^{8}$ | $\mathrm{M}^{1} \mathrm{~L}^{-1} \mathrm{~T}^{-2}$ | Number |  |
| $\mathrm{r}_{\text {min }}$ | 0.017 | $\mathrm{~L}^{1}$ | Number |  |
| $\mathrm{L}_{\mathrm{e}}$ | 5 | $\mathrm{~L}^{1}$ | Number |  |
| N | 675000 | $\mathrm{M}^{1} \mathrm{~L}^{1} \mathrm{~T}^{-2}$ | Number |  |
| $\lambda_{\mathrm{L}}$ | 300 |  | Number |  |

3. You will note that we do not just store the variable name and value, but also the dimensions. This is how Tedds handles all the unit conversions for you.

NOTE You can Delete variables from this list if you wish:
4. Cancel from this dialog, and edit one of the values on the page - say the tie force to $N=600 \mathrm{kN}$. Now check back in the stored variables and you will note the stored value has not changed.
5. Re-calculate the document and check back in the list of variables - the new value has now been stored.

NOTE An important observation - the stored value of a variable only changes when you re-calculate the definition, not when you just edit it on the page. If you edit the value of a variable you must recalculate the variable definition, and any calculations that use it to update them.

## More about units in Tedds

1. Change the tie force back to its original value $N=675 \mathrm{kN}$. Calculate again to store this new value.
2. Look again at the values displayed in the Variables dialog box. You will note that many of these values are not those displayed in the document.
3. The values in the dialog are in the Base Units in which Tedds performs all calculations and from which all the other units are derived. The base units are shown in the following table:

| Tedds Base Units |  |
| :--- | :--- |
|  | Metric |
| Length | m |
| Mass | kg |
| Time | S |
| Temp | ${ }^{\circ} \mathrm{C}$ |

NOTE If you hover over a variable name in the Variables dialog box a summary list is displayed showing the value of the variable in all applicable standard units.
4. Note that our calculation does not include any conversion factors.

NOTE Tedds' unit handling is a massive help - Tedds comes with a huge number of defined units and you can add more if needed.
Dimensional Checking - Tedds checks all dimensions in your calculation and will inform you if these are incorrect. This is why you should use units consistently throughout your calculations. Do so, and you can have total confidence that your calculations are dimensionally correct.
5. Save the document and give it a name - call it "Exercise 2" - as we wish to build on it later in the guide.
To complete this exercise, in the next section we will take a brief look at handling errors in calculations.

## Errors and troubleshooting

The problem with a lot of guides is they only show you the right way to do things, and then you have no idea what to do when something goes wrong! Let's look at a couple of errors and how to fix them.

- If you have an error in your calculations, Tedds will inform you when you calculate your document and the error is encountered. The first thing you should do is Interrupt the calculation process.
- If you have jumped to this section because you have encountered an error previously, then click the Interrupt button in the dialog (see step 11 below), review the details and then return to fix the error in your calculations and continue with the exercise.

If your previous calculations were error free, then you will have had no need to look at this section. We shall therefore create some calculations which do have errors so that we can see how to handle them.

1. Open a new blank document for this example.
2. Click the Tedds options ${ }^{\circ}$ button.
3. The Options dialog box will open, click on the Calculating / General page.

4. Make sure that the options above are checked and then click OK. We can now proceed to create some calculations with errors.
5. Enter the following 2 paragraphs as they appear here - see if you can spot any errors as you do, but don't fix them yet!

$$
\begin{aligned}
& \mathrm{WL}=4.5 \mathrm{kPa} \quad \mathrm{wD}=2.5 \mathrm{kPa} \\
& \mathrm{WT}=\mathrm{wL}+\mathrm{WD}=? \mathrm{kPa}
\end{aligned}
$$

6. Now click the Calculate All button to calculate the calculations - you should see the Expression Error dialog:

| Expression Error dialog Explained |  |
| :---: | :---: |
|  | Expression Efror <br> The following error invalid expression <br> 1 <br> has occurred in the expression: $w L=4.5 \mathrm{kN} / \mathrm{m} 2 \mathrm{wD}=2.5 \mathrm{kN} / \mathrm{m} 2 ;$ <br> Therefore the results for this expression can not be calculated. <br> Problem <br> Tedds cannot determine what this expression means. <br> Common causes and solutions <br> (1) Equations and text are not separated es <br> $1 \mathrm{~m}+2 \mathrm{in}=$ ? ft Here 25 some more sext Tedds will interpret this all as one equation (that doesn't make sense). Use a semicolon or new paragraph to separate equations and text e ? |
| This is the specific error. |  |
|  | This line is the one that Tedds cannot evaluate, so look here to spot the error. |
|  | This is an explanation of the error, together with some typical causes. |
| This is the button you should generally click, |  |

7. Tedds flags the first error, and gives you some help in fixing it.
8. When you are ready, click the Interrupt button. Tedds highlights the error for you in the document as shown below: Once we fix the problem and recalculate, this error message will automatically disappear.
9. Check the rule about delimiters (see The Standard Variable Definition Explained info box earlier in this topic). There should be a semi-colon between the expressions to separate them. Add this in and re-calculate the entire document.

## $\mathrm{wL}=4.5 \mathrm{kPa} \square \mathrm{wD}=2.5 \mathrm{kPa}$

10. Now we will get the next error - the variable WD is not defined. We have typed $W D$ instead of $w D$ and variable names are case-sensitive.
11. Click the Interrupt button to stop the calculation.
12. Correct the variable name on the page to $w D$ and re-calculate. The calculations should now complete with no problems. Tedds automatically deletes all error messages from the page.

## What next?

Congratulations! You have completed your first Tedds calculation. You can now begin writing effective calculations in Tedds for Word. There are more great features that make such calculations even more powerful, and we will show you these later.
Now we are going to look at using calculations from the Engineering Library in Tedds for Word: Using Library Calculations in Tedds for Word

## Using library calculations in Tedds for Word (Australian design example)

We have shown that you can write your own calculations in Tedds for Word, but you can also use the Library Calculations. The advantage of this is that you can add additional text to your output easily, because it is already in a Word document. You can also combine more than one calculation in a document, add pictures and tables - anything you need to create a polished report. And if you need to update the calculations you can do it directly in the document.
Sometimes, of course, you just need an answer right now and the polishing can wait. That's why we have Tedds too. With the two modes, you have both bases covered.

In this exercise we will use the RC circular column design calculation to show you how to run a typical calculation from the extensive Engineering Library in Tedds for Word.
(4)

Allow about 15 minutes to complete this exercise.

Information required for this exercise

| Design Information |  |
| :--- | :--- |
| Use the following information for the calculation. |  |
| Column state | Braced |
| Length of column | 3000 mm |
| Diameter of column | 300 mm |
| Effective height factor | 1.0 |
| Concrete characteristic compressive <br> strength | 32 MPa |
| Reinforcement yield stress | 500 MPa |
| Reinforcement bar size | 20 mm |
| Fitments bar size | 6 mm |
| Nominal concrete cover | 30 mm |
| Exposure classification | A 1 |
| Design axial load | 600 kN |
| Smaller end moment | 25 kNm |
| Larger end moment | 55 kNm |
| Ratio of axial dead load to total axial <br> load | 0.65 |
| Ratio of axial live load to total axial <br> load | 0.54 |

## Buttons used in this exercise

The new commands you will be introduced to in this exercise are located on the Tedds tab as shown below:


## Using Calculation Sections in Tedds for Word

As stated, one of the reasons for running library calculations in Tedds for Word is so that you can combine a number of calculations in a single document. In this case, each calculation should be placed in a separate Calculation Section, so we will start off by introducing one of these. Calculation Sections will be explained in more detail later in this exercise.

1. Open a new Tedds document.
2. Insert a New Calc Section by clicking the appropriate button.
3. The following dialog will appear - enter a name for the section. This will form the title for the calculation in the document.

4. Click OK and this will enter a Calculation Section Title in the document. We place a calculation below this title and thus within the section. You should note that your cursor is now on the line below the section title.

## Selecting calculations from the library

All the library calculations are available from the Library Access System. To use a calculation we retrieve it from the Library, place it in our document and calculate it.

1. If it is not open already, launch the Library Access System. $^{\text {B }}$
2. Click the Index button if the index is not displayed and ensure you have the Tedds calculations index option selected.

3. To open a folder in the index simply double-click it. Open the Columns folder, then the RC Circular column design (AS3600) folder, then select (click on) the RC Circular column design (AS3600) item.

4. To place this calculation in the document, click the Execute button in the library. (You can also double-click on the selected item to do this.) In both cases you will see the Insert Calc Item dialog.

5. This dialog allows you to control where the item will be added. Simply choose the options as above then click OK and the item will be pasted at the cursor position in the document.

NOTE Note that one of the options in the dialog is to add a new Calc Section. In this example we have already added one manually, so as shown above, on this occasion the option should be unchecked.
6. You should now have the following in your document.

## RC COLUMN DESIGN <br> RC Circular Column Design (AS 3600)

7. We can now close the Library - there is no need to have it open while a calculation is running.
8. Click the Calculate Section button to start the calculation.
9. The Interface for the calculation will now be displayed, along with the Progress Log. You are now in familiar territory as everything from this point works exactly as you learned in the first exercise - Using Tedds (page 277)
10. Click the Notes button and briefly look at the notes before proceeding.

11. The data to be entered is given at the start of this exercise. Use this to enter the data for the first page of the interface. You will be comfortable
with entering information in the interface by now, so we won't show every input step.
12. Continue to enter the reinforcement information on the second page. At this point we don't know how many longitudinal bars will be required so accept the default of 6
13. When you get to the Exposure classification, note the help information available for the input displayed in the information pane (as shown below).
```
Circular RC column design (AS3600) (v1.0.08)
From Table 4.3 of AS3600

NOTE Note that information about a particular item will also appear adjacent to your cursor if you hover over the information symbol associated with that item.
14. Fire resistance and any other data not specifically specified can be left at the default value.
15. Proceed to the third page and enter the design loads.
16. Click Next to complete the interface and the calculation will be performed.
17. Review the calculation result summary displayed in the interface. The current configuration is clearly not suitable as there is insufficient moment resisting capacity.
18. Click Back two times to return to the reinforcement page. Increase the number of longitudinal bars to 8 and then progress to the result summary once again. The revised configuration should now be acceptable.
19. The dropdown at the bottom of the page allows you to choose the amount of output you require. For this example pick the Full option. Also check the box to include a sketch and then click Finish to close the interface and generate the report.
20. Close the Progress Log and examine the calculations in the document they are of the same form as the ones you saw in Tedds, and they show you exactly how the results have been determined.

\section*{Viewing hidden text in Tedds for Word}

This particular calculation has no hidden text. It is worth pointing out that some do, and that there is a slightly different way of viewing Hidden Text in Tedds for Word.
1. Check the Hidden Calcs box to view any hidden text.
2. Uncheck the button to re-hide.

\section*{Re-calculating in Tedds for Word}

This is accomplished in a similar manner to Tedds.
1. Click the Calculate Section button.
2. The calculation will now run again - try changing some of the input data in the interface.
3. DO NOT overtype values on the page prior to re-calculating - this is not the way to change input data when using our library calculations (as distinct from ones you have written yourself in the manner shown in the previous section of the guide) in Tedds for Word.

Adding another calculation to the document
To start a new calculation in this document create a new Calculation Section.
1. Place your cursor below your existing calculations.
2. Click the Add New Calc Section button.
3. Type a name for the new section - this will be the title of your next calculation. Then click OK.
4. A new calculation should be placed below this title and thus within the section.
5. Retrieve another calculation from the library and place it within this section
6. To calculate just one section, we place our cursor within the section and use the Calculate Section button.

\section*{Calculation Sections Explained}

Refer back to the section Storing Variables in Tedds. You will note that here we have just one list of saved variables, known as Document variables, as we have not used Calculation Sections. When we
use Calculation Sections, Tedds for Word saves the variables for each calculation in a separate list unique to each section. These are knows as Section variables. This ensures that all your input values are retained separately from those for another calculation.

When you need to update a single calculation within a document that contains many calculations, simply place your cursor within that section and use the Calculate Section command. Place your cursor within the first
\begin{tabular}{|l|}
\hline \multicolumn{1}{|c|}{ Calculation Sections Explained } \\
\hline section in your document, and click the Variables button to view the unique \\
list for this part of the document. \\
Tedds for Word also has commands which enable you to manipulate the \\
calculation sections in your document. You can delete a calculation section, \\
copy it, paste it into a new location in your document and change it's name. \\
\hline
\end{tabular}

\section*{What next?}

Congratulations! You have completed the third exercise of the guide and learned all you need to run calculations from the Library in Tedds for Word.
You can now save the document and re-use it as appropriate.
In the next section you will learn how you can make your own calculations even more powerful: Writing Tedds Calculations - Stage 2

\section*{Writing Tedds calculations - stage 2 (Australian design example)}

In this exercise we will investigate the use of math and data functions to build on the stage 1 calculation, extending its capabilities and introducing some more Tedds features.

\section*{(1)}

\section*{Allow about 30 minutes to complete this exercise.}

\section*{Buttons used in this exercise}

The new commands you will be introduced to in this exercise are located on the Library and Show/Hide groups of the Tedds tab as shown below:


\section*{Defining input variables}

Here are the new calculations we will add to the document you created in exercise 2 in order to check the adequacy of an actual section.

\section*{Check section:}

Try a 150 Parallel Flanged Channel
Section properties; \(A=2254 \mathrm{~mm}^{2} ; \mathrm{r}_{\mathrm{x}}=60.8 \mathrm{~mm} ; \mathrm{r}_{\mathrm{y}}=23.9 \mathrm{~mm}\)
Design radius of gyration; \(r_{d}=\min \left(r_{x}, r_{y}\right)=? \mathrm{~cm}\)
Actual stress; \(\quad \mathrm{f}_{\mathrm{a}}=\mathrm{N} / \mathrm{A}=\) ? MPa
Actual slenderness; \(\lambda=L_{e} / r_{d}=\) ?f1
1. Type the first two paragraphs, which are just text, below the existing calculation.
2. Type the third paragraph and note that here we are defining three input variables which are properties of the section we are checking. Ensure you separate the text and all the expressions using delimiters (;) as shown.

\section*{Section properties;}
\[
A=2254 \mathrm{~mm}^{2} ; r_{x}=60.8 \mathrm{~mm} ; \quad r_{y}=23.9 \mathrm{~mm}
\]

\section*{Tedds math functions}
1. Now type the fourth paragraph. Note how the Tedds math function min is used here.

\section*{Design radius of gyration;}
\[
r_{d}=\min \left(r_{x}, r_{y}\right)=? c m
\]

NOTE A math function is always followed directly by its argument(s) in parentheses as shown here. There are many more such functions available in Tedds for Word. For full details of this and other functions, consult the Mathematical functions topic, or refer to the Writing your own custom calculations Index item in the Library Access System, where all functions are completely documented.
2. Now type the fifth paragraph - this is a simple expression that determines and displays the actual stress in the section and assigns the result to the variable \(f_{a}\)

\title{
Actual stress; \(\mathrm{f}_{\mathrm{a}}=\mathrm{N} / \mathrm{A}=\) ? MPa
}

\section*{Result accuracy and formats}

It is sufficient to display the slenderness to one decimal place. To do this we use a format string to override the default result setting of three decimal places.
1. Now type the last paragraph of the new calculations as follows. Use the Greek text button as you did on page 32 for the variable name \(\lambda\).

\section*{Actual slenderness;}
\[
\lambda=L_{e} / r_{d}=? f 1
\]
2. The characters \(f 1\) following the ? are the format string. The format string must immediately follow the ? with no space in between as shown. See below for a fuller explanation.
3. Once you have finished typing this last expression, check the new paragraphs carefully. Have you included all the delimiters? Have you used subscripts correctly? Have you used the correct case for variable names and units?
4. When you are satisfied that everything is correct, click the Calculate All button. A math function is always followed directly by its argument(s) in parentheses as shown here. There are many more such functions available in Tedds for Word. For full details of this and other functions, consult the Tedds Help system topic Mathematics, or refer to the Writing your own custom calculations Index item in the Library Access System, where all functions are completely documented.
5. If you have an Error, then Interrupt and see Errors and troubleshooting (page 307). Fix any errors until your calculation works fully.
6. Review your results and look at the last paragraph to see how the format string we used has operated:

\section*{Actual slenderness;}
\[
\lambda=L_{e} / r_{d}=209.2
\]
7. Click the Variables button to examine the list of saved variables and check the stored value for this variable:
\begin{tabular}{|c|c|c|c|c|}
\hline Name & Value & Dimensions & Type & Attributes \\
\hline \(\lambda^{\text {L }}\) & \multicolumn{2}{|l|}{300} & \multicolumn{2}{|l|}{Number} \\
\hline \(\lambda\). & \multicolumn{2}{|l|}{209.205} & \multicolumn{2}{|l|}{Number} \\
\hline & \multicolumn{4}{|c|}{Result Format Strings Explained} \\
\hline & \multicolumn{4}{|l|}{You can override the default result setting, and reduce or increase the number of decimal places for a displayed result, by using a result format string after the ? result field. For example typing ?f2 will display the result to two decimal places. It is important that there is no space between the format string and the ?. The format string characters signify the following:} \\
\hline & \multicolumn{4}{|l|}{\(\mathrm{f}=\) fixed format, and 2 = result to be displayed to 2 decimal places (can be from 0-15)} \\
\hline & \multicolumn{4}{|l|}{Note that format strings only control the precision of the result displayed in the document, not any result that is stored by Tedds.} \\
\hline & \multicolumn{4}{|l|}{For full details of this and other result formats, consult the topic Result formats and precision (page 523).} \\
\hline
\end{tabular}

\section*{Using data functions in calculations}

The calculation as written is very useful, but we can enhance it further. One big improvement is to include a Data List in the calculation, making the properties of a huge number of section types and sizes instantly available.
1. First edit the two paragraphs underneath the heading Check Section; as follows:
2. Delete the following text for the section name - Try a 150 Parallel Flanged Channel. Leave an empty line here.
3. Next delete just the values for the properties of the section. Replace them with a ? result field. You should end up with the following:

\section*{Check section;}

Section properties; \(\quad A=? \mathrm{~mm}^{2} ; \quad r_{x}=? \mathrm{~mm} ; \quad r_{y}=? \mathrm{~mm}\)
4. Finally, place your cursor as shown at the very end of the heading.

\section*{Retrieving Data Lists from the library}
1. Click the button to Launch the Tedds Engineering Data
2. This opens a special Set in the Library where all the Data Lists and Data Tables are accessed. There is a lot of data in this set. We wish to find a Data List that includes steel properties suitable for this calculation. We will use the Find facility to help us locate such a table.
3. Each item in the set has both a short and a long name, we are going to find by the short name, so ensure View/Long Names is unchecked before continuing.
4. Now select the Group we want to search in - Australian Standards.
5. Select Edit/ Find in the library, and type in AS 4100 as shown.

6. Library Access System finds the AS 4100 group which contains the data lists which are appropriate for AS 4100 design, click the plus sign to the left of this group. Pick the Steel sections data list (AU) item which is also highlighted above.
7. Now to bring this item into your calculation, either double click the item, or click the Execute... button. You should find the following has been entered in your document.

\section*{Check section;}

DataList("aussie.dls","Universal Beams","150(80(14))","Try ","");
Section properties;
\(A_{g}=? \mathrm{~mm}^{2} ; \mathrm{r}_{\mathrm{x}}=? \mathrm{~mm} ; \mathrm{r}_{\mathrm{y}}=? \mathrm{~mm}\)
8. This text inserted is a Tedds Data List Field which launches the specified Data List (further details on Tedds Fields are given below),
9. Close the library once you have retrieved the Tedds Data List Field.
10. Now click Calculate All to calculate the document again.
11. The Data List will now be displayed when the Tedds Data List Field is calculated:

12. Select the 150 channel section then click on the Details button to examine the variables defined in the table.

NOTE Note that we have used exactly the same names for the properties in our calculation as those defined by the Data List - A, \(r_{x}\) and \(r_{y}\). This is the key to integrating all Data Functions with your calculations. Remember that variable names are case-sensitive.
13. Click the Select button to return these variables to your calculations - you will see that the section's properties from the Data List replace the ? fields in your document and the Tedds Field displays the choice you made in the Data List.

\title{
Section properties; \(\quad A_{g}=2254.000 \mathrm{~mm}^{2} ; r_{x}=60.830 \mathrm{~mm} ; r_{y}=23.880 \mathrm{~mm}\)
}
14. The Data List is now integrated with your calculation. Re-calculate a few times, each time changing your selection of channel size in the Data List, to test this.
15. Click the Variables button and you will see that all the variables defined by the Data List are listed and are thus available to be used in calculations.
16. Save the calculation at this stage, as we will build on it in the final exercise.

NOTE Whilst in this exercise the Data List was inserted into the calculation via the Tedds Engineering Data button, it could have been inserted via the Tedds Field button instead. The use of Tedds Fields is covered in the next exercise Enhancing Calculations.

\section*{Tedds fields}
1. Check the Field Codes box.
2. Look at the Tedds Field in your document and you will see the following:

\section*{Check section;}
\{=CSC|CALL DataList("AUall.dls", "Parallel flange Channels", "150", "Try ", "", "Current_section", "Current_page") \};
3. The command that runs the Data List is now revealed. Uncheck the Field Codes box again to return to the normal view of the document.

\section*{Tedds Fields Explained}

Field Codes enable you to see and thus edit the hidden commands which are Tedds Fields. These commands run special functions in Tedds like the Data Lists. We will see some more Tedds Fields shortly. A Tedds Field will run when it is calculated, like any normal expression. We hide the Tedds field, since you would not want it to appear in a printed report. The Field Codes button reveals the Tedds Fields. Tedds Fields should be treated like expressions, and separated from text and other expressions in the same paragraph using semi-colons.

\section*{What next?}

Congratulations! You have completed the fourth exercise and learned everything you really need to write powerful Tedds calculations. Maybe now would be the time to have a go at writing a calculation of your own. It's a good idea to start with something simple and build on the complexity as you become more familiar with Tedds.

The next step in the guide, Enhancing Calculations (page 327) is about making Tedds calculations still easier to work with, and is especially relevant if you envisage writing calculations for others to use. Even if your calculations are for your own use you may find these further features beneficial so we recommend that you review them. You might like to leave this step until you have had a go at writing a calculation of your own using what you have learned so far.

\section*{Enhancing calculations (Australian design example)}

There is even more functionality available for our calculations than we have seen so far. Whether you use these enhancements depends both on the purpose of the calculation, and on the time you have available. Certainly these features are very useful when you are writing calculations which others will use (as we do at Trimble). Hence the Tedds library is packed with examples which use these features, and you have already seen many of them when running our calculations.
In this exercise we will enhance the previous calculation and you will see what we are talking about.
(ㄴ)
Allow about 15 minutes to complete this exercise.

\section*{Buttons used in this exercise}

The only new command you will be introduced to in this exercise is located on the Insert group of the Tedds Calcs ribbon as shown below:


\section*{Tedds Input Fields}

The Tedds Input Field speeds up the editing and often the creating of input variables. We will replace all the existing variable definitions in the calculation:
1. Delete the entire definition for the Yield strength, fu, from your page. Leave your cursor on the empty line.
2. Click the Tedds Field button.
3. The following dialog will appear.

\begin{tabular}{|l|l|}
\hline \multicolumn{2}{|c|}{ Tedds Input Field } \\
\hline Prompt & \begin{tabular}{l} 
tells the user what the variable is and \\
appears on the page
\end{tabular} \\
\hline Name & the unique name of the variable \\
\hline Units & \begin{tabular}{l} 
if the property has dimensions then \\
enter a unit here
\end{tabular} \\
\hline Default value & \begin{tabular}{l} 
this value will be displayed initially for \\
user to edit or accept
\end{tabular} \\
\hline Format & the format displayed on the page \\
\hline No. of decimal places & \begin{tabular}{l} 
the number of decimal places \\
displayed on the page
\end{tabular} \\
\hline
\end{tabular}
4. Enter the details shown to define the input for this variable:

Prompt \(=\) Yield strength
Name \(=f u\)
Units \(=M P a\)
Default value \(=430\)
Format \(=\) Fixed
No. of decimal places \(=0\)
5. Accept the defaults for other options and click OK when you have everything entered.

NOTE We do not put a value in this dialog - this is entered when the statement is calculated.
6. The following will appear on the line containing your cursor:
; Yield strength; fu = ?FO MPa;
7. With the Field Codes button on you will see the following Tedds Input Field preceding the text on the line.
\(\{=C S C \mid C A L L\) Input("Yield strength", "fu","MPa","430",1)\}; Yield strength; fu = ?F0 MPa;
8. Calculate your document to run it.


The Set Variable Value dialog appears, as shown above.
9. Because we already have a value defined for this variable it is displayed in the input. You can accept it, or edit it as required. There is no need to find and edit the variable value on the page, as it is automatically updated when you enter a value in the Set Variable Value dialog.
10. Delete and replace the 3 remaining variable definitions in the same manner - the table below shows what you need to enter in the Insert Tedds Field dialog for each of the three variables in order from left to right. When you have done this, recalculate your document to ensure that your definitions are correct.
\begin{tabular}{|l|l|l|l|}
\hline \multicolumn{4}{|c|}{ Insert Tedds Field Properties } \\
\hline \multicolumn{1}{|c|}{ Input } & \multicolumn{1}{c|}{\(\mathbf{T}_{\mathbf{f}}\)} & \multicolumn{1}{c|}{\(\mathbf{L}_{\mathbf{e}}\)} & \multicolumn{1}{c|}{\(\boldsymbol{\lambda}_{\mathbf{L}}\)} \\
\hline Prompt & Tie force & \begin{tabular}{l} 
Tie effective \\
length
\end{tabular} & \begin{tabular}{l} 
Slenderness \\
limit
\end{tabular} \\
\hline Name & Tf & \(\mathrm{L}_{\mathbf{e}}\) & \(\lambda_{\mathrm{L}}\) \\
\hline Units & kN & m & \\
\hline Default value & & & 300 \\
\hline Format & fixed & fixed & fixed \\
\hline No. of decimal places & 2 & 3 & 0 \\
\hline
\end{tabular}

NOTE To enter Greek characters in the Insert Tedds Field dialog for variable names like \(\lambda\) simply click the Greek character button
( \(\alpha\) ) and then type in the equivalent Roman character, in this case you need to type I (i.e. lowercase letter L) to get \(\lambda\). To enter Subscript or Superscript characters simply click the Subscript or
Superscript button ( \({ }^{\mathbf{x}_{2}}, \mathbf{x}^{\mathbf{2}}\) ) and then continue and type in the subscript or superscript. Once you have reached its end click the button again to switch back to typing normal text.
The Default value is entirely optional. If you enter one it will be displayed the first time a calculation is run, otherwise the input box will be empty. Delete the stored variables and re-calculate to see the defaults in operation.

\section*{Tedds Interface Designer}

Although The Tedds Input Field can be used to create all the variables required in a calculation, if you would like to give your calculations a slicker appearance we would strongly recommend using the Tedds Interface Designer instead. This easy to use tool allows you to place all the input variables on a single interface along with sketches and notes if required. For a worked example and further details of how to use the Tedds Interface Designer refer to the Tedds Help.

\section*{Tedds Show Fields}

The final thing we would like the calculation to do is automatically assess our section and report in the document whether our chosen section is passing or failing and，if it is failing，why．We use a Tedds Show Field to do this．
1．Enter the following two paragraphs after your existing calculations：

\section*{Check stress； \\ Check slenderness；}
```

check_stress = fa/ fy = ?
check_slenderness = \lambda/ 就=?

```

2．These last two values help us assess the utilisation of the section for the two checks．Assigning them to output variables will help us with creating Tedds Show Fields．Calculate your document once you have written them to ensure they are working properly before proceeding．

3．Place your cursor beneath these paragraphs and click the Insert Tedds Field button．

4．Select the Show tab．The Show Field we want to create will test whether the section is failing stress and output a message to give the status of the check．

5．Select the Condition type option and input the following information：
\begin{tabular}{|c|c|c|c|c|c|c|}
\hline \multicolumn{4}{|l|}{Insert Tedds Field} & \multicolumn{3}{|r|}{\(? \quad \times\)} \\
\hline \multicolumn{7}{|l|}{Show} \\
\hline \multicolumn{7}{|l|}{Insert a Tedds field that when calculated will show text in your document．} \\
\hline \multicolumn{2}{|l|}{国 Data List 罜 Data Table} & \multicolumn{2}{|r|}{W Data Graph} & \multicolumn{3}{|l|}{© Calc Item} \\
\hline ab Input & （i）Show & （i）Message & \multicolumn{2}{|l|}{＝＝－iog X} & \multicolumn{2}{|l|}{X Excel} \\
\hline Type： & Condition \(\checkmark\) & \(\checkmark\) & & & & \\
\hline Condition： & \multicolumn{3}{|l|}{check＿stress＞ 1} & \(\mathrm{x}^{2}\) & \(\mathrm{x}_{2}\) & \(\alpha\) \\
\hline Yes： & \multicolumn{3}{|l|}{Section fails stress check} & \(\mathrm{x}^{2}\) & \(\mathrm{x}_{2}\) & \(\alpha\) \\
\hline No： & \multicolumn{3}{|l|}{Section OK for stress} & \(\mathrm{x}^{2}\) & \(\mathrm{X}_{2}\) & \(\alpha\) \\
\hline
\end{tabular}

6．The output of the Tedds Show Field consists of two text messages known as output strings．Only one output string is displayed in the document depending on the status of the condition．

7．Check your input carefully，then click OK to enter the Tedds Show Field in the document．
8. When you have OK'd the input, click the Field Codes button to view the resulting Tedds Show Field. It should be as shown below. If your Tedds Show Field is incorrect, the best thing to do at this stage is to delete it and run through the Insert Tedds Field dialog again.

\section*{\(\{=\) CSCCCALL Show(ifcheck _stress \(>1\) 1,"Section falis stress checc", "Section OK for stress", Show, True, True) \};}

\section*{Using logic In Tedds}

Take a close look at this Tedds Show field, and you can see how we use a simple logic statement to output one of two pieces of text using the if logical operator.
```

if(check_stress > 1, "Section fails stress check" , "Section OK for
stress")

```

The general form of this logic expression is as follows:
```

if(condition, true_output, false_output)

```

NOTE You can use this kind of expression to define variables using a condition. The outputs can be values, expressions or further logic expressions.
For example:
\[
a=i f(b>c, 10,20)=?
\]

Check table of Logic Functions in the Mathematics (page 502) topic for full details.
1. Now calculate your document to calculate the Tedds Show Field. You should find you have something similar to the following in your Progress Log and you will also see the output text on the page where you placed the Tedds Show Field.

2. Change some of your input values and re-calculate a few times to test your full calculation and both the pass and fail output of the Tedds Show Field.

\section*{Tedds Data List Fields}

In the previous exercise we inserted a Data List Field into the calculation using the Engineering Data button. However, it could have been inserted more easily using the Tedds Field button:
1. With the Field Codes button on you will see the following Tedds Data List Field:

\section*{Check section;}

\title{
DataList("aussie.dls","Universal Beams","150(80(14))","Try ","");
} Section properties;
\(\mathrm{A}_{\mathrm{g}}=? \mathrm{~mm}^{2} ; \mathrm{r}_{\mathrm{x}}=\) ? \(\mathrm{mm} ; \mathrm{r}_{\mathrm{y}}=\) ? mm
2. Delete the entire definition of this field from your page. Leave your cursor on the empty line.
3. Click the Tedds Field button.
4. Select the Data List option and scroll down to select the same .dls file name as that shown in the line you just deleted above.
5. Input the Prompt as Select Section.
6. To input the Default page and Default item click the ellipsis button () and then select the page and section size that you want to appear as the default.
7. Accept the defaults for other options and click \(\mathbf{O K}\) when you have everything entered.
8. Calculate your document to run it once more.

\section*{What next?}

Congratulations! You have completed the final exercise in the guide and are ready to begin using Tedds to its full potential.

Here are a few things you could try next:
- Create another Tedds Show Field similar to that above for the slenderness check - following is the logic statement you would use for this:

\section*{Condition}
check slender >
- Create a Tedds Show Field to give the overall status of the section, checking both slenderness and stress. Try the following:

Condition
check_slender >

\section*{1}

PASS
Section fails!
- Take a look at Tedds Message Fields. The input for these is the same as Tedds Show Fields but their output is displayed in a Message box, rather than in the document. You will see examples of their use in the Tedds Engineering Library Calculations.
- Try creating Messages using the Value of Variable option to show the values of the minimum area and radius of gyration in the Log before the Data List is displayed.
Of course there's much more for you to discover. We wish you an enjoyable and productive time in using the program in your day-to-day work, and exploring its capabilities more fully.
If you would like to read up on further information about Tedds, then we recommend the Tedds Help system, which you can access in the usual way.
Some Tedds dialogs have context sensitive help. To see this simply click the Help button in the dialog.

We also run training courses in most locales, for further information on availability contact the Tedds support team in your region, simply click the Support icon in any of Tedds' automated calculations.

\section*{5 \\ Writing custom calculations}

With Tedds for Word, you can either perform pre-defined structural calculations, or write and use your own calculations. This section introduces the basic Tedds for Word calculations and their components.

Using Tedds for Word, you can:
- Define and perform your own calculations in any Microsoft Word document quickly and simply.
- Access standard calculations by using the Library Access System.
- Access component calculations by using the Library Access System.
- Include engineering data in your calculations by using data lists, data tables, and data graphs.
- Calculate anything from a single calculation to an entire document.
- Automatically verify the dimensional accuracy of your calculations by specifying the appropriate units for your variables.
- Define multiple calc sections in your document, so that the same variables can have different values within your document.

\subsection*{5.1 Components of calculations}

This presents the components of calculations which you can find in Tedds for Word. When you are familiar with the components, you can easily proceed to writing your own calculations.

NOTE The following only applies to Tedds for Word.

See also
Create and modify expressions (page 344)
Define results (page 345)
Show or hide semicolons (page 349)

\section*{Overview (SI Metric)}


NOTE The first three components (1-3) are mandatory key components in all Tedds calculations. The components 4-7 are optional.
1. An expression
that is the part of the calculation that needs to be evaluated.
2. An equal sign (=)
that tells Tedds for Word that this is a calculation which it should to calculate.
3. A results field
that defines the location of the result. If necessary, you can set a format and precision for the result.
4. An explanation
that helps the user of the calculations to understand a calculation.
5. One or more delimiters
that separate explanatory text from a calculation and calculations from one another.
6. A variable
that assigns the result of the expression to a variable. You can use the variable later in your calculations.
7. Units
that you use both when you define calculations and when you define results.

For further information about the components, see the following paragraphs.

\section*{Overview (US Imperial)}


NOTE The first three components (1-3) are mandatory key components in all Tedds calculations. The components 4-7 are optional.
1. An expression
that is the part of the calculation that needs to be evaluated.
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that tells Tedds for Word that this is a calculation which it should to calculate.
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5. One or more delimiters
that separate explanatory text from a calculation and calculations from one another.
6. A variable
that assigns the result of the expression to a variable. You can use the variable later in your calculations.
7. Units
that you use both when you define calculations and when you define results.
For further information about the components, see the following paragraphs.

\section*{Expressions}
\[
\mathrm{Fa}=0.6 \times \mathrm{Fy}=?
\]

The expression is the part of a calculation that is evaluated during the calculation process.
Tedds for Word recognizes an expression by the presence of an equal sign (=).
You can write expressions yourself, or use the expressions available in the Tedds engineering library.

\section*{Examples}
( \(45 \times 23\) )
\(a+b\)
\(0.6 \times\) Fy

\section*{Equal signs}

\section*{\(0.6 \times \mathrm{Fy}\) \#?}

Equal signs are a crucial component of calculation documents. They allow Tedds for Word to find and evaluate the calculations in a document.

Equal signs separate the different parts of your calculation:
- An expression from the results field, to show a result:
\[
a+b=\text { ? }
\]
- A variable from an expression:
\[
c=a+b
\]
- A variable from an expression from a results field \(F a=0.6 \times F y=\) ?
If you type text and do not include an equal sign, Tedds for Word considers the text an explanation.

TIP To insert an equal sign (=) that is not calculated, click the Equals not calculated button ( \({ }^{\{=\}}\)) in the Insert ribbon group.

\section*{Results fields}
\[
0.6 \times F y=?
\]

Results fields tell Tedds for Word where to place the result of an expression. Tedds for Word calculated all results to a precision of 15 decimal places.
- \# indicates that you want to view an intermediate result.
- ? indicates that you want to view a final result.

\section*{Explanations (SI Metric)}

\section*{Design strength ; Fa \(=0.6 \times \mathrm{Fy}=? \mathrm{~N} / \mathrm{mm}^{2}\)}

Explanations are optional elements that can make your calculations easier to follow.
You do not need to mark explanations with any special characters. However, if you want to add an explanation in the same paragraph as your calculations, remember to separate the explanation and the calculation with a semicolon delimiter ;

\section*{Explanations (US Imperial)}

\section*{Allowable stress ; Fa \(=0.6 \times \mathrm{Fy}=\) ? ksi}

Explanations are optional elements that can make your calculations easier to follow.

You do not need to mark explanations with any special characters. However, if you want to add an explanation in the same paragraph as your calculations, remember to separate the explanation and the calculation with a semicolon delimiter ;

\section*{Delimiters (SI Metric)}

\section*{Design strength; Fa \(=0.6 \times \mathrm{Fy}=? \mathrm{~N} / \mathrm{mm}^{2}\)}

Delimiters are special characters which you can use to separate text from a calculation, or calculations from one another.
Tedds for Word recognizes the following delimiters:
- Paragraph marks ( ( \()\)

If you write your calculations in separate paragraphs, you can press Enter to separate the calculations from each other. When you do so, Word automatically adds a paragraph mark ( \(\mathbb{\|}\) ).
- Semicolons (;)

If you want to place explanatory text in the same paragraph as an expression, or if you want to place several calculations in the same paragraphs, use a delimiter to separate the items from each other.

NOTE Semicolon is the default delimiter within paragraphs. However, certain locales allow you to use another delimiter within paragraphs. For more information, see Regional settings (page 145).

NOTE Line breaks (Shift + Enter) within an expression have no significance in Tedds for Word. You can therefore use them to improve the layout of long calculations on the page.
However, if you want to use line breaks and have several calculations within the same paragraph, you still need to use semicolons to separate the calculations.

\section*{Delimiters (US Imperial)}

\section*{Allowable stress; \(; \mathrm{Fa}=0.6 \times \mathrm{Fy}=\) ? ksi}

Delimiters are special characters which you can use to separate text from a calculation, or calculations from one another.
Tedds for Word recognizes the following delimiters:
- Paragraph marks ( \(\mathbb{}\) )

If you write your calculations in separate paragraphs, you can press Enter to separate the calculations from each other. When you do so, automatically adds a paragraph mark ( \(\mathbb{I}\) ).
- Semicolons (;)

If you want to place explanatory text in the same paragraph as an expression, or if you want to place several calculations in the same paragraphs, use a delimiter to separate the items from each other.

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However, if you want to use line breaks and have several calculations within the same paragraph, you still need to use semicolons to separate the calculations.

\section*{Variables (SI Metric)}

\section*{Design strength ; \(\mathrm{Fa}=0.6 \times \mathrm{Fy}=\) ? N/mm²}

Variables allow you to re-use a calculated value later in your calculations.
To recall the value, you can simply type the variable. Tedds for Word automatically looks up the value that was assigned to the variable, and allows you to use the value in the current calculation.
Variables must follow some simple rules. Variables must:
- Only contain alphanumeric characters (A-Z, a-z, 0-9), Greek characters, underscores (_), and full stops (.).
- Not be longer than 32 characters.
- Not start with a number.
- Not be the same as a Tedds function name (for example sin or median).
- Not contain superscript characters.
- Not contain any formatting other than subscripts.

NOTE When a part of a variable is in subscript, the part can contain spaces and a list separator (, or ;).

NOTE - Variables are case-sensitive.
For example, Area and area are two separate variables.
- Variables take subscripts into account.

For example, Aeff and \(A_{\text {eff }}\) are two separate variables.

\section*{Variables (US Imperial)}

\section*{Allowable stress ; Fa = \(0.6 \times \mathrm{Fy}=\) ? ksi}

Variables allow you to re-use a calculated value later in your calculations.
To recall the value, you can simply type the variable. Tedds for Word automatically looks up the value that was assigned to the variable, and allows you to use the value in the current calculation.

Variables must follow some simple rules. Variables must:
- Only contain alphanumeric characters (A-Z, a-z, 0-9), Greek characters, underscores ( \(\_\)), and full stops (.).
- Not be longer than 32 characters.
- Not start with a number.
- Not be the same as a Tedds function name (for example sin or median).
- Not contain superscript characters.
- Not contain any formatting other than subscripts.

NOTE When a part of a variable is in subscript, the part can contain spaces and a list separator (, or ;).

NOTE - Variables are case-sensitive.
For example, Area and area are two separate variables.
- Variables take subscripts into account.

For example, Aeff and \(A_{\text {eff }}\) are two separate variables.

\section*{Units (SI Metric)}

\section*{Design strength ; \(\mathrm{Fa}=0.6 \times \mathrm{Fy}=? \mathrm{~N} / \mathrm{mm}^{2}\)}

You can define units as you create your calculations. Tedds for Word allows you to both use its internal system units, called base units, and add new units into the system. In addition, Tedds for Word analyses whether the selected units are dimensionally correct.
You can define the desired units for both the variables that you define, and the results which you expect, by simply typing the units in your calculations.

The units which Tedds for Word uses as its base units depend on the locale option that you selected during installation. Some locale options only allow a single set of units, while others allow you to select the set which you prefer to use: SI Units or US units. To change the locale, see Regional settings (page 145).
See the base units of each set in the following table.
\begin{tabular}{|l|l|}
\hline \multicolumn{2}{|c|}{ Tedds for Word base units } \\
\hline \multicolumn{1}{|c|}{ Quantity } & \multicolumn{1}{c|}{ SI Metric } \\
\hline Length & m \\
\hline Mass & kg \\
\hline Time & S \\
\hline Temperature & \({ }^{\circ} \mathrm{C}\) \\
\hline Angle & \({ }^{\circ}\) \\
\hline
\end{tabular}

\section*{Units (US Imperial)}

\section*{Allowable stress ; Fa \(=0.6 \times \mathrm{Fy}=\) ? ksi}

You can define units as you create your calculations. Tedds for Word allows you to both use its internal system units, called base units, and add new units into the system. In addition, Tedds for Word analyses whether the selected units are dimensionally correct.
You can define the desired units for both the variables that you define, and the results which you expect, by simply typing the units in your calculations.

The units which Tedds for Word uses as its base units depend on the locale option that you selected during installation. Some locale options only allow a single set of units, while others allow you to select the set which you prefer to use: SI Units or US units. To change the locale, see Regional settings (page 145).

See the base units of each set in the following table.
\begin{tabular}{|l|l|}
\hline \multicolumn{2}{|c|}{ Tedds for Word base units } \\
\hline \multicolumn{1}{|c|}{ Quantity } & \multicolumn{1}{c|}{ US Imperial } \\
\hline Length & ft \\
\hline Mass & slugs \\
\hline Time & S \\
\hline Temperature & \({ }^{\circ} \mathrm{C}\) \\
\hline Angle & \({ }^{\circ}\) \\
\hline
\end{tabular}

\subsection*{5.2 Create and modify expressions}

Expressions are calculations that need be evaluated. To create and modify expressions, see the following instructions.

NOTE The following only applies to Tedds for Word.

\section*{Create expressions}
1. Type the expressions that you want to calculate.
2. After each expression, type = and one of the following:
- A value
- The intermediate results symbol (\#)
- The final results symbol (?)
3. Calculate the expressions.

\section*{Modify expressions}
1. Type over the parts that you want to change in your calculations.
2. Recalculate the changed calculations and any other calculations that are affected by the changes.

\subsection*{5.3 Define results}

To show the result of an expression, you must define the type of results that you want. To define the type of results, see the following instructions.

NOTE The following only applies to Tedds for Word.
Tedds for Word includes two types of results. The types are:
- Intermediate results
that display the values used within a calculation.
You can use an intermediate result with or without using a specific format.
- Final results
that display the final value of an expression.
You can use a final result with or without using a specific format and with or without units.

\section*{See also}

Define result formats (page 345)
Define units for results (page 347)

\section*{Define intermediate results}
1. Type your expressions.
2. After each expression, type = \#
3. If necessary, type a format string to define the result format and precision.

\section*{Define final results}
1. Type your expressions.
2. After each expression, type = ?
3. If necessary, type a format string to define the result format and precision.
4. If necessary, type the unit that you want to display the results in.

\section*{Define result formats}

Tedds for Word allows you to specify how a result appears in your document. To do so, you can define the format and precision of your results. For more
information on defining result formats and precision, see the following paragraphs.

NOTE The following only applies to Tedds for Word.

\section*{See also}

Result formats (page 523)

\section*{Use a format other than the default for a particular results field}
1. Type the appropriate results symbol (\# or ?).
2. Type a format string that contains the following components:
- A format letter to define the format
- A precision number to define the precision

NOTE If no format string is specified, Tedds for Word uses the default format.

To define the default format of results:
a. In the Tools ribbon group, click More --> Tedds options.
b. Go to Calculating --> Results.

\section*{Format letters and precision numbers}

\section*{Valid format letters for results}

See the valid format letters to define the format in the table below:
\begin{tabular}{|l|l|}
\hline \multicolumn{1}{|c|}{ Letters } & \multicolumn{1}{c|}{ Meaning } \\
\hline \(\mathbf{F}\) & Fixed format \\
\hline \(\mathbf{S}\) & Scientific format \\
\hline \(\mathbf{G}\) & General format \\
\hline \(\mathbf{E}\) & Engineering format \\
\hline \(\mathbf{O}\) & Output format \\
\hline
\end{tabular}

\section*{Valid precision numbers}

The precision number indicates the precision of the required results, and should be in the range of 15 and -15 .
- A positive number indicates the required number of decimal places or significant figures.
- A negative number indicates that the result will be rounded to a nearest value which depends on the magnitude of the negative number.

NOTE Tedds for Word returns all results in a results field. Each results field has two parts:
1. The result part
which contains the formatted result of a calculation. The result part is automatically shown when the result has been calculated.
2. The field code part which contains the format string of the results field.

To view the field code part, in the Show/Hide ribbon group, select Field Codes.

Example:
\(a=50.5 \mathrm{~mm}\)
\(b=60.75 \mathrm{~mm}\)
\(c=a * b=\# E 3=\) ?F2 \(\mathrm{cm}^{2}\)
With the Field Codes option unselected, Tedds for Word views:
\(c=a * b=(3.07 * 10-3)=30.68 \mathrm{~cm}^{2}\)
With the Field Codes selected, Tedds for Word views:
\[
c=a * b=\{=C S C \mid \# E 3\}=\{=C S C \mid ? F 2\} \mathrm{cm}^{2}
\]

\section*{Define formats for intermediate results}

The default intermediate result format is initially set to engineering format and 3 significant figures.
To define the format of an intermediate result:
- Type \# and the desired format string.

\section*{Define formats for final results}

The default final result format is initially set to fixed format and 3 decimal places.

You can either define the format for a final result, or specify both its format and precision. However, you can not specify only the precision of a final result.
To define the format of a final result:
- Type ? and the desired format string.

\section*{Define units for results}

If necessary, you can define the units that you want to use in the final results of your calculations. See the following instructions.
- After each question mark and format string, type the desired unit for the results.
For example:
\(=\) ? \(F 1 \mathrm{~N} / \mathrm{mm}^{2}\)
TIP To create clear calculation documents and minimize any calculation problems, we recommend that you place a space between a value and its unit.

NOTE If the Perform dimensional checks option is switched on, the dimensions of the units must be equivalent to the dimensions calculated by dimensional analysis. For more information, see Dimensional analysis (page 519).

\section*{Example}

With the format and precision settings shown, the following equations
\(a=150 \mathrm{~mm} ; b=60 \mathrm{~cm} ; c=2.5 \mathrm{~m}\)
\(a * b=\) ? \(F O \mathrm{~cm}^{2}\)
\(a * b * c=? F 3 m^{3}\)
calculate to give
\(a=150 \mathrm{~mm} ; b=60 \mathrm{~cm} ; c=2.5 \mathrm{~m}\)
\(a * b=900 \mathrm{~cm}^{2}\)
\(a * b * c=0.225 m^{3}\)

\section*{See also}

Use units in calculations (page 350)
Define result formats (page 345)

\section*{Change the units of results}

If necessary, you can modify the units used in final results. To change the units of results, see the following instructions.
1. Type new units over the existing ones.
2. Recalculate the modified expressions.

\section*{Example}

The following expressions have already been calculated as shown:
\(a=150 \mathrm{~mm} ; b=60 \mathrm{~cm} ; c=2.5 \mathrm{~m}\)
\(a * b=900 \mathrm{~cm}^{2}\)
\(a * b * c=2.250 * 10^{-1} \mathrm{~m}^{3}\)
We can now replace the units of the second and third results with new ones:
\(a=150 \mathrm{~mm} ; b=60 \mathrm{~cm} ; c=2.5 \mathrm{~m}\)
\(a * b=900 \boldsymbol{m}^{2}\)
\(a * b * c=2.250 * 10^{-1} \mathrm{~cm}^{3}\)
After that, we must recalculate the modified expressions. The updated results are:
\(a * b=90.0 * 10^{-3} \mathrm{~m}^{2}\)
\(a * b * c=2.250 * 10^{5} \mathrm{~cm}^{3}\)

\subsection*{5.4 Show or hide semicolons}

Semicolons (;) are delimiters which separate calculations from one another, and calculations from explanatory text. To define whether Tedds for Word shows or hides semicolons, see the following instructions.

NOTE The following only applies to Tedds for Word.
NOTE When you show or hide semicolons, all of them will be shown or hidden, whether they are in explanatory text or in calculations.
- In the Show/Hide ribbon group, select or clear the Semicolons check box.Field CodesHidden Calcs
Semicolons
Show/Hide
All semicolons in the document will become visible when you select the check box, and disappear when you clear the check box.

NOTE If nothing happens when you try to hide semicolons, ensure that you do not have the Show hidden text option enabled in Word options.

\subsection*{5.5 Use units in calculations}

Tedds for Word allows you to use units in various ways. You can, for example, define, use and modify new units, or use predefined system units. If necessary, Tedds for Word can also perform a full dimensional analysis on your units. To use units in your calculations, see the following instructions.

NOTE The following only applies to Tedds for Word and not the Tedds Application. (In the Tedds Application units are fixed according to the Engineering Library selected).

\section*{Use units in input}
- Type the desired unit after a value.

For example:
\(x=234 \mathrm{~N} / \mathrm{mm}^{2}\)

\section*{Use units in results}
- Type the desired unit after the question mark and, if necessary, the format string.

For example:
\(P_{y}=\) ? \(\mathrm{FO} \mathrm{N} / \mathrm{mm}^{2}\)

\section*{See also}

Define result formats (page 345)
Define units for results (page 347)
Using Tedds Trig functions in equations involving radians (support article)

\section*{Change units in calculations}

You can change the units of a value or a result at any time. To change units in your calculations, see the following instructions.

NOTE The following only applies to Tedds for Word.
1. Erase the current units in the expression.
2. Type the new units in the expression.
3. Recalculate the expression, and any other parts of the document that the modified expression affects.

\section*{See also}

Use units in calculations (page 350)

\section*{Use constants with units}

If you need to use constants with units in an expression, do the following:
NOTE The following only applies to Tedds for Word.
- Type the constant value and its unit in the document.

NOTE In some cases, in order to remove ambiguity, we recommend placing the constant and its unit within brackets.
Example:
The beam \(x\) has a fixed length 14.5 m , and is subdivided into a variable number of equal spacings, \(s\).
Do not write the calculation as follows:
\(s=10\)
\(x=14.5 \mathrm{~m} / \mathrm{s}=\) ? *
* In the above expression, Tedds for Word considers \(\mathrm{m} / \mathrm{s}\) as the unit meters per second, and not the intended calculation (14.5 m divided by 10 spacings).
To ensure that Tedds for Word performs the calculations as you intend, place the constant and its unit within brackets as follows:
\(s=10\)
\(x=(14.5 \mathrm{~m}) / \mathrm{s}=1.45 \mathrm{~m}=\) ?
When the revised expression is calculated, it gives the correct answer:
\[
x=(14.5 \mathrm{~m}) / \mathrm{s}=1,45 \mathrm{~m}
\]

\section*{See also}

Use units in calculations (page 350)
Dimensional analysis (page 519)
Introducing calculation errors (page 372)

\section*{Use system units}

Tedds for Word contains a number of pre-defined system units that you can use in all of your calculations. The following paragraphs teach you how to use, view, add, and remove system units.

NOTE The following only applies to Tedds for Word.

\section*{See also}

Units (page 526)

\section*{Use system units in calculations}
- Do one of the following:
- Type the unit after a value or a results field.
- In the Insert ribbon group, click Units, and in either the SI Units or US Units list, select the desired unit.

The selected unit appears in your document.

\section*{View all system units}
1. In a Tedds for Word document, type ListAllUnits () = ?
2. Calculate the document.

Tedds for Word lists all available system units in your document.

\section*{Add system units}

NOTE - If you have the right to access the units database file, the new unit will be permanently added into system units.
- If you do not have the right to access the units database file, the new unit will only be available in the current calculation process.
1. In a Tedds for Word document, type AddUnit(\$x\$, \#a\#, \#b\#, \#c\#, \#d\#, \#f\#) = ?
where
- \(\$ \times \$\) is the name of the unit which you want to add
- \#a\# is the power of the unit dimension \(\mathrm{M}^{a}\)
- \#b\# is the power of the unit dimension \(L^{b}\)
- \#c\# is the power of the unit dimension \(\mathrm{T}^{\text {c }}\)
- \#d\# is the power of the unit dimension \(\theta^{d}\)
- \#f\# is the multiplication factor that you need to apply to the Tedds base units to change the base units to the unit symbols (such as \(h\) for hour) of the unit that you are adding.
2. Calculate the document.

Tedds for Word adds the unit to the unit database.

\section*{Delete system units}

WARNING Before you delete a system unit, note that:
- The unit will no longer be available for you to use.
- Any calculations that use the deleted unit will no longer calculate correctly.
- If you have the right to access the units database file, the unit will be permanently deleted from system units.
- If you do not have the right to access the units database file, the deleted unit will no longer be available in the current calculation process.
1. In your document, type RemoveUnit (\$x\$)
where
- \(\$ x \$\) is the name of the unit which you want to remove
2. Calculate the document.

Tedds for Word deletes the unit from the unit database.

\subsection*{5.6 Use variables}

Using variables allows you to use the results of previous calculations in later calculations. For further information on variables and variable levels, see the following paragraphs.

NOTE The following only applies to Tedds for Word.

\section*{Variable definitions}

All variable definitions take a similar form. The minimal variable definition must include:
- A variable name
- An equal sign
- An expression or a constant value

In addition, most variable definitions include:
- An explanation
- A delimiter
- A unit

The components of a variable definition are very similar to the component of calculations. For more information on each component, see The components of calculations (page 335).

\section*{Variable levels}

Tedds for Word recognizes three different levels of variables:
1. Calc section variables
2. Document variables
3. System variables

This is also the order in which Tedds for Word searches values for each variable that you place in your document. If Tedds for Word cannot find the value in one of the variable levels, a variable definition error occurs.

NOTE You must define each variable before you recall it later in your calculation.

\section*{See also}

Use calc section variables (page 358)
Use document variables (page 361)
Use system variables (page 364)
Modify variables (page 356)
Pre-defined system variables (page 540)

\section*{Calc section variables}

You can use calc sections to separate the variables in your document from one another. Each calc section stores its own variables independently. This way, you can repeat similar calculations which use the same named variables without the calculations affecting each others' results.
Any variable that you define between the start of one calc section and the start of the next calc section is considered a calc section variable.

NOTE • If you define variables within one calc section and want to use the variables elsewhere in your document, you can select the variables in a calc section and promote them to document variables.
- If you define a calc section variable with the same name as a document or system variable, Tedds for Word uses the value that you defined in the current calc section.
- If you define a variable twice in the same calc section, Tedds for Word uses the initial value up to the point at which the value is redefined. After this point, Tedds for Word uses the new value.

\section*{Document variables}

Any variable that you define in the document but outside of a calc section is considered a document variable. Usually, you would define document variables before the first calc section of the document.

After you have defined document variables, they are available throughout the document and across all calc sections.

TIP To avoid the variables of one set of calculations affecting a different set of calculations, we recommend using calc sections in all calculation documents.

\section*{System variables}

System variables are provided with Tedds for Word, and you can use them anywhere in your calculations. As system variables are pre-defined, you do not need to define system variables before you use them in your calculations.
To use a system variable, you can simply type the name of the variable in your document.

TIP If you want to use a system variable name with a different value, you can redefine the variable, and the modified value will be used in document variables or calc section variables.

\section*{Define variables}

You define all variables in the same way whether you are defining variables for a calc section or for a document. After you have created a variable and assigned a value to the variable, you can use it throughout your calculations in the same calc section or document. To create variables, see the following instructions.

NOTE The following only applies to Tedds for Word.
Variables can be equal to:
- A value

For example \(x=45\) or \(Z=245 \mathrm{~N} / \mathrm{mm}^{2}\)
- A string

For example text = "This is a string of text."
- The result of an expression

For example \(C=A+B\)
For more information about the rules for variable names, see Components of calculations (page 335).

\section*{Assign a value to a variable}
1. Type the variable name and an equal sign.
2. After the equal sign, type the desired value, expression, or string.

For example:
\(a=45\)
3. Calculate the expression.

The variable is now stored in the variable list, and you can use it in later calculations.

\section*{Assign a unit to a variable}
1. After the variable and its value, place a space. Then, type the desired unit. For example:
\(a=45 \mathrm{~m}\)
2. Calculate the expression.

The variable is now stored in the variable list with its unit, and you can use it in later calculations.

\section*{Modify variables}

You may sometimes need to modify the values or units of variables that you have defined. To modify variables, see the following instructions.

NOTE The following only applies to Tedds for Word.

\section*{Modify the value of a variable}
1. Type a new value over the current value of the variable.
2. Calculate the expression.

\section*{Modify the units of a variable}
1. Type new units over the current units of the variable.
2. Calculate the expression.

\section*{Store variables as expressions}

By default, Tedds for Word stores all variables as values. However, it may sometimes be useful to store variables as expressions instead. This is particularly useful when the value of a term in an expression changes during calculations. To store variables as expressions, see the following instructions.

NOTE The following only applies to Tedds for Word.

\section*{Example}

To understand the difference between storing variables as values and expressions, consider the following calculation:
\(r=10 \mathrm{~mm}\)
\(A=p i * r^{2}=? \mathrm{~mm}^{2}\)
The calculation is calculated to give:
\(r=10 \mathrm{~mm} \mathrm{~A}=p i * r^{2}=314.2 \mathrm{~mm}^{2}\)
When calculated, the variable \(A\) above can be stored in two different ways:
- As the value resulting from the calculation:
\[
A=314.2 \mathrm{~mm}^{2}
\]
- As the expression that is used to define the variable:
\[
A=p i * r^{2}
\]

If you store \(A\) as an expression value, each time you reference \(A\) in later calculations, the value returned is re-calculated.

Therefore, if the value of \(r\) changes, the result of \(A\) changes as well.

\section*{Store variables as expressions}
1. Before the variable name, type \(\$\).
2. Type the expression that you want to store.
3. Calculate the expression.

The value of the variable is now stored as an expression.

\section*{See also}

Modify variables (page 356)
Components of calculations (page 335)

\section*{Use calc section variables}

You can use calc sections to separate the variables in your document from one another, as each calc section stores its own variables independently. This way, you can repeat similar calculations that use the same named variables without the calculations affecting each others' results. To use calc section variables, see the following instructions.

NOTE The following only applies to Tedds for Word.

\section*{See also}

Use the Variables dialog box (page 365)
Calc sections (page 368)
Use document variables (page 361)

\section*{Define calc section variables}
1. Create a calc section.
2. In the calc section, write the variable name, an equal sign, and the value of the variable
3. Calculate the expression.

\section*{View calc section variables}
1. Place the insertion point inside the calc section whose variables you want to view.
2. In the Tools ribbon group, click Variables.

The Variables dialog box appears.
3. Click the Calc Section tab to view calc section variables.

NOTE To see the Calc Section tab, the insertion point must be inside a calc section.

\section*{Write out calc section variables into a document}

NOTE You can only insert calc section variables within the calc section in which they are defined.
If you want to use the variables in another calc section, you have to copy and paste the variables to the other section, or promote the variables into document variables.
1. Place the insertion point inside the calc section whose variables you wish to insert in the document.
2. In the Tools ribbon group, click Variables.

The Variables dialog box appears.
3. Click the Calc Section tab to view calc section variables.

NOTE To see the Calc Section tab, the insertion point must be inside a calc section.

4. Select the variables that you want to insert in your document.
5. At the bottom left corner of the Variables dialog box, select the variable details that you want to insert in your document.
6. Click Write Out.

The selected variables appear in your document.

\section*{Promote calc section variables into document variables}
1. Place the insertion point inside the calc section whose variables you want to promote.
2. In the Tools ribbon group, click Variables.

The Variables dialog box appears.
3. Click the Manage tab.

4. In the Calc section variables list, select the variables that you want to promote.
5. Click <-- Add to promote the selected variables.

The selected variables appear in the Document variables list, and can now be used throughout the calculation document.

NOTE If you make changes that cause the value of a promoted variable to change, the value of the promoted variable automatically changes to the new value.

\section*{Delete calc section variables}
1. Place the insertion point inside the calc section whose variables you want to delete.
2. In the Tools ribbon group, click Variables.

The Variables dialog box appears.
3. Click the Manage tab.
4. Select the variables that you want to delete.
5. Click Delete.

NOTE If you do not plan to recreate the deleted variables, erase the calculations that define or use the deleted variables.

\section*{Use document variables}

To use a document variable, you must first define the variable. The following paragraphs teach you to define document variables, add document variables below calc sections, insert document variables in a calculation document, and delete document variables.

NOTE The following only applies to Tedds for Word.

\section*{See also}

Use the Variables dialog box (page 365)

\section*{Define document variables}
1. At the beginning of your document, type the variable name, an equal sign, and the value of the variable.
2. Select the variable, and calculate the selection.

The variable is now stored in the Document variables list.

\section*{View document variables}
1. Place the insertion point anywhere in the document.
2. In the Tools ribbon group, click Variables.

The Variables dialog box appears.
3. If the Document tab is not already open, click it to view document variables.

\section*{Add document variables below existing calc sections}
1. In the Calc Section ribbon group, click Insert.

The Add Calc Section dialog box appears.
2. Change the type to Revert to document section.

3. In the Title field, type a title for the document section.
4. If you want the calc section to start on a new page, select the Insert page break option.
5. Click OK to create the new calc section.

\section*{Write out document variables into a document}
1. Place the insertion point where you want to insert document variables.
2. In the Tools ribbon group, click Variables.

The Variables dialog box appears.

3. Click the Document tab to view document variables.
4. Select the variables that you want to insert in your document.
5. At the bottom left corner of the Variables dialog box, select the variable details that you want to insert in the calculation document.
6. Click Write Out.

\section*{Delete document variables}
1. In the Tools ribbon group, click Variables.

The Variables dialog box appears.
2. Go to the Manage tab.
3. In the Document variables list, select the variables that you want to delete.
4. Click the Delete button.

NOTE If you do not plan to recreate the deleted document variables, remember to erase the calculations that define or use the deleted variables.

\section*{Use system variables}

System variables are pre-defined variables for common constants, such as pi. You can use system variables in all your calculations. To use or view system variables, or to insert system variables in your documents, see the following instructions.

NOTE The following only applies to Tedds for Word.

\section*{See also}

Pre-defined system variables (page 540)
Use the Variables dialog box (page 365)

\section*{Use system variables in your calculations}
1. Type the variable name into an expression in your document.
2. Calculate the expression.

\section*{View all system variables}
1. In the Tools ribbon group, click Variables.

The Variables dialog box opens.
2. Click the System tab.

The Variables dialog box displays the system variables.


\section*{Insert system variables in your document}
1. Place the insertion point where you want to place the system values.
2. In the Tools ribbon group, click Variables.

The Variables dialog box opens.
3. Click the System tab.

The Variables dialog box displays system variables.

4. Select the variables that you want to insert in your document.
5. In the Write Out options, select the variable details that you want to insert in your document.
6. Click Write Out.

The selected system variables appear in your document.

\section*{Use the Variables dialog box}

You can use the Variables dialog box to manage the different variables in your calculation documents. The following paragraphs cover some useful features of the Variables dialog box.

NOTE To adjust the Variables dialog box, do the following:
In the Tedds Application:
1. On the Home tab, click Options.

The Options - Default dialog box opens.
2. Go to Dialogs.

In Tedds for Word:
- In the Tools ribbon group, go to More --> Tedds options. The Options - Default dialog box opens.
- Go to Dialogs.


\section*{Dimensions and units}

Variables are stored in system base units, rather than the units which you specified in your calculation. Therefore, the Variables dialog box does not store units. Instead the Variables dialog box replaces units with the dimensions of the variable.

The following table illustrates the different dimensions of variables:
\begin{tabular}{|l|l|}
\hline \multicolumn{2}{|c|}{ Variable dimensions } \\
\hline & \multicolumn{1}{|c|}{ Symbol } \\
\hline M & Mass \\
\hline L & Length \\
\hline T & Time \\
\hline D & Temperature \\
\hline
\end{tabular}

The dimension symbols can be combined in different ways.
- For example, the dimensions of a variable in kN or kips are \(M L T^{-2}\).

TIP In order to view the variable in its original units and have it converted into all equivalent US and SI units, move and hold the cursor over the variable.


\section*{Variable attributes}

The following table illustrates the different variable attributes. You can see them in the Attributes column.
\begin{tabular}{|l|l|}
\hline \multicolumn{1}{|c|}{ Symbol } & \multicolumn{1}{c|}{ Meaning } \\
\hline e & \begin{tabular}{l} 
The variable is stored as an \\
expression.
\end{tabular} \\
\hline r & The value cannot be overwritten. \\
\hline m & \begin{tabular}{l} 
The variable has been modified since \\
the current calculation process \\
started.
\end{tabular} \\
\hline
\end{tabular}

\section*{Sort variables}

Sorting variables makes it easier to locate variables and values, and allows you to analyze variable data. You can, for example, verify that similar variables share the same dimensions and units.
- To change the order in which the variables are displayed, click one of the columns.

The first click arranges the variables in ascending order.
A second click arranges the variables in descending order.

TIP To modify the sorting of variables, in the Options - Default dialog box, go to Dialogs --> Variables.

\section*{Group variables}

Grouping variables by column allows you to analyze variable data efficiently. You can, for example, group variables by value to find variables with the exact same values. To group variables, see the following instructions.
1. Right-click anywhere in the variable list.
2. In the context menu that appears, select Group by.
3. Select the column by which you want to group the variables.

\section*{Copy and paste variables}

You can use the Copy and Paste buttons to copy variables:
- From calc section to calc section
- From document to calc section
- From calc section to document
- From system to calc section or document
- FromTedds document to Tedds document
- From Tedds for Word document to Tedds for Word document
- From Tedds document to Tedds for Word document or vice versa

\section*{See also}

Pre-defined system variables (page 540)

\subsection*{5.7 Calc sections}

You can use calc sections to separate the variables in your document from one another. Each calc section stores its own variables independently. This way, you can repeat similar calculations which use the same named variables without the calculations affecting each others' results.

NOTE The following only applies to Tedds for Word.

\section*{See also}

Use calc section variables (page 358)

\section*{Add new calc sections}
1. In the Calc Section ribbon group, click Insert.

The Add Calc Section dialog box appears.

2. In the Title field, type the title of the new calc section.
3. If necessary, select the Insert page break option.
4. Click OK.

\section*{Change the title of a calc section}
1. Place the insertion point inside the calc section whose title you want to change.
2. In the Calc Section ribbon group, click Edit.

The Edit Calc Sectiondialog appears.
\begin{tabular}{|lll|}
\hline Edit Calc Section & & \\
Title: & \\
& & \\
\hline & & OK Cancel \\
\hline
\end{tabular}
3. Modify the title according to your needs.
4. Click OK.

\section*{Cut, copy and paste calc sections}
1. In the Calc Section ribbon group, do one of the following according to your needs.
a. To cut the current calc section, inside the current calc section, click Cut.
b. To copy the current calc section, click Copy.
c. To paste a calc section where the insertion point is, click Paste.

\section*{Delete calc sections}
1. Place the insertion point inside the calc section which you want to delete.
2. In the Calc Section ribbon group, click Delete.

A confirmation message appears.
3. If you are sure that you want to delete the calc section, click Yes.

All variables and calculations in the calc section are now deleted.

\section*{Delete calc section fields}

If you want to delete the title and variables associated with a calc section, but keep the calculation in your document, you can delete the Word field that defines the start of the section.
1. In the Show/Hide ribbon group, select the Field Codes box.
2. Highlight the calc section field that you want to delete.
3. To delete the highlighted part of your document, press the Delete key.

\section*{Find the next or previous calc section}
- In the Calc Section ribbon group, click the arrow next to the Go To button.
- To find the next calc section, select Next.
- To find the previous calc section, select Previous.

\subsection*{5.8 Calculate results}

To calculate different parts of your document, see the following instructions.
```

NOTE The following only applies to Tedds for Word.

```

\section*{Calculate an expression}

An expression consists of all calculations in the same paragraph, and it is the smallest unit that Tedds for Word can automatically calculate. To calculate an expression, follow the instructions below.
1. Place the insertion point in the expression that you want to calculate.
2. In the Calculate ribbon group, click Expression. Tedds for Word calculates the expression.

\section*{Calculate a selected area}
1. Highlight the area of the document which you want to calculate.
2. In the Calculate ribbon group, click Selection.

Tedds for Word calculates the selection.

\section*{Recalculate a previously selected area}

TIP Tedds for Word remembers the start and end of the highlighted area which it has last calculated. Therefore, you do not need to highlight the area again in order to re-calculate it.
- In the Calculate ribbon group, click Recalc Selection.

Tedds for Word calculates the previous selection.

\section*{Calculate a calc section}

If you have defined calc sections within your document, you can choose to calculate a single calc section.
1. Place the insertion point in the calc section you want to calculate.
2. In the Calculate ribbon group, click Calc Section.

Tedds for Word calculates the calc section.

\section*{Calculate from the beginning of a document to a selected expression}
1. Place the insertion point in the expression which you want to calculate up to.
2. In the Calculate ribbon group, click Start to Here. Tedds for Word calculates the document from the start to the end of the selected expression.

\section*{Calculate from a selected expression to the end of a document}
1. Place the insertion point in the expression from which you want to begin calculating.
2. In the Calculate ribbon group, click Here to End. Tedds for Word calculates the document from the start of the selected expression to the end.

\section*{Calculate an entire document}
1. Place the insertion point anywhere in the document.
2. In the Calculate ribbon group, click AII. Tedds for Word calculates the entire document.

\subsection*{5.9 Introducing calculation errors}

While evaluating calculations, you will most probably encounter some sort of calculation errors. The following paragraphs focus on introducing calculation errors, error alerts, and error categories used in Tedds for Word.

NOTE The following only applies to Tedds for Word.

\section*{See also}

Error messages (page 554)
React to errors (page 375)
Find errors (page 376)

\section*{Error alerts}

The method in which Tedds for Word informs you about calculation errors depends on whether you have selected the Prompt on calculation error option in Tedds options.

Depending on whether the Prompt on calculation error option is selected, Tedds for Word either:
- Places an error field in your document directly after the erroneous expression.
```

a=4.32 m
d=21.313 s
a +d = ?<Error: dimensional equality required for addition/subtraction>

```

TIP To make the error fields easy to locate, you can set a specific font and color for them. To modify the look of error messages, go to More --> Tedds options --> Calculating --> Errors.
- Pauses calculations and alerts you with a dialog.

- If you click Continue, Tedds for Word continues calculating until the calculation process has finished, or until it finds the next calculation error.
- If you click Abort, the document will be returned to the state where it was before you started the calculation process.

\section*{Error categories}

Tedds for Word contains four different error categories:
- Variable definition errors
- Dimensional errors
- Non-fatal errors
- Fatal errors

In the table below, see the meaning and typical examples of each error category.
\begin{tabular}{|c|c|c|c|}
\hline Category & Description & Examples & Further information \\
\hline Variable definition errors & Errors related to missing or erroneous variables. & \begin{tabular}{l}
- Undefined variables \\
- Capitalization errors in variables \\
- Illegal formatting of variables
\end{tabular} & \begin{tabular}{l}
You can select whether you want Tedds for Word to consider undefined variables as errors. \\
1. Go to More --> \\
Tedds options -- \\
> Calculating. \\
2. If you want an undefined variable to be treated as an error, select the Error on undefined variable box. \\
If you do not want an undefined variable to be treated as an error, clear the Error on undefined variable box. In this case, Tedds for Word asks you to enter the variable's details directly.
\end{tabular} \\
\hline Dimensio nal errors & Errors which occur when dimensional analysis is switched on, and the units in the expression do not match. & - Two variables which should be added have different dimensions & None \\
\hline
\end{tabular}
\begin{tabular}{|l|l|l|c|}
\hline Category & \multicolumn{1}{|c|}{ Description } & \multicolumn{1}{c|}{ Examples } & \multicolumn{1}{c|}{\begin{tabular}{c} 
Further \\
information
\end{tabular}} \\
\hline \begin{tabular}{l} 
Non-fatal \\
errors
\end{tabular} & \begin{tabular}{l} 
Syntax errors or \\
other errors, which \\
do not allow Tedds \\
for Word to finish a \\
calculation.
\end{tabular} & \begin{tabular}{l} 
-
\end{tabular} & \begin{tabular}{l} 
Missing brackets \\
within an \\
expression \\
- \\
Division by zero \\
Unrecognized \\
units
\end{tabular} \\
\hline \begin{tabular}{l} 
Fatal \\
errors
\end{tabular} & \begin{tabular}{l} 
Major system errors, \\
which automatically \\
abort your \\
calculations.
\end{tabular} & \begin{tabular}{l} 
System is out of \\
memory
\end{tabular} & \\
\hline
\end{tabular}

\section*{React to errors}

The method with which you should react to errors depends on both the error category and the settings that you have specified for calculations in Tedds options. The following paragraphs cover reacting to different types of errors, which may occur while using Tedds for Word.

NOTE The following only applies to Tedds for Word.

\section*{See also}

Introducing calculation errors (page 372)
Error messages (page 554)

\section*{Fix variable definition errors}

Variable definition errors occur when you try to use a variable that has not been defined, is not one of the standard system variables, or is formatted incorrectly. Tedds for Word only alerts you about variable definition errors if you have selected the Error on undefined variable option in Tedds options.
1. Do one of the following.
a. Define the variable by typing the value of an undefined variable, or an expression from which the value can be determined, and the eventual units of the variable.
b. Use another variable by typing another variable name, or by clicking Tools --> Variables and selecting an item from the variable list.
2. Click Continue to proceed with the calculations.

\section*{React to dimensional or non-fatal errors}

Dimensional and non-fatal errors occur when Tedds for Word cannot complete the calculation for some reason.

Do one of the following.
- Ignore the error that has occurred, and click Continue to proceed with the calculations.
- Click Abort to return to your document leaving it as it was before the calculation commenced, and correct the error.

\section*{React to fatal errors}

Fatal errors occur when Tedds for Word cannot run correctly due to a system error, which may mean, for example, lack of memory or disk space.

In these situations, the System error dialog appears and informs you about the error that has occurred.
- Click Abort and return to your document, leaving it as it was before starting the calculation.

\section*{Find errors}

In a large calculation document, you can find errors easily by using the Go to Next/Previous Error button.

NOTE The following only applies to Tedds for Word.
1. Depending on whether you want to locate the next or the previous error, do one of the following.
a. To locate the next error: in the Tools ribbon bar, click Next error.
b. To locate the previous error: in the Tools ribbon bar, click the arrow on the right side of the Next error button, and select Previous error.

NOTE If an errors occur in hidden lines of the calculations, finding them with the Go to Next/Previous Error button is not possible. To view the error, do one of the following actions.
- In the Show/Hide toolbar, select the Hidden Calcs box.
- Go to File --> Options, and in the Display settings, ensure that the Hidden text option is selected.

NOTE Some errors may seem impossible to find. In most cases, these kinds of invisible errors occur because of multiple accidental clicks on the subscript or superscript buttons.
If you simply cannot find the error, try deleting and re-typing the erroneous expression in the calculation document.

\section*{See also}

Introducing calculation errors (page 372)

\subsection*{5.10 Automated calculations}

Tedds for Word includes a great number of automated calculations, each of which consists of a user interface. The interface allows you to define the details and options for your design.

NOTE The following only applies to Tedds for Word.
When you insert an automated calculation in your document, you can only see the title of the calculation in your document. To perform the automated calculation, you need to select and calculate the title.
When you perform the automated calculation, the details that you have defined and the results are stored as variables.

\section*{See also}

Library Access System (page 81)

\subsection*{5.11 The Progress Log}

When you are writing your own calculations, enabling the Progress Log may be helpful. The Progress Log provides additional information about the progress of the calculation process. This information may help you find eventual problems in your calculations.


If you enable the Progress Log, you can define which information you want the Progress Log to display. For more information, see Progress options (page 144).

\section*{Select the items displayed in the Progress Log}

You can select the items which you want to view in the Progress Log. To select the items displayed in the Progress Log, see the following instructions.
1. Right-click the anywhere in the Progress Log.

A context menu appears.
2. Click Options.

The Log type options dialog box appears.
\begin{tabular}{|ll|}
\hline Copy & \\
Clear & \\
\hline Find & \(>\) \\
\hline Filter & \(>\) \\
Formatted Text & \\
Toolbar & \\
\hline Options... & \\
\hline
\end{tabular}
3. In the Log item types list, select the type of item that you want to adjust.
4. To not display a type of item, clear the Log [Item type] items option.
5. If necessary, adjust the colors that are used to show each type of item in the log.

- Log type
controls the colors in the left column of the Progress Log window, where the type of item is displayed.
- Log item
controls the colors in the right column of the Progress Log window, where the details of an item are shown.
6. Click OK.

The settings are saved, and you return to the Progress Log window.

\section*{See also}

Filter the items displayed in the Progress Log (page 379)
Roll up the Progress Log (page 380)

\section*{Filter the items displayed in the Progress Log}

If necessary, you can filter the items that are displayed in the Progress Log. To do so, see the following instructions.
1. Right-click the anywhere in the Progress Log.

A context menu appears.
2. In the context menu, click Filter.
3. In the list that appears, select the elements that you want to display in the Progress Log.
\begin{tabular}{l|l|ll}
\hline \begin{tabular}{l} 
Copy \\
Clear
\end{tabular} & & & \\
\hline Find & \(>\) & & \\
\hline Filter & \(>\) & \(\checkmark\) & Calc Items \\
\hline Formatted Text & & \(\checkmark\) & Errors \\
\hline Toolbar & \(\checkmark\) & Input Items \\
\hline Options... & \(\checkmark\) & Messages \\
\hline & \(\checkmark\) & Show Items & \\
\hline & \(\checkmark\) & User Items \\
\hline & & \(\checkmark\) & Warnings \\
\hline
\end{tabular}

\section*{See also}

Select the items displayed in the Progress Log (page 378)
Roll up the Progress Log (page 380)

\section*{Roll up the Progress Log}

You may sometimes want to reduce the size of the Progress Log, so that it does not take up so much space on your screen. To roll up or unroll the Progress Log, see the following instructions.
- To roll up the Progress Log, click the upwards arrows in the upper right corner of the Progress Log.
- To unroll the Progress Log, click the downwards arrows in the upper right corner of the Progress Log.

\subsection*{5.12 Enhancing Tedds for Word calculations with Tedds fields}

Tedds fields are Tedds features that help you create different messages and dialogs in your calculation document. Therefore, they can aid you in making your calculations clear and easy to use.

NOTE The following only applies to Tedds for Word.
Tedds for Word provides the following major Tedds fields:
- fields (page 381), which display a dialog asking for the value of a particular variable.
- fields (page 383), which display information about the current calculation.
- fields (page 389), which display a message box giving the user information on how to use the calculations.
- fields (page 394), which display information, such as details about the progress of the calculation, in the Progress Log.
- fields (page 399), which allow you to combine the strength of Tedds for Word and Excel.
- fields (page 402), which allow you to access data lists and select items from them to be used as variables.
- fields (page 404), which allow you to access data tables and select items from them to be used as variables.
- fields (page 405), which allow you to access data graphs and select items from them to be used as variables.
- fields (page 406), which allow you to calculate an item stored in a calculation library.

In addition to major Tedds fields, Tedds for Word contains several additional fields. For further information on other Tedds fields, see Other Tedds fields.

To modify (page 408) some of the major Tedds fields, Tedds for Word contains special functions. The special functions are primarily intended to be used with Input fields, Show fields, Message fields and Log fields. The functions are:
- The string function (page 411), which allows you to format a numerical value as a string to be used in Tedds fields that require a string value.
- Conditions (page 412), which allow you to select a value based on one or more conditions than can be used with Tedds fields.
Advanced Tedds fields allow you to use multiple conditions and other components to enhance your calculations.

NOTE We recommend that you experiment with advanced Tedds fields before actually using them in your actual calculations, as using advanced Tedds fields may require some practice. Experimenting also helps you discover exactly what each field type can offer you.

\section*{See also}

Major Tedds field syntax (page 489)

\section*{Input fields}

An Input field allows you to create a dialog that asks the user for a value of a variable that is required in the calculations. To create Input fields, see the following instructions.

NOTE The following only applies to Tedds for Word.


\section*{Create Input fields}
1. In the Insert ribbon group, click Tedds field.

The Insert Tedds field dialog box appears, displaying the Input tab.

2. Specify the parts of the input.
a. In the Prompt field, type text that specifies what information the user should enter in the dialog.

You can use the string function to add previously calculated values into the prompt text.
b. In the Name field, type the name of variable.
c. In the Units field, type the units for the variable.
d. In the Default value field, type the default value of the variable.
3. Select Write out standard input line to add text and the final result of the field calculation to your calculation document.
- In the Format list, select the format in which the variable value should be displayed, if necessary.
- In the Decimal places box, specify the number of decimal places to which the variable value should be displayed.
4. In the Show input dialog box list, select how you want the input dialog to be displayed, and what the initial variable value in the input box should be.
- Only if variable not defined

The dialog is only displayed if the variable has not been defined.
The initial value is the default value that you have determined for the field.
- Always (with current value)

The dialog is always displayed.
If the variable is defined, the initial variable value is the current variable value.

If the variable is not defined, the initial value is the default value that you have determined for the field.
- Always (with default value)

The dialog is always displayed.
The initial value is the default value that you have determined for the field.
- Use system option

The dialog is displayed according to the setting made in Tedds options --> Calculating.
5. Click OK.

\section*{See also}

Major Tedds field syntax (page 489)
Modify Tedds fields (page 408)
Use the string function (page 411)
Use conditions (page 412)

\section*{Show fields}

Show fields allow you to summarize the information resulting from several calculations within the document. To create different types of Show fields, follow the instructions below.

NOTE The following only applies to Tedds for Word.

\section*{See also}

Major Tedds field syntax (page 489)
Tedds fields and functions (page 488)
Use the string function (page 411)
Use conditions (page 412)

\section*{Create Show fields}
1. In the Insert ribbon group, click Tedds field.

The Insert Tedds field dialog box appears, displaying the Input tab.
2. Click the Show tab.

The following view appears.

3. In the Type list, select the type of field which you want to create.
- Select Simple to add fixed text into your calculation.
- Select Value of variable to add text indicating the value of a variable into your calculation.
- Select Condition to add a different piece of text into your calculation, depending on whether a condition is met.
- Select Advanced to add a different piece of text into your calculation depending on whether one or more conditions are met.

\section*{Create Simple Show fields}

1. In the Text field, type the text and the calculation that you want to be displayed in the field.
2. Select the style in which you want the field to be displayed.
- If you want the text of the field to be identical with the rest of the paragraph, select Use paragraph style.
- If you want the text to use the format which is defined for a result, select Use Tedds result style.
3. Click OK.

\section*{Create Value of variable Show fields}

1. Specify the details of the field.
a. In the Prefix field, type the text that you want insert before the value of the variable, if necessary.
b. In the Name or expression field, type the name of the variable, or the expression that defines the value.
c. In the Value type list, select the type of the value.
- If the variable is a number, select Number.
- If the variable is stored as a string, select String.
d. In the Units field, type the units for the variable.
e. In the Format list, select the format in which the variable value should be displayed, if necessary.
f. In the No. of decimal places box, specify the number of decimal places to which the variable value should be displayed.
g. In the Postfix field, type the text that you want to insert after the value of the variable, if necessary.
2. Select the style in which you want the field to be displayed.
- If you want the text of the field to be identical with the rest of the paragraph, select Use paragraph style.
- If you want the text to use the format which is defined for a result, select Use Tedds result style.
3. Click OK.

\section*{Create conditional Show fields}

Conditional Show fields allow you to define:
- a condition to be tested,
- the text that is to be returned to your document if the condition is true,
- the text that is to be returned to your document if the condition is false.

1. Specify the details of the field.
a. In the Condition field, specify the condition that you want to test in the field.

You can specify any of the Tedds for Word logical functions as conditions.
b. In the Yes field, type the text that will be placed in your calculation if the value of the condition is True.
c. In the No field, type the text that will be placed in your calculation if the value of the condition is False.
2. Select the style in which you want the field to be displayed.
- If you want the text of the field to be identical with the rest of the paragraph, select Use paragraph style.
- If you want the text to use the format which is defined for a result, select Use Tedds result style.
3. Click OK.

\section*{Create Advanced Show fields}

You can assemble Advanced fields using two methods. You can type directly in the Statement field, or use Insert buttons to add variable and condition details in the Statement field. Tedds for Word then evaluates the Statement field to create the Advanced field.

NOTE When you create an Advanced Show field, ensure that:
- All text is surrounded by quotation marks
- All parts that you want to include in the Show field are in the Statement field.

1. Specify the variable details, and click Insert.
a. In the Name or expression field, type the name of the variable, or the expression that defines the value.
b. In the Value type list, select the type of the value.
- If the variable is a number, select Number.
- If the variable is stored as a string, select String.
c. In the Units field, type the units for the variable.
d. In the Format list, select the format in which the variable value should be displayed, if necessary.
e. In the No. of decimal places box, specify the number of decimal places to which the variable value should be displayed.
2. Click the Insert button next to the No. of decimal places box.
3. Specify the condition details.
a. In the Condition field, specify the condition that you want to test in the field.

You can specify any of the Tedds for Word logical functions as conditions.
b. In the Yes field, type the text that will be placed in your calculation if the value of the condition is True.
c. In the No field, type the text that will be placed in your calculation if the value of the condition is False.
4. Click the Insert button next to the No field.
5. Select the style in which you want the field to be displayed.
- If you want the text of the field to be identical with the rest of the paragraph, select Use paragraph style.
- If you want the text to use the format which is defined for a result, select Use Tedds result style.
6. Click OK.

\section*{Message fields}

Message fields display a message box that gives the user information as the calculations are performed. To create different types of Message fields, see the following instructions.

NOTE The following only applies to Tedds for Word.

\section*{Example Message field}
\begin{tabular}{|lr|}
\hline Value of L \\
Note that the value of L must be greater than 1. \\
\hline OK \\
\hline
\end{tabular}

\section*{See also}

Major Tedds field syntax (page 489)
Tedds fields and functions (page 488)
Modify Tedds fields (page 408)
Use the string function (page 411)
Use conditions (page 412)

\section*{Create Message fields}
1. In the Insert ribbon group, click Tedds field.

The Insert Tedds field dialog box appears, displaying the Input tab.
2. Click the Message tab.

The following view appears.

3. In the Type list, select the type of field which you want to create.
- Select Simple to add a fixed message into your calculations.
- Select Value of variable to add a message indicating the value of a variable into your calculations.
- Select Condition to add a different message into your calculations depending on whether a condition is met.
- Select Advanced to add a different message into your calculations depending on whether one or more conditions are met.

\section*{Create Simple Message fields}

1. In the Title field, type the title of the message box.
2. In the Text field, type the text that you want the message box to display.
3. Click OK.

\section*{Create Value of variable Message fields}

1. Specify the details of the field.
a. In the Title field, type the title of the message box.
b. In the Prefix field, type the text that you want insert before the value of the variable, if necessary.
c. In the Postfix field, type the text that you want to insert after the value of the variable, if necessary.
2. Specify the details of the variable.
a. In the Name or expression field, type the name of the variable or the expression that defines the value.
b. In the Value type list, select the type of the value.
- If the variable is a number, select Number.
- If the variable is stored as a string, select String.
c. In the Units field, type the units for the variable.
d. In the Format list, select the format in which the variable value should be displayed, if necessary.
e. In the No. of decimal places box, specify the number of decimal places to which the variable value should be displayed.
3. Click OK.

\section*{Create conditional Message fields}

1. Specify the details of the field.
a. In the Title field, type the title of the message box.
b. In the Condition field, specify the condition that you want to test in the message box.
You can specify any of the Tedds for Word logical functions as conditions.
c. In the Yes field, type the text that will be placed in the message box if the value of the condition is True.
d. In the No field, type the text that will be placed in the message box if the value of the condition is False.

\section*{2. Click OK.}

\section*{Create Advanced Message fields}

You can create Advanced fields using two different approaches. You can either type directly in the Statement field or use Insert buttons to add variable and condition details in the Statement field. Tedds for Word then evaluates the Statement field to create the Advanced field.

NOTE When you create an Advanced Message field, ensure that:
- All text is surrounded by quotation marks
- All parts that you want to include in the message box are in the Statement field.

1. In the Title field, type the title of the message box.
2. Specify the variable details.
a. In the Name or expression field, type the name of the variable, or the expression that defines the value of the variable.
b. In the Value type list, select the type of the value.
- If the variable is a number, select Number.
- if the variable is stored as a string, select String.
c. In the Units field, type the units for the variable.
d. In the Format list, select the format in which the variable value should be displayed, if necessary.
e. In the No. of decimal places box, specify the number of decimal places to which the variable value should be displayed.
3. Click the Insert button next to the No. of decimal places box.
4. Specify the condition details.
a. In the Condition field, specify the condition that you want to test in the message box.

You can specify any of the Tedds for Word logical functions as conditions.
b. In the Yes field, type the text that will be placed in your calculation if the value of the condition is true.
c. In the No field, type the text that will be placed in your calculation if the value of the condition is false.
5. Click the Insert button next to the No field.
6. Click OK.

\section*{Log fields}

Log fields allow you to create a summary of your calculations and display it in the Progress Log. To create Log fields, see the following instructions.

NOTE The following only applies to Tedds for Word.

\section*{See also}

Major Tedds field syntax (page 489)
Tedds fields and functions (page 488)
Modify Tedds fields (page 408)
Use the string function (page 411)
Use conditions (page 412)

\section*{Create Log fields}
1. In the Insert ribbon group, click Tedds field.

The Insert Tedds field dialog box appears, displaying the Input tab.
2. Click the Log tab.

The following view appears.

3. In the Type list, select the type of field which you want to create.
- Select Simple to add fixed text into the Progress Log.
- Select Value of variable to add text indicating the value of a variable into the Progress Log.
- Select Condition to add a different piece of text into the Progress Log depending on whether a condition is met.
- Select Advanced to add a different piece of text into the Progress Log depending on whether one or more conditions are met.

\section*{Create Simple Log fields}

1. In the Text field, type the text that you want to display in the Progress Log.
2. Click OK.

\section*{Create Value of variable Log fields}

1. In the Prefix field, type the text that you want to insert before the value of the variable, if necessary.
2. Specify the details of the variable.
a. In the Name or expression field, type the name of the variable, or the expression that defines the value.
b. In the Value type list, select the type of the value.
- If the variable is a number, select Number.
- If the variable is stored as a string, select String.
c. In the Units field, type the units for the variable.
d. In the Format list, select the format in which the variable value should be displayed, if necessary.
e. In the No. of decimal places box, specify the number of decimal places to which the variable value should be displayed.
3. In the Postfix field, type the text that you want to insert after the value of the variable, if necessary.
4. Click OK.

\section*{Create conditional Log fields}

1. Specify the details of the field.
a. In the Condition field, specify the condition that you want to test.

You can specify any of the Tedds for Word logical functions as conditions.
b. In the Yes field, type the text that will be placed in the Progress Log if the value of the condition is true.
c. In the No field, type the text that will be placed in the Progress Log if the value of the condition is false.
2. Click OK.

\section*{Create Advanced Log fields}

You can assemble Advanced fields using two different approaches. You can either type directly in the Statement field or use Insert buttons to add variable and condition details in the Statement field. Tedds for Word then evaluates the Statement field to create the Advanced field.

NOTE When you create an Advanced Log field, ensure that:
- All text is surrounded by quotation marks
- All parts that you want to include in Progress Log are in the Statement field.

1. Specify the variable details.
a. In the Name or expression field, type the name of the variable, or the expression that defines the value.
b. In the Value type list, select the type of the value.
- If the variable is a number, select Number.
- If the variable is stored as a string, select String.
c. In the Units field, type the units for the variable.
d. In the Format list, select the format in which the variable value should be displayed, if necessary.
e. In the No. of decimal places box, specify the number of decimal places to which the variable value should be displayed.
2. To add the variable details into the Log field, click the Insert button next to the No. of decimal places box.
3. Specify the condition details.
a. In the Condition field, specify the condition that you want to test.

You can specify any of the Tedds for Word logical functions as conditions.
b. In the Yes field, type the text that will be placed in Progress Log if the value of the condition is true.
c. In the No field, type the text that will be placed in Progress Log if the value of the condition is false.
4. To add the condition details into the Log field, click the Insert button next to the No field.
5. Click OK.

\section*{Excel link fields}

Excel Link fields link Tedds for Word and Excel together, so that your Excel calculations can be sent to Tedds for Word, or the other way around. To create Excel Link fields and create a Tedds compatible Excel worksheet, follow the instructions below.

NOTE The following only applies to Tedds for Word.

\section*{See also}

Modify Tedds fields (page 408)
Major Tedds field syntax (page 489)

\section*{Create Excel Link fields}
1. In the Insert ribbon group, click Tedds field.

The Insert Tedds field dialog box appears, displaying the Input tab.
2. Click the Excel tab.

The following view appears.

3. Specify the details of the field.
a. In the Filename field, full path and filename of the Excel document to which you want to link.
b. In the Link Sheet field, type the name of the linking worksheet in the Excel document you set above.

NOTE An Excel file may have several worksheets involved in the calculations, but there can only be one worksheet that you use as the link between Tedds for Word and Excel. The selected worksheet receives the variables from Tedds for Word and contains the resultant variables to return to Tedds for Word.

The linking worksheet must conform to a particular layout. You can find a worksheet with this layout in ProgramData ITekla\Structural\Tedds\Excel\TEDDS2XL.xls. You can use the file by copying the path into the Link Sheet field, or create and use your own worksheet.
4. In the Output Picture list, select whether you want to return a chart or a picture of selected table cells from Excel to Tedds for Word.
- If you do not want to include a picture, select None.
- If you want to include a picture of a chart, select Chart.

After that, type the name of the sheet and, if there are more than one charts in the sheet, the chart name.
- If you want to include a picture of a selected range of cells, select Table Range.
After that, type the name of the sheet and the range of cells which you want to include from the selected sheet.
5. In the Options list, adjust the link options according to your needs.
a. If you want to transfer variables from Tedds for Word to Excel, select Link variables from Tedds to Excel.
b. If you want to transfer variables from Excel to Tedds for Word, select Link variables from Excel to Tedds.

NOTE If you check both of the link options above, then the order in which the data is transferred is:
1. From Tedds for Word to Excel
2. From Excel back to Tedds for Word.

If you wish to transfer data in the reverse order, create two Excel Link fields. In the first link, only select the Link variables from Excel to Tedds option. In the second link, only select the Link variables from Excel to Tedds option.
c. If you want to have Excel open when the calculations are performed, select Show Excel.
d. If you select the Show Excel option, you can also select Wait for workbook to be closed before linking in finished. If you select the Wait for workbook to be closed before linking in finished option, the linking process will pause until you close the Excel worksheet.
e. If you want to save the workbook after performing the calculations, select Save workbook when linking is finished.
6. If necessary, you can make Excel run up to three macros during the linking process. Select the macros in the Excel macros to run whilst linking section.
- If you want to run a macro before the variables are passed to Excel from Tedds for Word, type its name in the leftmost field.
- If you want to run a macro after the variables have been passed but before they are returned to Tedds for Word, type its name in the middle field.
- If you want to run a macro after performing the linking, type its name in the rightmost field.
7. Click OK.

\section*{Create a compatible Excel worksheet}

You can find a compatible Excel worksheet on your computer in ProgramData ITekla\Structura/ITedds\Exce/\TEDDS2XL.xIs. You can use the file by copying the path into the Link Sheet field, or create and use your own worksheet. To create your own worksheet, see the following instructions.
1. In your Excel worksheet, create two sets of three columns. Leave one empty column between the sets.
2. In the central cell above the first three columns, type the title Variables from Tedds.
3. In the central cell above the second three columns, type the title Variables back to Tedds.
4. In the cells below the titles, type the following subtitles:
- Variable
- Value
- Unit

The following image illustrates how the worksheet should look.
\begin{tabular}{|l|l|l|l|l|l|l|}
\hline \multicolumn{3}{|c|}{ Variables from Tedds } & & \multicolumn{3}{c|}{ Variables back to Tedds } \\
\hline Variable & Value & Unit & & Variable & Value & Unit \\
\hline & & & & & & \\
\hline & & & & & & \\
\hline & & & & & & \\
\hline
\end{tabular}

NOTE Although you can do calculations within the Variables back to Tedds cells, we do not recommend this.

You do not need to fill in any values in either of the value columns. Tedds for Word automatically enters values to the Value cells during the calculation.

\section*{Data list fields}

Data lists contain engineering data, and using Data List fields allows you to display the data in the the Data List dialog box. The easiest way to create

Data List fields is to find the appropriate data list using Library Access System. To do that, see the following instructions.

NOTE The following only applies to Tedds for Word.

\section*{Example data list}

1. In the Library ribbon group, click the arrow below the 国 Launch the Tedds Library Access System button.
2. In the list, select Engineering Data.

The Library Access System window opens.
3. Find and select the data list that you want to insert in your calculations.
4. Perform your calculations.

When Tedds for Word proceeds to calculating the Data List field, the Data List dialog box opens.

NOTE You can also create a Data List field using the Insert Tedds field dialog. For further information on the syntax of Data List fields, see Major Tedds field syntax (page 489).

\section*{See also}

Modify Tedds fields (page 408)
Data lists (page 414)
Components of the Data List dialog box (page 414)

\section*{Data Table fields}

Data tables contain standard engineering data, and using Data Table fields allows you to display the data as tables in your calculations. To create Data Table fields, see the following instructions.

NOTE The following only applies to Tedds for Word.

\section*{Example data table}
\begin{tabular}{|c|c|c|c|c|c|c|c|c|}
\hline \multirow[t]{3}{*}{} & \multicolumn{8}{|l|}{External pressure coefficient, \(\mathrm{C}_{\mathrm{pe}}\), for Leet Table 3.4.3.1 (B)} \\
\hline & \multicolumn{7}{|c|}{Zone for \(\theta=0^{\circ}\)} & \multirow[t]{2}{*}{Zone for \(\theta=\)} \\
\hline & \multicolumn{7}{|l|}{\multirow[t]{2}{*}{\(\alpha=0^{\circ} \alpha=10^{\circ} \alpha=10^{\circ} \alpha=15^{\circ} \alpha=20^{\circ} \alpha=25^{\circ} \alpha=90^{\circ}\)}} & \\
\hline \(\mathrm{d} / \mathrm{b}=0\) & & & & & & & & -0.5 \\
\hline \(\mathrm{d} / \mathrm{b}=1\) & -0.5 & -0.5 & -0.3 & -0.3 & -0.4 & -0.5 & -0.5 & -0.5 \\
\hline \(\mathrm{d} / \mathrm{b}=2\) & -0.3 & -0.3 & -0.3 & -0.3 & -0.4 & -0.5 & -0.5 & -0.3 \\
\hline \(\mathrm{d} / \mathrm{b}=4\) & -0.2 & -0.2 & -0.3 & -0.3 & -0.4 & -0.5 & -0.5 & -0.2 \\
\hline \(\mathrm{d} / \mathrm{b}=100\) & -0.2 & -0.2 & -0.3 & -0.3 & -0.4 & -0.5 & -0.5 & -0.2 \\
\hline
\end{tabular}
1. In the Library ribbon group, click the arrow below the 国 Launch the Tedds Library Access System button.
2. In the list, select Engineering Data.

The Library Access System window opens.
3. Find and select the data table that you want to insert in your calculations.
4. Perform your calculations.

When Tedds for Word proceeds to calculating the Data Table field, the Data Tables window opens.

NOTE You can also create Data Table fields using the Insert Tedds field dialog. For further information on the syntax of Data Table fields, see Major Tedds field syntax.

\section*{See also}

Modify Tedds fields (page 408)
Data tables (page 419)
Components of the Data Tables window (page 420)

\section*{Data graph fields}

Using Data Graph fields in your calculations allows you to display engineering data as graphs in your calculations. To create Data Graph fields, see the following instructions.

NOTE The following only applies to Tedds for Word.

\section*{Example of a Data Graph}

1. In the Library ribbon group, click the arrow below the 国 Launch the Tedds Library Access System button.
2. In the list, select Engineering Data.

The Library Access System window opens.
3. Find and select the data graph that you want to insert in your calculations.
4. Perform your calculations.

When Tedds for Word proceeds to calculating the Data Graph field, the Data Graph window opens.

NOTE You can also create a Data Graph field using the Insert Tedds field dialog. For further information on the syntax of Data Graph fields, see Major Tedds field syntax.

\section*{See also}

Modify Tedds fields (page 408)
Data graphs (page 428)
Components of the Data Graph window (page 428)

\section*{Calc item fields}

Calc Item fields allow you to calculate an item stored in a calculation library and select whether or not the results are returned in the calculation document. To create Calc Item fields, see the following instructions.

NOTE The following only applies to Tedds for Word.

\section*{See also}

Major Tedds field syntax (page 489)
Modify Tedds fields (page 408)

\section*{Create Calc Item fields}
1. In the Insert ribbon group, click Tedds field.

The Insert Tedds field dialog box appears, displaying the Input tab.
2. Click the Calc Item tab.

The following view appears.
3. In the Type list, select the type of field that you want to create.
- Select Simple to insert and calculate any library item in your calculations.
- Select Condition to insert one of two possible library items in your calculations, depending on whether a condition is met.

\section*{Create Simple Calc Item fields}

1. Specify the details of the field.
a. In the Calc library field, find the correct library by clicking the . button, or type the full path and filename of the library.
b. In the Calc item field, find the correct calculation item by clicking ... button, or type the short name of the item that you want to calculate.
2. In the Output list, select whether you want to insert the item results in your calculations.
- To insert the item results in your calculations, select Append.
- Otherwise, select Discard.
3. Click OK.

\section*{Create conditional Calc Item fields}

1. Specify the details of the condition.
a. In the Condition field, specify the condition that you want to test.
b. In the Calc library field, find the correct library by clicking the ... button, or type the full path and filename of the library.
c. In the Yes Calc item field, type the calc item that will be placed in the calculations if the value of the condition is true.
d. In the No Calc item field, type the calc item that will be placed in the calculations if the value of the condition is false.
2. In the Output list, select whether you want to insert the item results in your calculations.
- To insert the item results in your calculations, select Append.
- Otherwise, select Discard.
3. Click OK.

\section*{Modify Tedds fields}

This section covers modifying Tedds fields in different ways, such as modifying Tedds field syntax, correcting Tedds field errors, and entering formatted text in Tedds fields.

NOTE The following only applies to Tedds for Word.

\section*{See also}

Major Tedds field syntax (page 489)
Expression text format (page 516)
Units (page 526)

\section*{Modify the content of Tedds fields}

All Tedds fields have their own particular syntax.
You can modify Tedds fields by modifying the elements in their syntax. For more information, see the syntax of each Tedds field.

\section*{Fix Tedds field errors}

If your Tedds fields contain mismatched quotation marks, Tedds for Word displays a fatal error message while calculating the field.
If this occurs, do the following:
1. Click Interrupt to stop the calculation.

An error field is placed in your document. The error field allows you to identify the invalid Tedds field.
2. Make the necessary corrections to the Tedds field.
3. Recalculate the calculations from the corrected Tedds field to the end of the document.

\section*{Enter formatted text in Tedds fields}

You may need to enter formatted text in your Tedds fields. In many cases, the Insert Tedds field dialog box allows you to access the most common formatting options with the buttons on the right side of each field.
1. In the Insert ribbon group, click Tedds field.

The Insert Tedds field dialog box appears.
2. Do one of the following.
a. Use one of the suggested formatting options, presented as buttons next to each field in the Insert Tedds field dialog box.
b. Right-click a field that allows formatted text to access the full range of formatting options.

\section*{A context menu containing all of the formatting options appears.}
\begin{tabular}{|c|c|}
\hline Undo & Ctrl + Z \\
\hline Cut & Ctrl +X \\
\hline Copy & \(\mathrm{Ctrl}+\mathrm{C}\) \\
\hline Paste & Ctrl +V \\
\hline Select All & Ctrl + A \\
\hline Superscript & Ctrl + Shift \(+=\) \\
\hline Subscript & Ctrl \(+=\) \\
\hline Greek & Ctrl + G \\
\hline Lowercase & > \\
\hline Uppercase & > \\
\hline SI Units & > \\
\hline US Units & > \\
\hline Expression Text & Ctrl + E \\
\hline
\end{tabular}

See the description of each option in the table below.
\begin{tabular}{|l|l|}
\hline \multicolumn{1}{|c|}{ Option } & \multicolumn{1}{c|}{ Description } \\
\hline Select all & Selects all text in the field. \\
\hline Superscript & \(\begin{array}{l}\text { If no text is selected in the field, switches to } \\
\text { typing in superscript characters. } \\
\text { If text is selected, switches the selected text } \\
\text { between normal and superscript characters. }\end{array}\) \\
\hline Subscript & \(\begin{array}{l}\text { If no text is selected in the field, switches to } \\
\text { typing in subscript characters. } \\
\text { If text is selected, switches the selected text } \\
\text { between normal and subscript characters. }\end{array}\) \\
\hline Greek & \(\begin{array}{l}\text { If no text is selected in the field, switches to } \\
\text { typing in Greek characters. }\end{array}\) \\
\hline Lowercase & \(\begin{array}{l}\text { If text is selected, switches the selected text } \\
\text { between normal and Greek characters. }\end{array}\) \\
\hline Uppercase & \(\begin{array}{l}\text { Displays a list of lowercase Greek characters, } \\
\text { from which you can select one to add it to the } \\
\text { formatted text field. }\end{array}\) \\
If text is selected in the field, the selected text is \\
replaced by the selected Greek character.
\end{tabular}\(\}\)
\begin{tabular}{|l|l|}
\hline US Units & \begin{tabular}{l} 
Shows a list of US unit types, in which you can \\
and select a unit and add it to the formatted text \\
field. \\
If text is selected in the formatted text field, the \\
selected text is replaced by the selected unit.
\end{tabular} \\
\hline Expression text / Formatted text & \begin{tabular}{l} 
If the formatted text field currently shows \\
formatted information, then switches the text to \\
expression text format. \\
If the field currently shows expression text \\
format, then switches the text to formatted text.
\end{tabular} \\
\hline
\end{tabular}

\section*{Use the string function}

The string function converts a variable value into text, so you can use it in a Tedds field that only accepts string arguments. You can use the string function with Input fields, Show fields, Message fields and Log fields.

\section*{NOTE The following only applies to Tedds for Word.}

The particular syntax of a string function is:
string(\$variable name\$, \$format\$, \$unit\$)
Parameters:
\$variable name\$ is the name of the variable that you want to include in the string, or a calculation that gives you the variable value.
\$format\$ is the format that you want to apply to the calculated value.
\$unit\$ is the unit in which the variable is to be displayed. Units are optional.

\section*{Examples of the string function}

\section*{Message field}

Message("The minimum Area of steel required is "+string(A_\{s\},"FO","mm^(2)")+" mm^2 ","Note")
In the example, the string function \(\left(\left(A_{-}\{s\}, " F 0^{\prime}, " m m^{\wedge}(2)^{\prime \prime}\right)\right)\) is used for adding values within text.

The + signs tell Tedds for Word to add the parts together to create the text that goes into the dialog.

\section*{Input field}

Input("Input the bar diameter - minimum "+string(D_\{min\},"FO","mm")+"
mm","Dia","mm", string(D_\{min\},"FO","mm"),2)
In the example, the first string function is used for adding values within the text. The second string function is used on its own without other text, and it calculates a default value that is set in the input dialog.

\section*{See also}

Syntax conventions (page 488)
Major Tedds field syntax (page 489)

\section*{Use conditions}

The condition function allows you to give alternative results based on whether the value of a particular condition is True or False. You can use the condition function with Input, Show, Message, and Log fields.

NOTE The following only applies to Tedds for Word.

\section*{Condition syntax}

The condition syntax for each of the eventual conditional fields is:
- Input(\$prompt\$, \$variable name\$, \$units\$, \#default value\# or \$default value\$, [\#control flag\#], (ificonditioni, \$true text\$, \$false text\$))
- Show(ificonditioni,\$true text\$, \$false text\$, icontrol flagi, iformat flagi, \#control flag\#)
- Message(if(iconditioni, \$true text\$, \$false text\$), \$message title\$, [icontrol flagi])
- LogText(if(iconditioni,\$true text\$,\$false text\$))

The parameters are:
- icondition \({ }_{j}\) is the condition which controls the field and determines whether the true text or the false text will appear in your document.
- \$true text\$ is the text which is displayed if the value of the condition is True. You can use the string function to add values of variables into the text.
- \$false text\$ is the text which is displayed if the value of the condition is False. You can use the string function to add values of variables into the text.

\section*{Condition function example}

Consider the Input field syntax below:
Input("Input the bar diameter - minimum "+String(D_\{min\},"F0","mm")+"
mm","Dia", "mm", if(D_\{min\}>Dia, string(D_\{min\},"FO","mm"),
string(Dia,"FO","mm")),2)
In this case, the default value for the variable Dia depends on whether the minimum bar diameter is greater than the actual diameter.

You can see this more clearly if we isolate the condition from the rest of the field:
if(D_\{min\}>Dia, string(D_\{min\},"FO","mm"), string(Dia,"FO","mm"))

If we further remove the string expressions, replacing them with \(D_{-}\{m i n\}\) and Dia we get
if(D_\{min\}>Dia, \(\left.D_{-}\{m i n\}, D i a\right)\).
Now the condition is much easier to see: if \(D_{-}\{\min \}\) is greater than Dia, the input dialog has its default value set to \(D_{-}\{m i n\}\).
If \(D_{-} \min\) is less than or equal to Dia, then its default value will be set to Dia.
NOTE If you want to use complex conditions in your calculations, you may find it useful to create the overall structure of the field, and then divide the field syntax into pieces.

You must use expression text format for non alphanumeric characters.

\section*{See also}

Syntax conventions (page 488)
Major Tedds field syntax (page 489)

\section*{6 other Tedds features}

The following additional Tedds features are available in both the Tedds Application and Tedds for Word.
- Data lists (page 414)
- Data tables (page 419)
- Data graphs (page 428)
- 2D analysis (page 434)
- Section properties calculator (page 456)

\subsection*{6.1 Data lists}

Data lists are lists that contain and allow you to access engineering data. Tedds allows you to use these lists with the help of the the Data List dialog box. For more information on the benefits of data lists, see the following paragraphs.
You do not need to open the Data List dialog box separately, since it automatically opens if the calculation requires any data from it.
The the Data List dialog box allows you to:
- Access data for a wide range of items with the help of a simple interface.

You can access such data as section properties, grade stresses, and design strengths.
- Select a specific item in a data list and view its properties on the screen.
- Return and use the properties for a selected item to your calculations.

\section*{See also}

Data list fields (page 402)

\section*{Components of the Data List dialog box}

A data list displays information related by a common theme. In the following paragraphs, we present the main components of the Data List dialog box.

1. Page pane
displays all pages of information related to the selected theme, such as Steel Sections.
2. Item pane
displays all items of the selected page.
3. Page divider
is the area between the Page pane and the Item pane.
The page divider allows you to modify the width of each pane.
4. Selected item
is the item which will be inserted in your calculations when you click Select.

The selected item is always highlighted with blue.
5. Details button
allows you to see the variables of the selected item.

\section*{See also}

Return an item to your calculations (page 417)
Adjust the view of the Data List dialog box (page 416)

\section*{Adjust the view of the Data List dialog box}

You can adjust the proportions of the Data List dialog box according to your needs. For more details on how to adjust the view of the Data List dialog box, see the following paragraphs.
By default, the Data List dialog box remembers the size and position which you have defined the last time that you used it.
However, Tedds resets the relative proportions of the Page pane and the Item pane each time that you close the Data List dialog box.

\section*{Adjust the view}
- Drag the page divider to alter the relative proportions of the Page pane and the Item pane.


\section*{View the details of a selected item}

With an item selected in the Data List dialog box, you can see all the details that the data list has stored for the item.
1. Select the item whose details you wish to view.
2. Click the Details button.
\begin{tabular}{|c|c|c|c|c|c|c|c|}
\hline \multicolumn{8}{|l|}{包 Data List - European Steel Sections \(\times\)} \\
\hline \multicolumn{8}{|c|}{UB \(127 \times 76 \times 13\)} \\
\hline & & & D & B & & t. & \\
\hline \multirow[t]{2}{*}{\[
\sqrt{6}
\]} & \multirow[t]{2}{*}{Universal Beams} & \multirow[t]{2}{*}{\(\wedge\)} & 127 & 76 & 13 & & \(\wedge\) \\
\hline & & & 152 & 89 & 16 & & \\
\hline \multicolumn{2}{|l|}{\multirow[t]{8}{*}{\begin{tabular}{l}
Advance UKB
Universal Columns
\(\square\) Advance UKC \\
I \\
Rolled Steel Joists \\
Asymmetric Beams \\
I \\
Slimflor Fabricated Beams \\
[ \\
Rolled Steel Channels
\end{tabular}}} & & 178 & 102 & 19 & & \\
\hline & & & 203 & 102 & 23 & & \\
\hline & & & & 133 & 25 & 30 & \\
\hline & & & 254 & 102 & 22
28 & 25 & \\
\hline & & & & 146 & 31
43 & 37 & \\
\hline & & & 305 & 102 & 25
33 & 28 & \\
\hline & & & & 127 & 37
48 & 42 & \\
\hline & & & & 165 & 40
54 & & \(\checkmark\) \\
\hline \multicolumn{4}{|l|}{Details} & \multicolumn{2}{|l|}{Select} & & \\
\hline
\end{tabular}

The Details sheet opens.
NOTE If you select different items with the Details sheet open, the dialog box always displays the information for the currently selected item.
To close the Details sheet, click \(\mathbf{X}\) at the top right corner of the Details sheet.

\section*{See also}

Return an item to your calculations (page 417)

\section*{Return an item to your calculations}

Using the Data List dialog box, you can return items and their properties to your calculations. To select the item to return, see the following instructions.

\section*{Return an item to your calculations}

The basic process of selecting an item which you want to return to your calculations is described in the following instructions.

1. In the Page pane, select the correct type of the item.
2. In the Item pane, select the correct item.
3. To insert the properties of the selected item in your calculations, click Select.

For detailed instructions on how to select the correct page and item, see the following paragraphs.

\section*{Select the page containing the correct item type}
1. Scroll the Page pane to find the correct page.
2. Click the page icon or page text to select the page.

The page title bar displays the selected page.

\section*{Select the correct item}
1. Do one of the following:
- Scroll the Item pane until you can see the correct item.
- Click anywhere in the first column of the Item pane and type the first character of the correct item.

Tedds views the first item beginning with the character which you typed.

To see other results, repeat the first character as many times as necessary.
2. Click the rightmost column to pick the particular item you require.

The page title bar displays the selected item.
3. To insert the properties of the selected item in your calculations, click Select.

\subsection*{6.2 Data tables}

Data tables are tables that contain and allow you to access engineering data. Using the Data Tables tool, you can return a piece of the engineering data to your calculations. For more information on the use and benefits of the Data Tables tool, see the following paragraphs.

You do not need to open the Data Tables tool separately, since it automatically opens if the calculation requires any data from it.
Using the Data Tables tool, you can:
- Access a wide range of data including such information as design tables and proprietary manufacturers data.
- Search any table using comprehensive criteria.
- Interpolate data tables to see the exact values that you need in your calculations.
- Select specific items simultaneously in all open data tables.
- Return details from some or all tables to your calculations.

The Data Tables tool consists of an application window that contains one or more subsidiary windows, each of which contains the information for a particular table.
When you select a single item, the Data Tables tool selects the same item in all open tables. You can then either:
- Return the information from all the open data tables to your calculations.
- Select the tables whose information you want to return to your calculations.

\section*{See also}

Data Table fields (page 404)

\section*{Components of the Data Tables window}

When you calculate a data table, the Data Tables window automatically opens and allows you to select the data that you need in your calculations. To efficiently use data tables, see the main components of the Data Tables window in the following paragraphs.

1. Table tabs
allow you to view different details of the data table.
a. Table tab
displays a graphical representation of the data table.
b. Variables tab
displays the current variables of a selected item in the data table.
c. Notes tab
displays any notes that apply to the data table.
d. Sketches tab
displays any sketches that relate to the data table.

\section*{NOTE}

All data tables do not contain all of the previously mentioned details. That is why the Notes tab and the Sketches tab may not always be available.

\section*{2. Home button}
returns the table display to the top left corner of the table.
3. Toolbar
allows you to access the different functions of data tables.

\section*{See also}

Select an item in a data table (page 421)
View the different details of a data table (page 425)

\section*{Linked data tables}

The Data Tables tool can open several linked data tables at once. This allows you to select items in several tables with one click.
For example, designing a strut may require opening one data table on section properties, and another one on safe loads. Although each data table contains different information, the items in all tables are similar.
When you select an item in one table, the same item is also selected in the linked data tables, as long as the selection meets the search criteria that you have set for the linked data tables. This means that by selecting one item, you can return information to your calculations from several different data tables.

\section*{See also}

Select an item in a data table (page 421)

\section*{Select an item in a data table}

In the Data Tables window, you can select an item whose information you want to return to your calculations. To select an item in a data table, see the following instructions.
- Click the cell at the intersection of the correct row and column, containing the information that you want to return to your calculations.

Tedds indicates the selected item by highlighting it with the color determined in Data Tables settings.
\begin{tabular}{|c|c|c|c|c|c|c|c|c|c|c|c|}
\hline \multirow[t]{2}{*}{} & \multicolumn{11}{|c|}{Slenderness correction factor, \(\mathbf{k}_{\mathbf{c}}\), for members with applied loading other than as for table 15} \\
\hline & \multicolumn{6}{|c|}{\(\mu\) positive} & \multicolumn{5}{|c|}{\(\mu\) negative} \\
\hline \(\boldsymbol{\psi}\) & 1.0 & 0.8 & 0.6 & 0.4 & 0.2 & 0.0 & -0.2 & -0.4 & -0.6 & -0.8 & -1.0 \\
\hline 10000.00 & 1.00 & 0.96 & 0.91 & 0.86 & 0.82 & 0.77 & 0.72 & 0.68 & 0.65 & 0.65 & 0.65 \\
\hline 50.00 & 1.00 & 0.96 & 0.92 & 0.87 & 0.83 & 0.77 & 0.72 & 0.67 & 0.66 & 0.66 & 0.65 \\
\hline 10.00 & 0.99 & 0.98 & 0.95 & 0.91 & 0.86 & 0.81 & 0.76 & 0.70 & 0.68 & 0.68 & 0.67 \\
\hline 5.00 & 0.99 & 0.98 & 0.97 & 0.94 & 0.90 & 0.85 & 0.80 & 0.75 & 0.71 & 0.70 & 0.70 \\
\hline 2.00 & 0.98 & 0.98 & 0.97 & 0.96 & 0.94 & 0.92 & 0.90 & 0.86 & 0.82 & 0.78 & 0.76 \\
\hline 1.50 & 0.97 & 0.97 & 0.97 & 0.96 & 0.95 & 0.93 & 0.92 & 0.89 & 0.86 & 0.83 & 0.79 \\
\hline 1.00 & 0.97 & 0.97 & 0.97 & 0.96 & 0.96 & 0.95 & 0.94 & 0.93 & 0.93 & 0.91 & 0.89 \\
\hline 0.50 & 0.96 & 0.96 & 0.96 & 0.96 & 0.96 & 0.95 & 0.94 & 0.94 & 0.94 & 0.93 & 0.92 \\
\hline 0.00 & 0.94 & 0.94 & 0.94 & 0.94 & 0.94 & 0.94 & 0.94 & 0.94 & 0.94 & 0.94 & 0.94 \\
\hline -0.10 & 0.93 & 0.93 & 0.93 & 0.93 & 0.94 & 0.94 & 0.94 & 0.94 & 0.94 & 0.94 & 0.94 \\
\hline -0.20 & 0.92 & 0.92 & 0.92 & 0.92 & 0.93 & 0.93 & 0.93 & 0.93 & 0.94 & 0.94 & 0.93 \\
\hline -0.30 & 0.91 & 0.91 & 0.92 & 0.92 & 0.93 & 0.93 & 0.93 & 0.93 & 0.94 & 0.94 & 0.94 \\
\hline -0.40 & 0.90 & 0.90 & 0.91 & 0.91 & 0.92 & 0.92 & 0.92 & 0.92 & 0.93 & 0.93 & 0.93 \\
\hline -0.50 & 0.89 & 0.90 & 0.91 & 0.91 & 0.92 & 0.92 & 0.92 & 0.92 & 0.92 & 0.92 & 0.92 \\
\hline -0.60 & 0.71 & 0.77 & 0.84 & 0.87 & 0.89 & 0.91 & 0.92 & 0.92 & 0.92 & 0.92 & 0.92 \\
\hline -0.70 & 0.57 & 0.64 & 0.70 & 0.77 & 0.82 & 0.87 & 0.89 & 0.91 & 0.92 & 0.92 & 0.91 \\
\hline -0.80 & 0.47 & 0.52 & 0.59 & 0.67 & 0.73 & 0.80 & 0.86 & 0.90 & 0.92 & 0.92 & 0.92 \\
\hline -0.90 & 0.47 & 0.46 & 0.50 & 0.58 & 0.65 & 0.73 & 0.80 & 0.87 & 0.90 & 0.90 & 0.90 \\
\hline -1.00 & 0.50 & 0.48 & 0.46 & 0.51 & 0.58 & 0.66 & 0.73 & 0.81 & 0.87 & 0.89 & 0.89 \\
\hline -1.10 & 0.54 & 0.51 & 0.48 & 0.49 & 0.54 & 0.61 & 0.69 & 0.77 & 0.83 & 0.87 & 0.88 \\
\hline -1.20 & 0.57 & 0.54 & 0.50 & 0.47 & 0.51 & 0.56 & 0.64 & 0.73 & 0.80 & 0.84 & 0.87 \\
\hline -1.30 & 0.61 & 0.56 & 0.52 & 0.47 & 0.49 & 0.53 & 0.61 & 0.70 & 0.77 & 0.82 & 0.86 \\
\hline -1.40 & 0.64 & 0.59 & 0.55 & 0.49 & 0.48 & 0.51 & 0.58 & 0.67 & 0.74 & 0.79 & 0.85 \\
\hline -1.50 & 0.67 & 0.62 & 0.57 & 0.51 & 0.47 & 0.49 & 0.56 & 0.64 & 0.71 & 0.77 & 0.84 \\
\hline -1.60 & 0.69 & 0.64 & 0.59 & 0.52 & 0.48 & 0.50 & 0.55 & 0.63 & 0.69 & 0.76 & 0.83 \\
\hline -1.70 & 0.71 & 0.66 & 0.60 & 0.54 & 0.50 & 0.51 & 0.55 & 0.61 & 0.68 & 0.74 & 0.82 \\
\hline -1.80 & 0.74 & 0.69 & 0.62 & 0.55 & 0.51 & 0.51 & 0.54 & 0.60 & 0.66 & 0.73 & 0.81 \\
\hline -1.90 & 0.76 & 0.71 & 0.63 & 0.57 & 0.53 & 0.52 & 0.54 & 0.58 & 0.65 & 0.71 & 0.80 \\
\hline -2.00 & 0.78 & 0.73 & 0.65 & 0.58 & 0.54 & 0.53 & 0.53 & 0.57 & 0.63 & 0.70 & 0.79 \\
\hline -5.00 & 0.91 & 0.86 & 0.80 & 0.74 & 0.70 & 0.65 & 0.62 & 0.59 & 0.58 & 0.61 & 0.67 \\
\hline -50.00 & 0.99 & 0.95 & 0.89 & 0.84 & 0.79 & 0.74 & 0.70 & 0.66 & 0.63 & 0.62 & 0.65 \\
\hline 10000.00 & 1.00 & 0.96 & 0.91 & 0.86 & 0.82 & 0.77 & 0.72 & 0.68 & 0.65 & 0.65 & 0.65 \\
\hline
\end{tabular}

NOTE If your selection is not sufficient to identify a unique item, the Variables tab states Needs selecting.

\section*{See also}

Linked data tables (page 421)
Search specific information in a data table (page 424)
Interpolate data within a data table (page 422)
View the different details of a data table (page 425)
Return data table information to your calculations (page 425)
Adjust data table settings (page 426)

\section*{Interpolate data within a data table}

If a data table contains data that allows interpolating, you can interpolate the table linearly. To interpolate data within a data table, see the following instructions.
1. In the toolbar, click Interpolate.

The Interpolate dialog box appears.

2. In the Range Item list, select the item that you want to interpolate.
3. Type the desired value in the Value to be added field.

NOTE The value that you add must be greater than the smallest value and smaller than the greatest value in the Range Values list.
4. Click Interpolate.

Tedds performs the interpolation and updates the table to include the new value.
5. If necessary, repeat steps 1-4 to receive the desired result.

NOTE If you make selections within a table, the Data Tables window automatically transfers the existing selection to the interpolated value.

\section*{See also}

Clear an interpolation (page 423)

\section*{Clear an interpolation}

Sometimes, you may want to clear the interpolation that you have made in order to return a data table to its original condition. To clear an interpolation, see the following instructions.
- Click Edit --> Clear interpolation.

The last interpolation that you made is cleared.

\section*{See also}

Interpolate data within a data table (page 422)

\section*{Search specific information in a data table}

You can easily search a data table for information that matches specific search criteria. The matching cells are identified using a color of your choice, so that you can easily identify the items which match your search criteria. For more information on how to search specific information in a data table, see the following instructions.

\section*{See also}

Select an item in a data table (page 421)
View the different details of a data table (page 425)
Return data table information to your calculations (page 425)

\section*{Search specific information in a data table}
1. Click Search.

The Search criteria dialog box appears.
2. In the Search for list, select the item that you want to search for.
3. In Criterion 1, set the condition which you want to use in your search.
4. If necessary, in Criterion 2, set another condition to limit your search further.
5. If you have defined Criterion 2, select whether Criterion \(\mathbf{2}\) is additional or alternative to Criterion 1 by selecting either And or Or.
6. If you want to apply search conditions for other items, repeat steps 2-5 for each item.
7. To search the data table, click OK.

The data table re-displays, and highlights the items that match your search criteria.

To view the details of the matching items, click the Variables tab.

\section*{Change the search criteria for a data table}
1. Click Search.

The Search criteria dialog box appears.
2. Select the item whose criteria you want to change.
3. Change the search criteria according to your needs.
- If you want to remove all search criteria, set Criterion 1 to None.
4. Click OK.

\section*{Clear a search}
- To clear your search, click Edit --> Clear search.
\begin{tabular}{c|l|}
\hline File & Edit View Window Help \\
\hline & Interpolate... \\
& Search... \\
& Clear Interpolation \\
& Clear Search \\
\hline
\end{tabular}

Your search is cleared.

\section*{Return data table information to your calculations}

Once you have made your selections in the group of data tables you have open, you can return the appropriate information from one or more of these tables to your calculation sheet. That way, you can use the information in your calculations. To return data table information to your calculations, see the following instructions.

\section*{See also}

Close the Data Tables window (page 427)

\section*{Return data table information to your document}
1. Do one of the following:
- Double-click the selected item.
- Select the item and click Copy to calcs.

If you have more than one table open, you can select from which tables you want to return information.

NOTE You cannot return information to your calculations from a table if you have not made a proper selection. To return to make a selection in a data table, click Cancel.
2. Click OK.

The information of the selected item is returned to your calculations.

\section*{View the different details of a data table}

Data tables do not only consist of the graphical representation of the table, but also variables. In addition, data tables may contain associated notes and sketches. To view the different details of a data table, see the following instructions.
You can view different details by clicking the different table tabs, located at the bottom of the Data Tables window.
Table \(\triangle\) Variables \(\times\) Notes \(\times\) Sketches
- Based on which details of the data table you want to display, do one of the following.
- To view the graphical representation of the table, click the Table tab.

NOTE The Table tab is the initial view when you open the Data Tables window.
- To view the variables associated with the table, click the Variables tab.
- To view the notes associated with the table, click the Notes tab.
- To view the sketches associated with the table, click the Sketches tab.

\section*{See also}

Components of the Data Tables window (page 420)

\section*{Adjust data table settings}

To alter the appearance of the Data Tables window, you can adjust data table settings yourself. To adjust the settings, follow the instructions below.
1. In the Data Tables window, click File --> User Options.

The Options dialog box appears.

2. Modify the colors that you want to use for the different parts of the Data Tables window.
a. To change the background color of the Data Tables window, modify the Page color.
b. To change the color of entries that match your search criteria, modify the Qualifying value text color.
c. To change the color of selections that you have made on the screen, modify the Cell selection color.
d. To change the color of entries that do not match you search criteria, modify the Excluded value text color.
3. Select the zoom level for the table.
4. Click OK.

\section*{See also}

Components of the Data Tables window (page 420)
Search specific information in a data table (page 424)

\section*{Close the Data Tables window}

You can close the Data Tables window in two ways: you can either return variables to your calculations, or close the Data Tables window without returning any information to your calculations.

\section*{Close the Data Tables window and return variables}
- Do one of the following:
- Double-click the desired item.
- In the toolbar, click the Copy to calcs button.

\section*{Close the Data Tables window without returning variables}

WARNING If you close the Data Tables window without returning variables, any remaining calculations that use details from the data tables will not calculate correctly.
- Do one of the following:
- Click File --> Exit Without Copy.
- Click \(\mathbf{X}\) at the top right corner of the Data Tables window, and in the confirmation message that appears, click Yes.

\subsection*{6.3 Data graphs}

Data graphs are graphs that contain and allow you to access engineering data.
You can then use the engineering data in your calculations.
You do not need to open the Data Graph window separately, since it automatically opens if the calculation requires any data from a data graph.

The the Data Graph window allows you to:
- Access a wide range of data, including design curves and proprietary manufacturers data.
- Interpolate graphs to see the exact values that you require.
- Return details from graphs to your calculations.

\section*{See also}

Data graph fields (page 405)

\section*{Components of the Data Graph window}

To help you work with data graphs quickly and efficiently, see the components of the Data Graph window in the following paragraphs.

1. Interpolate bar
allows you to access the main data graph functions with one click.
2. Data graph tabs
allow you to display different details of the data graph.
a. Graph tab
displays a graphical representation of the graph.
The Graph tab is the initial view of a data graph.
b. Variables tab
displays the current values of all variables related to the selected point of the graph.
c. Notes tab
displays any notes that apply to the graph.
d. Sketches tab
displays a diagram that relates to the graph.
NOTE All data graphs do not contain all of the previously mentioned details. If that is the case, the Notes tab and the Sketches tab may not be selectable.

\section*{See also}

Select a point in a data graph (page 429)
Interpolate data within a data graph (page 431)
Return data graph information to your calculations (page 431)

\section*{Select a point in a data graph}

Using the Data Graph window allows you to select a point in a graph and return its data to your calculations. To select an item in a data graph, see the following instructions.
1. Click a point of a curve.

TIP To see the value of the selected point, rest the mouse pointer over the point.
To see the properties of the selected point, click the Variables tab.

A pair of cross hairs appears around the selected point.

2. If necessary, do one of the following to further specify the desired point:
- Drag the cross hairs to a specific point of the curve.
- At the top of the graph, type the details of the desired point in the \(X\) axis and \(Y\) axis fields.

\section*{See also}

Components of the Data Graph window (page 428)
Interpolate data within a data graph (page 431)
Return data graph information to your calculations (page 431)

\section*{Interpolate data within a data graph}

Data graphs allow you to interpolate new values within them, if necessary. To interpolate data within a data graph or clear interpolations, see the following instructions.

\section*{See also}

Select a point in a data graph (page 429)

\section*{Interpolate within a data graph}
1. In the Interpolate bar, click \(\equiv\) Interpolate.

The Interpolate dialog box appears.
\begin{tabular}{|c|c|}
\hline Interpolate & X \\
\hline \multicolumn{2}{|l|}{Existing Values} \\
\hline 0300 & OK \\
\hline 5 & \multirow[t]{6}{*}{Cancel} \\
\hline 10 & \\
\hline 20 & \\
\hline 40 & \\
\hline 100 & \\
\hline 200 & \\
\hline New Value: 0 & m \\
\hline
\end{tabular}
2. Type the new value that you want to insert in the data graph.

The new value must be greater than the smallest existing value and smaller than the greatest existing value.
3. Click OK.

The new value that you entered appears in the data graph.
Only the values that are relevant to the selected point are stored when you insert information in your calculations.

\section*{Clear an interpolation}
1. Click Curve --> Clear Interpolation.

Your latest interpolation is cleared.

\section*{Return data graph information to your calculations}

Once you have made your selection in a data graph, you can return the information of the selected point to your calculations. You can then use the information in further calculations. To return data graph information to your calculations, see the following instructions.

\section*{Return point information to your calculation}
- In the Interpolate bar, click Copy to calcs.

The information of the selected point is returned to your calculations and the the Data Graph window closes.

\section*{See also}

Select a point in a data graph (page 429)

\section*{Close the Data Graph window (page 433)}

\section*{Adjust data graph settings}

To adjust the appearance of the Data Graph window, see the following instructions.
1. In the Data Graph window, click File --> User Options.

The User Options dialog box appears.

2. Select the components that you want to view in the Data Graph window.
- To view the grid lines for the \(X\) axis, select the \(\mathbf{X}\) grid lines option.
- To view the grid lines for the \(Y\) axis, select the \(\mathbf{Y}\) grid lines option.
- To view the point of the curve for which primary data has been defined, select the Curve points option.
The other values are determined by linear interpolation between curve points.
3. Select the color and style with which you want the selected curve to be highlighted.
4. Select the precision with which data graphs work by using the up and down arrows.
- If you select 1000 , the data graph works with numbers that are multiples of one thousand.
- If you select 1200 , the data graph works with numbers that are multiples of one hundred.
- If you select 1230 , the data graph works with numbers that are multiples of ten.
- If you select 1234 , the data graph works with numbers that are multiples of one, or integers.
- If you select 1234.0, the data graph works with numbers that are multiples of one tenth.
- If you select 1234.00 , the data graph works with numbers that are multiples of one hundredth.
- If you select 1234.000, the data graph works with numbers that are multiples of one thousandth.

\section*{5. Click OK.}

The settings are now saved.

\section*{Close the Data Graph window}

You can close the Data Graph window in two ways. You can either decide to return data graph information to your calculations, or close the Data Graph window without returning any information to your calculations.

\section*{Close the Data Graph window and return variables}

\section*{1. Do one of the following:}
- In the toolbar, click Copy to calcs.
- Click File --> Copy To Calcs and Exit.

\section*{Close the Data Graph window without returning variables}

WARNING If you close the Data Graph window without returning variables, any remaining calculations that use details from the data graph will not calculate correctly.
1. Do one of the following:
- Click File --> Exit Without Copy.
- Click \(\mathbf{X}\) at the top right corner of the Data Graph window, and in the confirmation dialog box that appears, click Yes.

\subsection*{6.4 2D analysis}

Tedds includes a fully integrated 2D analysis tool that allows you to define a frame in 2D, analyze the frame, and insert the results in your calculation document. In the following paragraphs, see the benefits of using the 2D analysis tool.
The 2D analysis tool allows you to:
- Model frames with unlimited nodes and elements.
- Use a spreadsheet for inputting data.
- View model geometry, loading and results for shear, moment, deflection, axial deflection, and axial force.
- Output results for node reactions, node deflections, shear, moment, deflection, axial deflection and axial force.
- Output drawings for geometry, loading, shear, moment, deflection, axial deflection and axial force.

\section*{Start 2D analysis}

To start the 2D analysis tool and model your own frames, see the following instructions.

\section*{See also}

Components of the 2D Analysis dialog box (page 435)
Create a 2D analysis model (page 437)
Modify a 2D analysis model (page 441)

\section*{Start 2D analysis (the Tedds Application)}
1. Create a new document.

The Select Calculation dialog box opens.
2. In the Analysis folder, click the 2D analysis subfolder.
3. Double-click the 2D analysis item.

The 2D analysis dialog box opens.

\section*{Start 2D analysis (Tedds for Word)}
1. On the Tedds tab, click 国Library Access System.

The Library Access System window opens.
2. Click the Analysis folder and the 2D analysis subfolder.
3. Double-click the 2D analysis item.

The 2D analysis item appears in your document.
4. Calculate the 2D analysis item.

The 2D analysis dialog box opens.

\section*{Components of the 2D Analysis dialog box}

The 2D analysis tool allows you to create and define several different properties for your components. In the paragraphs below, see the main components of the 2D analysis dialog box.

1. Context-sensitive help box
guides you in creating your model.
2. Preview window
displays a preview of the model that you are defining.
3. 2 D analysis tabs
allow you to define the different components of your model.
a. Nodes tab
allows you to define an unlimited number of nodes.
b. Materials tab
allows you to select pre-defined materials used in your model or define the properties of a custom material manually.
c. Sections tab
allows you to select pre-defined sections used in your model or define custom section properties manually.
d. Elements tab
allows you to create analysis elements by connecting two nodes and assigning the material and section for the elements.
e. Design Members tab
allows you to join elements to form design members. Using design members enables applying loads to design members, and outputting results so that they suit your design purposes.

\section*{f. Loading tab}
allows you to create load cases, which enable entering loads.
g. Load Combinations tab
allows you to define load combinations with an appropriate load factor for each load case.
h. Results tab
allows you to view the results of your analysis and define how you want the results to be displayed.
i. Output tab
allows you to determine which details of the analysis are included when you insert the analysis in your calculation document.
4. Property spreadsheet
allows you to define the properties of the components that you are creating.
5. Quick-access buttons
allow you to access the notes related to the 2D analysis tool and the variables of your model, and send feedback or a support request to the Tedds help desk.

\section*{See also}

Start 2D analysis (page 434)
Create a 2D analysis model (page 437)

\section*{Create a 2D analysis model}

Creating a 2D analysis model is a process with multiple phases. To create your own 2D analysis model, see the following instructions.

NOTE When you have entered or modified values for a row, remember to save the data by pressing Enter, clicking another row, or switching to another tab.

TIP When you define the components and properties for your model in the property spreadsheet, some labels specify the units in which they expect the values to be entered. To use other units, simply type the unit in the field after the value.

\section*{See also}

Start 2D analysis (page 434)
Components of the 2D Analysis dialog box (page 435)

Modify a 2D analysis model (page 441)
Example 2D analysis model (page 442)

\section*{1. Define geometry for the model}
1. On the Nodes tab, type the node coordinates and define their properties.

Nodes Materials Sections Elements Design Members Loading Load Combinations Results Output
\begin{tabular}{|c|c|c|c|c|c|c|c|c|c|c|c|c|}
\hline \multicolumn{2}{|l|}{+ Add} & \multicolumn{2}{|l|}{\begin{tabular}{l}
- Delete \\
cooranates
\end{tabular}} & & & & & & & & & \\
\hline & Index & \[
\begin{aligned}
& \text { Cooro } \\
& \times(\mathrm{m})
\end{aligned}
\] & \[
\begin{aligned}
& \text { anates } \\
& Z(m)
\end{aligned}
\] & \multicolumn{3}{|l|}{Vegrees of Freedo} & Label & \multicolumn{2}{|l|}{Coordinate System Name Angle (")} & \multicolumn{3}{|l|}{Spring Sbiftness} \\
\hline , & 1 & 0 & 0 & Fix... & Fix... & Free & & & & & & \\
\hline & 2 & 2 & 0 & Free & Free & Free & & & & & & \\
\hline & 3 & 4 & 0 & Free & Free & Free & & & & & & \\
\hline & 4 & 6 & 0 & Free & Free & Free & & & & & & \\
\hline - & & & & & & & & & & & & \\
\hline
\end{tabular}

NOTE Before creating additional nodes, ensure that the existing node is valid.
2. Go to the Materials tab.

Nodes Materials Sections Elements Design Members Loading Load Combinations Results Output
\begin{tabular}{|c|c|c|c|c|c|c|}
\hline \multicolumn{2}{|l|}{+ Add} & * Delete & & & & \\
\hline \multicolumn{3}{|c|}{Name} & \[
\begin{aligned}
& \text { Density } \\
& \left.(\mathrm{kg} / \mathrm{m})^{2}\right)
\end{aligned}
\] & Youngs Modulus ( \(\mathrm{kN} / \mathrm{mm}^{2}\) ) & Shear Modulus \(\left(\mathrm{kN} / \mathrm{mm}^{2}\right)\) & Themal. Coefficient \\
\hline , & Steel ( & C3) & 7850 & 210 & 80.8 & 12 \\
\hline - & & & & & & \\
\hline
\end{tabular}
3. Do one of the following:
- In the Name column, click the arrow on the right side of cells, and select the correct material in the list that appears. You can then modify the material properties according to your needs.
- Type the name of the material and the material properties in the fields manually.
4. Go to the Sections tab.

5. Do one of the following:
- Click Select... and select the desired pre-defined sections which you use in your model. If necessary, you can then modify the design properties by clicking Custom...
- Type the properties of your sections in the fields manually.
6. Click the Elements tab to open it.
7. Define the elements that you want to use in your model.

Nodes Materials Sections Elements Design Members Loading Load Combinations Results Output
\begin{tabular}{|c|c|c|c|c|c|c|c|c|c|c|}
\hline \multicolumn{2}{|l|}{+ Add} & \multicolumn{3}{|l|}{- Delete} & & & \multicolumn{3}{|r|}{\multirow[b]{2}{*}{Releases}} & \multirow[b]{2}{*}{Rotated} \\
\hline & Ind & & End & \begin{tabular}{l}
Length \\
(m)
\end{tabular} & Material & Section & & & & \\
\hline \multirow[t]{6}{*}{*} & 1 & 1 & 2 & 2 & Steel (EC3) & UC 203x203x60 & Fixed & Fixed & Fixed & \(\square\) \\
\hline & 2 & 2 & 3 & 2 & Steel (EC3) & UC 203x203x60 & Fixed & Fixed & Fixed & \(\square\) \\
\hline & 3 & 3 & 4 & 2 & Steel (EC3) & UC 203x203x60 & Fixed & Fixed & Fixed & \(\square\) \\
\hline & 4 & 5 & 6 & 2 & Steel (EC3) & UC \(203 \times 203 \times 60\) & Fixed & Fixed & Fixed & \(\square\) \\
\hline & 5 & 6 & 7 & 2 & Steel (EC3) & UC 203x203x60 & Fixed & Fixed & Fixed & \(\square\) \\
\hline & R. & 1 & 5 & 116 & Sinal IE~2) & in mammanan & Eived & Eivad & Eiven & \(\square\) \\
\hline
\end{tabular}

NOTE The local \(x\)-axis of each element runs from the start node to the end node. By default, the local major axis is perpendicular to the local \(x\)-axis in the 2D plane of the model with positive values, in the same sense as the global \(z\)-axis. For elements parallel to the global \(z\)-axis, the major axis is rotated anti-clockwise to the local \(x\) axis.

To use the minor axis section properties instead of major axis, select the Rotated option.
a. Connect two nodes by defining the start and end nodes for each element.
b. Select a material for the element.
c. Select a section for the element.
d. Define the releases and rotation of the element according to your needs.

\section*{2. Define design members for the model}
1. Go to the Design Members tab.
2. Name the design members that you want to use in your calculations.
3. Click the ... button in the Edit column and specify a start and end element for each design member.

Nodes Materials Sections Elements Design Members Loading Load Combinations Results Output

4. Modify the properties of the design members according to your needs.

\section*{3. Define loading for the model}
1. Go to the Loading tab.
2. Do one of the following:
- Use the existing load cases that are visible in the left property spreadsheet (labeled Loading).
- In the Loading property spreadsheet, define new load cases according to your needs.
3. In the list above the right property spreadsheet, Select the types of loads that you want to use in your model.
\begin{tabular}{|l|}
\hline Member Loads \\
\hline Node Loads \\
Element Loads \\
\hline Member Loads \\
\hline
\end{tabular}
4. Define the loads for the different types of loads.


TIP You can enter load positions in the following ways:
- as absolute values
- as ratios from 0 to 1 , where 0 is the start of the element or member, and 1 is the end of the element or member
5. Go to the Load Combinations tab.
6. Define the properties of the load combinations which you want to use in your model.

Nodes Materials Sections Elements Design Members Loading Load Combinations Results Output


\section*{4. View and examine results}
1. Go to the Results tab.
2. Select result options according to your needs using the available check boxes and lists.

TIP By default, results view the results for the entire model. However, if you enable the Only show current selection option, the results only view the currently selected elements or members.

\section*{5. Specify output details}
1. Go to the Output tab.
2. Select output options according to your needs using the available check boxes and lists.
3. To preview the output created with the options you selected, click Preview output...
4. To insert the output in your calculation document, click OK TIP To modify the 2D analysis model later, you can recalculate it.

\section*{Modify a 2D analysis model}

Tedds allows you to make changes to an existing 2D analysis model, if necessary. To modify a 2D analysis model, you must have the 2D analysis dialog box open. For more information, see the following instructions.

\section*{See also}

Create a 2D analysis model (page 437)
Example 2D analysis model (page 442)

\section*{Modify a group of cells}

NOTE You can modify both cells that have a numeric value and cells that have some other sort of content. This may mean cells with text, or cells for which you select the desired option in a list.
1. Hold down the Ctrl key, and select the cells that you want to modify.
2. Still holding down the Ctrl key, change the value in one of the selected cells.
3. Press Enter to update all cells to the new value.
4. Release the Ctrl key.

\section*{Modify expressions}

In addition to numerical values, you can type mathematical expressions in the cells of the 2D analysis dialog box.

If the expression starts with an operator, the current value of the cell will automatically be prefixed to the expression.

For example:
=+1 adds 1 to the current value.
\(=+500 \mathrm{~mm}\) ' adds 500 mm to the current value.
\(=* 2^{\prime}\) multiplies the current value by 2 .
\(=L\) assigns the value of the variable \(L\).
To modify expressions, see the following instructions.
1. Select the cells that you want to modify.
2. Type \(=\) and the expression. For example \(=+1\).
3. Press Enter to update the selection.

\section*{Sort data}

You can easily sort data in any column of the 2D analysis dialog box by clicking the column header.
- To sort the data in a column in ascending order, click the column header once.
- To sort the data in a column in descending order, click the column header twice.

NOTE If you modify the value of a cell in a currently sorted column, the modified cell may move in the list because its value changes the sort order.

\section*{Example 2D analysis model}

This example demonstrates the use of the 2D analysis tool and highlights techniques that can be used for efficiently entering data and modifying the model.

\section*{See also}

Creating the example 2D analysis model (page 445)

\section*{Example 2D analysis model (SI Metric)}

\section*{Geometry and Loading}

The truss shown below is to be input:

- Top and bottom chords: UC \(203 \times 203 \times 46\)
- Diagonals: CHS 168.3x6.3

\section*{Load case 1: Self weight}

Calculated automatically.
Load case 2: Dead


\section*{Load case 3: Live}


\section*{Load Combination:}
1.35 * Self weight + 1.35 * Dead + 1.50 * Live

\section*{Example 2D analysis model (US Imperial)}

\section*{Geometry and Loading}

The truss shown below is to be input:

- Top and bottom chords: W 8x40
- Diagonals: HSS 6.625x0.250

\section*{Load case 1: Self weight}

Calculated automatically.
Load case 2: Dead


Load case 3: Live


Other Tedds features

\section*{Load Combination:}
1.2 * Self weight + 1.2 * Dead + 1.6 * Live

\section*{Creating the example 2D analysis model}

To create the example 2D analysis model, see the following instructions.

\section*{See also}

Example 2D analysis model (page 442)
Create a 2D analysis model (page 437)

\section*{Open the 2D analysis dialog box}

See: Start 2D analysis (page 434)

\section*{Define the geometry (SI Metric)}
1. On the Nodes tab, enter the nodal coordinates.
2. Indicate that the frame is supported at nodes 1 and 4, as shown below.

TIP To generate additional rows for new nodes, ensure the existing row is valid. Then, click anywhere in the empty row below, marked with *.
\begin{tabular}{|l|l|l|l|l|l|}
\hline \multicolumn{1}{|c|}{ Node } & \(\mathbf{y}(\mathbf{m})\) & \(\mathbf{Z}(\mathbf{m})\) & \multicolumn{1}{|c|}{ DOF X } & \multicolumn{1}{c|}{ DOF Z } & \begin{tabular}{c} 
DOF \\
rotation
\end{tabular} \\
\hline 1 & 0 & 0 & Fixed & Fixed & Free \\
\hline 2 & 2 & 0 & Free & Free & Free \\
\hline 3 & 4 & 0 & Free & Free & Free \\
\hline 4 & 6 & 0 & Free & Fixed & Free \\
\hline 5 & 1 & 1.75 & Free & Free & Free \\
\hline 6 & 3 & 1.75 & Free & Free & Free \\
\hline 7 & 5 & 1.75 & Free & Free & Free \\
\hline
\end{tabular}
3. On the Materials tab, set the material to Steel (EC3).

The material properties appear in the property spreadsheet.
\begin{tabular}{|l|l|l|l|l|}
\hline \multicolumn{1}{|c|}{ Name } & \multicolumn{1}{|c|}{\begin{tabular}{c} 
Density \\
\(\left(\mathbf{k g} / \mathbf{m}^{\wedge} \mathbf{3}\right)\)
\end{tabular}} & \begin{tabular}{c} 
Youngs \\
Modulus \\
\(\mathbf{( k N / m m \wedge 2 )}\)
\end{tabular} & \begin{tabular}{c} 
Shear \\
Modulus \\
\(\mathbf{( k N / m m \wedge 2 )}\)
\end{tabular} & \begin{tabular}{c} 
Thermal Co- \\
efficient
\end{tabular} \\
\hline Steel (EC3) & 7850 & 210 & 80.8 & 12 \\
\hline
\end{tabular}
4. On the Sections tab, click Select..., and select the two sections shown below in the European steel data list:
\begin{tabular}{|c|c|c|c|c|c|}
\hline Name & \[
\begin{gathered}
\text { Area } \\
\left(\mathrm{cm}^{\wedge}\right)
\end{gathered}
\] & Major Inertia (cm^4) & Minor Inertia (cm^4) & Shear Area, y (cm^2) & Shear Area, z (cm^2) \\
\hline \[
\begin{aligned}
& \text { UC } \\
& 203 \times 203 \times 6 \\
& 0
\end{aligned}
\] & 76.373 & 6124.513 & 2064.598 & 52.602 & 19.702 \\
\hline \[
\begin{aligned}
& \hline \text { CHS } \\
& 168.3 \times 6.3
\end{aligned}
\] & 32.063 & 1053.420 & 1053.420 & 16.0315 & 16.031 \\
\hline
\end{tabular}
5. On the Elements tab, define the analysis elements as shown below.
\begin{tabular}{|l|l|l|l|l|}
\hline Element & \multicolumn{1}{|c|}{ Start Node } & \multicolumn{1}{c|}{ End Node } & \multicolumn{1}{|c|}{ Material } & \multicolumn{1}{c|}{ Section } \\
\hline 1 & 1 & 2 & Steel & \begin{tabular}{l} 
UC \\
\(203 \times 203 \times 60\)
\end{tabular} \\
\hline 2 & 2 & 3 & Steel & \begin{tabular}{l} 
UC \\
\(203 \times 203 \times 60\)
\end{tabular} \\
\hline 3 & 3 & 4 & Steel & \begin{tabular}{l} 
UC \\
\(203 \times 203 \times 60\)
\end{tabular} \\
\hline 4 & 5 & 6 & Steel & \begin{tabular}{l} 
UC \\
\(203 \times 203 \times 60\)
\end{tabular} \\
\hline 5 & 6 & 7 & Steel & \begin{tabular}{l} 
UC \\
\(203 \times 203 \times 60\)
\end{tabular} \\
\hline 6 & 1 & 5 & Steel & CHS 168.3x6.3 \\
\hline 7 & 5 & 2 & Steel & CHS 168.3×6.3 \\
\hline 8 & 2 & 6 & Steel & CHS 168.3x6.3 \\
\hline 9 & 6 & 3 & Steel & CHS 168.3x6.3 \\
\hline 10 & 3 & 7 & Steel & CHS 168.3x6.3 \\
\hline 11 & 7 & 4 & Steel & CHS 168.3x6.3 \\
\hline
\end{tabular}
6. Define the end releases for the elements as shown below.
\begin{tabular}{|l|l|l|l|l|l|}
\hline Element & \begin{tabular}{c} 
Start \\
Node
\end{tabular} & End Node & \begin{tabular}{c} 
Start \\
Moment
\end{tabular} & \begin{tabular}{c} 
End \\
Moment
\end{tabular} & \multicolumn{1}{c|}{ Axial } \\
\hline 1 & 1 & 2 & Fixed & Fixed & Fixed \\
\hline 2 & 2 & 3 & Fixed & Fixed & Fixed \\
\hline 3 & 3 & 4 & Fixed & Fixed & Fixed \\
\hline 4 & 5 & 6 & Fixed & Fixed & Fixed \\
\hline 5 & 5 & 6 & Fixed & Fixed & Fixed \\
\hline 6 & 1 & 5 & Free & Free & Fixed \\
\hline 7 & 5 & 2 & Free & Free & Fixed \\
\hline 8 & 2 & 6 & Free & Free & Fixed \\
\hline 9 & 6 & 3 & Free & Free & Fixed \\
\hline
\end{tabular}
\begin{tabular}{|l|l|l|l|l|l|}
\hline Element & \multicolumn{1}{|c|}{\begin{tabular}{c} 
Start \\
Node
\end{tabular}} & End Node & \begin{tabular}{c} 
Start \\
Moment
\end{tabular} & \begin{tabular}{c} 
End \\
Moment
\end{tabular} & \multicolumn{1}{c|}{ Axial } \\
\hline 10 & 3 & 7 & Free & Free & Fixed \\
\hline 11 & 7 & 4 & Free & Free & Fixed \\
\hline
\end{tabular}

The releases should now be displayed in the graphical display as shown below.


\section*{Define the geometry (US Imperial)}
1. On the Nodes tab, enter the nodal coordinates.
2. Indicate that the frame is supported at nodes 1 and 4, as shown below.

TIP To generate additional rows for new nodes, ensure the existing row is valid. Then, click anywhere in the empty row below, marked with *.
\begin{tabular}{|l|l|l|l|l|l|}
\hline \multicolumn{1}{|c|}{ Node } & \multicolumn{1}{|c|}{\(\mathbf{X ( f t )}\)} & \(\mathbf{Z}(\mathbf{f t )}\) & \multicolumn{1}{c|}{ DOF X } & \multicolumn{1}{c|}{ DOF Z } & \begin{tabular}{c} 
DOF \\
rotation
\end{tabular} \\
\hline 1 & 0 & 0 & Fixed & Fixed & Free \\
\hline 2 & 7 & 0 & Free & Free & Free \\
\hline 3 & 14 & 0 & Free & Free & Free \\
\hline 4 & 21 & 0 & Free & Fixed & Free \\
\hline 5 & 3.5 & 6 & Free & Free & Free \\
\hline 6 & 10.5 & 6 & Free & Free & Free \\
\hline 7 & 17.5 & 6 & Free & Free & Free \\
\hline
\end{tabular}
3. On the Materials tab, select Steel (AISC).

Delete
\begin{tabular}{|c|c|c|c|c|c|c|}
\hline & Name & & Density ( \(\mathrm{lbm} / \mathrm{ft} 3\) ) & Youngs Modulus
(ksi) & Shear Modulus
(ksi) & Thermal Coefficient \\
\hline . & Steel (AISC) & \(\square\) & 489.999 & 29000 & 11200 & 12 \\
\hline * & \begin{tabular}{l}
Aluminium \\
Composite (BS5268) \\
Concrete (ACI light weight) \\
Concrete ( ACl normal) \\
Concrete (AS3600 light weight)
\end{tabular} & & & & & \\
\hline
\end{tabular}

The material properties appear in the property spreadsheet.
\begin{tabular}{|l|l|l|l|l|}
\hline \multicolumn{1}{|c|}{ Name } & \multicolumn{1}{|c|}{\begin{tabular}{c} 
Density \\
(lbm/ft^3)
\end{tabular}} & \begin{tabular}{c} 
Youngs \\
Modulus \\
(ksi)
\end{tabular} & \begin{tabular}{c} 
Shear \\
Modulus \\
(ksi)
\end{tabular} & \begin{tabular}{c} 
Thermal Co- \\
efficient
\end{tabular} \\
\hline Steel (AISC) & 490 & 29000 & 11200 & 12 \\
\hline
\end{tabular}
4. On the Sections tab, click Select..., and select the two sections shown below in the USA (US units) steel data list:
\begin{tabular}{|l|l|l|l|l|l|}
\hline \multicolumn{1}{|c|}{ Name } & \multicolumn{1}{|c|}{\begin{tabular}{c} 
Area \\
(in^2)
\end{tabular}} & \begin{tabular}{c} 
Major \\
Inertia \\
(in^4)
\end{tabular} & \begin{tabular}{c} 
Minor \\
Inertia \\
(in^4)
\end{tabular} & \begin{tabular}{c} 
Shear \\
Area, \(\mathbf{y}\) \\
(in^2)
\end{tabular} & \begin{tabular}{c} 
Shear \\
Area, z \\
(in^2)
\end{tabular} \\
\hline W 8×40 & 1.7 & 146 & 49.1 & 8.13 & 2.97 \\
\hline \begin{tabular}{l} 
HSS \\
\(6.625 \times 0.25\) \\
0
\end{tabular} & 4.68 & 23.9 & 23.9 & 2.34 & 2.34 \\
\hline
\end{tabular}
5. On the Elements tab, define the analysis elements as shown below.
\begin{tabular}{|l|l|l|l|l|}
\hline \multicolumn{1}{|c|}{ Element } & \multicolumn{1}{|c|}{ Start Node } & \multicolumn{1}{c|}{ End Node } & \multicolumn{1}{c|}{ Material } & \multicolumn{1}{c|}{ Section } \\
\hline 1 & 1 & 2 & Steel (AISC) & W \(8 \times 40\) \\
\hline 2 & 2 & 3 & Steel (AISC) & W \(8 \times 40\) \\
\hline 3 & 3 & 4 & Steel (AISC) & W \(8 \times 40\) \\
\hline 4 & 5 & 6 & Steel (AISC) & W \(8 \times 40\) \\
\hline 5 & 6 & 7 & Steel (AISC) & W \(8 \times 40\) \\
\hline 6 & 1 & 5 & Steel (AISC) & \begin{tabular}{l} 
HSS \\
\(6.625 \times 0.250\)
\end{tabular} \\
\hline 7 & 5 & 2 & Steel (AISC) & \begin{tabular}{l} 
HSS \\
\(6.625 \times 0.250\)
\end{tabular} \\
\hline 8 & 2 & 6 & Steel (AISC) & \begin{tabular}{l} 
HSS \\
\(6.625 \times 0.250\) \\
\hline
\end{tabular} \\
\hline
\end{tabular}
\begin{tabular}{|l|l|l|l|l|}
\hline \multicolumn{1}{|c|}{ Element } & Start Node & \multicolumn{1}{|c|}{ End Node } & \multicolumn{1}{|c|}{ Material } & \multicolumn{1}{c|}{ Section } \\
\hline 9 & 6 & 3 & Steel (AISC) & \begin{tabular}{l} 
HSS \\
\(6.625 \times 0.250\) \\
\hline 10
\end{tabular} \\
& 3 & 7 & Steel (AISC) & \begin{tabular}{l} 
HSS \\
\(6.625 \times 0.250\) \\
\hline 11
\end{tabular} \\
& 7 & 4 & Steel (AISC) & \begin{tabular}{l} 
HSS \\
\(6.625 \times 0.250\) \\
\hline
\end{tabular} \\
\hline
\end{tabular}
6. Define the end releases for the elements as shown below.
\begin{tabular}{|l|l|l|l|l|l|}
\hline Element & \begin{tabular}{c} 
Start \\
Node
\end{tabular} & End Node & \begin{tabular}{c} 
Start \\
Moment
\end{tabular} & \begin{tabular}{c} 
End \\
Moment
\end{tabular} & \multicolumn{1}{c|}{ Axial } \\
\hline 1 & 1 & 2 & Fixed & Fixed & Fixed \\
\hline 2 & 2 & 3 & Fixed & Fixed & Fixed \\
\hline 3 & 3 & 4 & Fixed & Fixed & Fixed \\
\hline 4 & 5 & 6 & Fixed & Fixed & Fixed \\
\hline 5 & 5 & 6 & Fixed & Fixed & Fixed \\
\hline 6 & 1 & 5 & Free & Free & Fixed \\
\hline 7 & 5 & 2 & Free & Free & Fixed \\
\hline 8 & 2 & 6 & Free & Free & Fixed \\
\hline 9 & 6 & 3 & Free & Free & Fixed \\
\hline 10 & 3 & 7 & Free & Free & Fixed \\
\hline 11 & 7 & 4 & Free & Free & Fixed \\
\hline
\end{tabular}

The releases should now be displayed in the graphical display as shown below.


Make the top and bottom chords continuous
1. On the Design Members tab, name the first member Top Chord.
2. Click the ... button in the Edit column and specify the properties of Top Chord as shown below:
- start node 4
- end node 5
- support at the two end nodes
3. Repeat the above process to create a second member, Bottom Chord, with the properties shown below:
- start node 1
- end node 3
- support at the two end nodes

\section*{Define the loading (SI Metric)}
1. On the Loading tab, select Node loads as the type of load.
2. Define the three \(Z\) direction loads shown below, at the same time ensuring that the load case for each one is set to Dead.

3. Add three more node loads as shown below, this time changing the load case to Live.

4. On the Load Combinations tab, create a single combination whose type is Strength.
5. Define the factors of the combination as follows:
- Self weight: 1.35
- Dead: 1.35
- Live: 1.5

\section*{Define the loading (US Imperial)}
1. On the Loading tab, select Node loads as the type of load.
2. Define the three \(Z\) direction loads shown below, at the same time ensuring that the load case for each one is set to Dead.

3. Add three more node loads as shown below, this time changing the load case to Live.

4. On the Load Combinations tab, create a single combination whose type is Strength.
5. Define the factors of the combination as follows:
- Self weight: 1.2
- Dead: 1.2
- Live: 1.6

\section*{Examine the results (SI Metric)}

The Results tab displays both tabular and graphical results for the selected load case, combination or envelope. You can control the graphical results with the available lists and the check boxes.
1. In the list immediately to the left of the table, select Single load combination, and highlight the previously defined combination.

2. Select the box to display the axial force diagram, and note the forces in each of the members.
3. Try checking each of the result check boxes to view the different diagrams that can be displayed.
4. On the Nodal tabular results spreadsheet, click the column header for vertical global deflection. The deflections are sorted in ascending order, click again to sort in descending order.

NOTE Minimum and maximum member forces can be located in a similar way.

\section*{Examine the results (US Imperial)}

The Results tab displays both tabular and graphical results for the selected load case, combination or envelope. You can control the graphical results with the available lists and the check boxes.
1. In the list immediately to the left of the table, select Single load combination, and highlight the previously defined combination.

2. Select the box to display the axial force diagram, and note the forces in each of the members.
3. Try checking each of the result check boxes to view the different diagrams that can be displayed.
4. On the Nodal tabular results spreadsheet, click the column header for vertical global deflection. The deflections are sorted in ascending order, click again to sort in descending order.

NOTE Minimum and maximum member forces can be located in a similar way.

\section*{Modify the geometry (SI Metric)}

You can quickly modify the model by using expressions in spreadsheets. See an example below.
1. Return to the Nodes tab and highlight all \(X\) coordinate cells.
2. Type \(=* 2\), as shown below.


\section*{3. Press Enter.}

The value in each highlighted cell is increased by the amount specified.
\begin{tabular}{|l|}
\hline\(X(\mathrm{~m})\) \\
\hline 0 \\
\hline 4 \\
\hline 8 \\
\hline 12 \\
\hline 2 \\
\hline 6 \\
\hline 10 \\
\hline
\end{tabular}

Click the Results tab to see that the analysis has been automatically updated to reflect the increased span.


\section*{Modify the geometry (US Imperial)}

You can quickly modify the model by using expressions in spreadsheets. See an example below.
1. Return to the Nodes tab and highlight all \(X\) coordinate cells.
2. Type \(=* 2\), as shown below.
\begin{tabular}{|l|}
\hline\(X(\mathrm{tt})\) \\
\hline 0 \\
\hline 7 \\
\hline 14 \\
\hline 21 \\
\hline 3.5 \\
\hline 10.5 \\
\hline\(={ }^{2} 2\) \\
\hline
\end{tabular}

\section*{3. Press Enter.}

The value in each highlighted cell is increased by the amount specified.
\begin{tabular}{|l|}
\hline\(X[f t)\) \\
\hline 0 \\
\hline 14 \\
\hline 28 \\
\hline 42 \\
\hline 7 \\
\hline 21 \\
\hline 35 \\
\hline
\end{tabular}

Click the Results tab to see that the analysis has been automatically updated to reflect the increased span.


Other Tedds features

\subsection*{6.5 Section properties calculator}

The Section Properties Calculator allows you to create custom section shapes by entering the dimensions of each component. For more information, see the following paragraphs. The Section Properties Calculator also allows you to recall any existing sections using the Data Lists tool, converting them into primary shapes that the Section Properties Calculator can easily process.

\section*{Start the Section Properties Calculator}

You can start the Section Properties Calculator by selecting it in the engineering library. To do so, see the following instructions.

\section*{See also}

The Section Designer (page 457)
Create sections in the Section Designer (page 459)

\section*{Start the Section Properties Calculator (the Tedds Application)}
1. Open a new document.

The Select Calculation dialog box opens.
2. Click the Section Properties folder and the Section Properties Calculator subfolder.
3. To start the Section Properties Calculator, double-click the Section Properties Calculator item.
The Section Properties Calculator calculation interface appears, allowing you to define the properties for your section.

NOTE If you select Custom as the section type, the Section Designer window will open, allowing you to create the desired section.

\section*{Start the Section Properties Calculator (Tedds for Word)}
1. In the Library ribbon group, click the 国 Launch the Tedds Library Access System button.
The Library Access System window opens.
2. Click the Section Properties folder and the Section Properties Calculator subfolder.
3. To start the Section Properties Calculator, double-click the Section Properties Calculator item.

The Insert Calc Item dialog box appears.
\begin{tabular}{|c|c|c|c|}
\hline \multicolumn{4}{|l|}{Insert Calc Item \(\times\)} \\
\hline \multicolumn{4}{|l|}{Insert Calc Item} \\
\hline \multicolumn{4}{|c|}{Choose how you want to insert this Calc Item into a document.} \\
\hline \multicolumn{4}{|l|}{Onew document} \\
\hline \multicolumn{4}{|l|}{Append to active document} \\
\hline \multicolumn{4}{|l|}{- Insert in active document} \\
\hline \multicolumn{4}{|l|}{\(\square\) Add new Calc Section} \\
\hline \multirow[t]{2}{*}{} & Section prope & & \\
\hline & Insert page & & \\
\hline  & Variables for ea that a calc in on section. & & ue list so in another \\
\hline \(\square\) Don & ask me again & OK & Cancel \\
\hline
\end{tabular}
4. Select how you want to insert the Section Properties Calculator in the calculation document.
- To insert the calc item in a new document, select New document.
- To append the calc item in the end of the current document, select Append to active document.
- To insert the calc item at the location of your insert point in the current document, select Insert in active document.
- To insert the calc item in a new calc section, select Add new Calc Section.
- To insert a page break before the new calc section, select Insert page break.
5. Click OK.

The Section Properties Calculator item appears in your document.
6. Select and calculate the Section Properties Calculator item.

The Section Properties Calculator calculation interface appears, allowing you to define the properties for your section.

NOTE If you select Custom as the section type, the Section Designer window will open, allowing you to create the desired section yourself.

\section*{The Section Designer}

The Section Properties Calculator allows to create custom section types by assembling any number of primary shapes on a canvas tool. The tool for
creating the section types is called the Section Designer. For more information, see the following paragraphs.


Using the Section Designer, you can:
- Combine primary shapes (rectangles, circles, and triangles) with each other to generate new sections.
- Create holes within the primary shapes, if necessary.
- Recall sections from the Data Lists tool.
- Combine the recalled sections with other primary shapes to generate new sections.
- Modify the size and position of primary shapes in several ways.
- Calculate the properties of the overall section that you have created, and insert its properties in your calculation document.

\section*{See also}

Create sections in the Section Designer (page 459)
Modify sections (page 463)
Structure sections (page 465)
Control the position of objects on the canvas (page 466)
Move objects on the canvas (page 467)
Rotate objects (page 469)
Snap objects with respect to each other (page 472)

View section properties (page 476)
Return section properties to your calculations (page 478)
Section Designer toolbars (page 600)

\section*{Create sections in the Section Designer}

To create different sections, or shapes, in the Section Designer, follow the instructions below.

To define the sections whose properties you want to calculate, you can:
- Build the sections by creating primary shapes (rectangles, circles, triangles and holes).
- Recall standard sections using the Data Lists tool.
- Select a standard section shape and enter the appropriate details directly.

\section*{See also}

Modify sections (page 463)
Structure sections (page 465)
Control the position of objects on the canvas (page 466)
Move objects on the canvas (page 467)
Rotate objects (page 469)
Snap objects with respect to each other (page 472)
View section properties (page 476)
Section Designer toolbars (page 600)

\section*{Create a rectangle}

You can create rectangles either by drawing them on the canvas, or by typing their properties manually.

\section*{Draw the shape on the canvas}
1. In the toolbar, click the Rectangle button.
2. Place the mouse pointer where you want to place one corner of the rectangle.
3. Hold down the left mouse button and drag the pointer where you want to place the opposite corner of the rectangle.
4. To create the rectangle, release the left mouse button.

\section*{Define shape properties manually}
1. Right-click anywhere in the Section Designer window.
2. In the context menu that appears, click Insert --> Rectangular shape. The Add Rectangle dialog box appears.
3. In the dialog box, type properties for the rectangle.
4. Click OK.

\section*{Create a circle}

You can create circles either by drawing them on the canvas, or by typing their properties manually.

\section*{Draw the shape on the canvas}
1. In the toolbar, click the Circle button.
2. Place the mouse pointer where you want the circle to start.
3. Hold down the left mouse button, and drag the mouse pointer where you want the circle to end.
4. To create the circle, release the left mouse button.

Define shape properties manually
1. Right-click anywhere in the Section Designer window.
2. In the context menu that appears, click Insert --> Circular shape.

The Add Circle dialog box appears.
3. In the dialog box, type properties for the circle.
4. Click OK.

\section*{Create a triangle}

You can create triangles either by drawing them on the canvas, or by typing their properties manually.

\section*{Draw the shape on the canvas}
1. In the toolbar, click the Triangle button.
2. Place the mouse pointer where you want the triangle to start.
3. Hold down the left mouse button, and drag the mouse pointer where you want the triangle to end.
4. To create the triangle, release the left mouse button.

\section*{Define shape properties manually}
1. Click Insert --> Triangular shape.

The Add Triangle dialog box appears.
2. In the dialog box, type properties for the triangle.
3. Click OK.

\section*{Create a hole}

NOTE Before you create holes, note the following:
- Holes must lie completely within the shape to that they belong.
- Rectangular shapes can contain any number of holes.

The holes can be rectangular on elevation, circular on elevation, or rectangular on section.
- Circular shapes can only contain a single hole.

The holes must be circular on section, and concentric within the shape.
- You cannot create holes within triangular shapes.
1. Select the shape to that you want to add a hole.
2. Click Insert --> Hole.

The Add Hole dialog box appears.

3. Select the type of hole that you want to define.

The rest of the dialog box configures to show the details appropriate to the selected hole type.
4. Enter properties for the hole.
5. Click OK.

NOTE In order for you to understand the way that holes are handled in the Section Designer, read the following about containment:
- In order to prevent a hole and its parent shape being separated, a property called containment is switched on for the parent shape.
This means that any other shape or hole, or group that lies completely within the shape, will be selected and moved
together with the parent shape. This also includes the following cases:
- Shapes that you add within the shape that has containment switched on.
- Shapes that lie within the shape that has containment switched on.
- If you want containment to be switched off, delete the holes in the parent shape. You can then select the shape by itself and move it out of the way before reinstating the holes that you deleted.
- If you place shapes (including holes) in a group, the containment feature is switched off for the entire group.
Therefore, we recommend that when you have finished creating a shape with holes, you select the shape together with all its holes and place them in a group.

\section*{Create a predefined shape}

The Tedds Data Lists tool includes details for many standard sections. The Section Designer also allows you to insert these sections on your canvas to create your own custom sections.

NOTE The Section Designer converts the pre-defined sections that you insert into groups of primary shapes. The conversion process may ignore some features of the section. Therefore, always check whether using the Section Designer suits your needs.
1. Do one of the following:
- In the toolbar, click the I Predefined shape button.
- Right-click anywhere in the Section Designer window, and in the context menu that appears, click Insert --> Predefined shape.
The Select Predefined Shape dialog box appears.
2. Do one of the following:
- To recall a standard section using Data Lists, double-click an item in the Standard shape from list.
a. In the Data List dialog box, select the desired item.
b. Click OK.
- To enter the details for a shape yourself, select the Custom library shape option and click OK.
a. In the Add Custom Library Shape dialog box, select the type of shape.

b. Click Next.
c. In the dialog box that appears, type properties for the section.

d. Click Finish.
e. To place the shape on the canvas, click the left mouse button where you want to place the section.

\section*{Modify sections}

Once you have created shapes in the Section Designer, you may need to modify their location, size, or other properties. To modify existing sections on the canvas, see the following instructions.
1. Do one of the following:
- Click Edit --> Shape....
\begin{tabular}{lr|r|}
\hline Edit & View & Insert
\end{tabular} Structure \begin{tabular}{l} 
Help \\
\hline Alt+Askelpalautin
\end{tabular}
- Click the shape which you want to modify with the right mouse button, and in the context menu which appears, select Edit Shape....
\begin{tabular}{|ll|}
\hline Insert & \(>\) \\
\hline Edit Shape... & \\
\hline Move Shape... & \\
Snap Shapes... & \\
\hline Cut & \\
Copy & \\
Paste & \\
Delete & \\
\hline Order & \\
Grouping & \\
\hline
\end{tabular}
- Select a shape and drag the control handles around the shape to adjust its size.
2. Modify the shape properties according to your needs.

\section*{See also}

Structure sections (page 465)
Control the position of objects on the canvas (page 466)
Move objects on the canvas (page 467)
Rotate objects (page 469)
Snap objects with respect to each other (page 472)
View section properties (page 476)

Section Designer toolbars (page 600)

\section*{Structure sections}

As you create custom sections, you can define them in many ways. You can, for example, move shapes back and forward on the canvas, and group shapes.

\section*{See also}

Control the position of objects on the canvas (page 466)
Move objects on the canvas (page 467)
Rotate objects (page 469)
Snap objects with respect to each other (page 472)
View section properties (page 476)
Section Designer toolbars (page 600)

\section*{Select objects}
- To select an object, click the shape which you want to select with the left mouse button

Any other objects are automatically deselected.
- To add objects to your current selection, hold the Shift key down and click the objects that you want to add.
- To remove objects from your current selection, hold the Shift key down and click the objects that you want to remove.

\section*{Move objects forward or backward}
1. Select the object that you want to move.
2. In the left side pane, do one of the following:
- To move an object to the front, in the toolbar, click the Front button.
- To move an object to the back, in the toolbar, click the back button.
- To move an object forward, in the toolbar, click the \(\quad\) Forward button.
- To move an object backward, click the

Backward button.

\section*{Create groups}

Grouping objects allows you to move and rotate the shapes as a single entity. If necessary, you can create a hierarchy of shapes by adding groups into other groups.
1. Select the objects that you want to group.
2. Do one of the following:
- In the toolbar, click the Group button.
- Click Structure --> Group.

The objects are now grouped.
NOTE When you insert the section in a calculation document, all grouping details are lost.

\section*{Destroy groups}
1. Select the group that you want to destroy.
2. Do one of the following:
- In the toolbar, click the 呠 Ungroup button.
- Click Structure --> Ungroup.

The items in the selected group are no longer grouped. Any groups within the selected group can also be destroyed as above.

\section*{Control the position of objects on the canvas}

The Section Designer provides several different ways of positioning objects on the canvas, such as snapping the objects to the grid. For more information, see the following paragraphs.

\section*{See also}

Structure sections (page 465)
Move objects on the canvas (page 467)
Rotate objects (page 469)
Snap objects with respect to each other (page 472)
Adjust Section Designer settings (page 473)

\section*{Control snapping to the grid}

The grid is displayed as a series of small dots on the canvas. By default, the Section Designer views the grid when it starts.
Snapping items to grid allows you to create shapes that are at exactly the right spot on your canvas.
- To control the current grid snap setting, click View --> Snap to grid on drag.

\section*{Control angle snapping}

When you rotate shapes, you can also limit the allowable rotations to multiples of \(15^{\circ}\) by selecting the Angle snap option. By default, the Angle snap option is selected when the Section Designer starts.
- To control the current angle snapping setting, click View --> Angle snap.

\section*{Move objects on the canvas}

The Section Designer provides several different ways of positioning objects on the canvas. You can drag and drop objects on the canvas, nudge objects, or type the desired location of objects in a dialog box. For more information, see the following instructions.

\section*{See also}

Structure sections (page 465)
Control the position of objects on the canvas (page 466)
Rotate objects (page 469)
Snap objects with respect to each other (page 472)
Adjust Section Designer settings (page 473)
Section Designer toolbars (page 600)

\section*{Move objects by dragging and dropping}
1. Select the objects that you want to move.
2. Click one of the object and hold down the left mouse button.
3. Drag the selected objects to the desired location.

NOTE If the Snap to grid on drag option is switched on, the top left corner of the selected objects snaps to the nearest grid point.
4. Release the mouse button to drop the objects in their new location.

\section*{Move objects by nudging}
1. Select the objects that you want to move.
2. Use the nudge buttons on the left side pane (see the image below) or the arrow keys on the keyboard to move the selected objects in the appropriate direction in steps that are equal to the current grid spacing in that direction.

NOTE If you hold down the Shift key and use the buttons from the Nudge toolbar to move the selected objects, they move in the selected direction by one unit.
The unit of movement depends on the size of canvas. For more details, see the table below.
\begin{tabular}{|l|l|}
\hline \multicolumn{1}{|c|}{ Canvas Size } & \multicolumn{1}{c|}{ Unit } \\
\\
\hline \(2 \mathrm{~m} \times 1.5 \mathrm{~m}\) & 0.1 mm \\
\hline & \\
\hline \(21 \mathrm{~m} \times 15 \mathrm{~m}\) & 1 mm \\
\hline \(210 \mathrm{~m} \times 150 \mathrm{~m}\) & 10 mm \\
\hline \(328 \mathrm{in} \times 234 \mathrm{in}\) & \(1 / 64^{\prime \prime}\) \\
\hline \(109 \mathrm{ft} \times 75 \mathrm{ft}\) & \(1 / 16^{\prime \prime}\) \\
\hline \(875 \mathrm{ft} \times 625 \mathrm{ft}\) & \(1 / 2^{\prime \prime}\) \\
\\
\hline
\end{tabular}

\section*{Define the position of objects in a dialog box}

NOTE You can only move one object at a time by defining the position of objects in a dialog box.
1. Select the object that you want to move.
2. Do one of the following:
- Click Edit --> Move Shape....
- Right-click anywhere in the canvas, and in the context menu, select Move Shape....

The Move shape by dialog box appears.


NOTE The appearance of the dialog box depends on the shape that you have selected.
3. Type the distances by that you want to move the object.

NOTE - Rectangles and triangles:
You can move the objects along either the global or the local coordinate axis system, or along the two coordinate systems.
- Circles and groups:

You can only move the objects along the global axis.

\section*{4. Click OK.}

\section*{Rotate objects}

When you create a shape, you can specify its rotation from the global axis system where appropriate. You can apply rotations to all shapes and groups using the mouse.

NOTE To determine whether you want to limit the rotation of objects to multiples of \(15^{\circ}\), see Control angle snapping (page 466).
1. Select the objects that you want to rotate.
2. In the toolbar, click the Rotate button.
3. Click one of the selected objects and hold down the left mouse button.
4. Drag the object until you achieve the desired rotation.

NOTE The way objects are rotated depends on their grouping.
If you rotate separate objects, each object is rotated around its midpoint.


If you rotate groups, each group rotates around its midpoint.

5. Once the rotation is correct, release the left mouse button. The shapes are rotated in the desired position.

\section*{See also}

Structure sections (page 465)
Control the position of objects on the canvas (page 466)

Move objects on the canvas (page 467)
Snap objects with respect to each other (page 472)
Section Designer toolbars (page 600)

\section*{Snap objects with respect to each other}

The Section Designer allows you to position shapes on your canvas by positioning two objects with respect to each other.

NOTE When you select multiple objects, the squares that surround the object that you have last selected are gray.

The squares that surround previously selected objects are white.
The color is important for snapping the items. The object that you want to move should be surrounded by grey squares, whereas the sqaures around the other object should be white.
If you select the objects in the wrong order, then you can hold the Shift key down and click over the object twice (to deselect it and then select it again). You can also old the Ctrl key down and click the object.
1. Select the two objects that you want to snap to one another.
2. Ensure that the object that you want to move is surrounded by gray squares, and that the object that should remain stationary is surrounded by white squares.
3. Do one of the following:
- In the toolbar, click the \({ }^{\| \pi}\) Snap Shapes button.
- Click Edit --> Snap Shapes...

The Snap Shapes dialog box appears.

4. Use the Snapping buttons determine the face of the moving object that you want to snap to the stationary object.
5. To align the objects with each other, select the appropriate alignment option.
6. To move the object once you have snapped it, type the distance for the moving object in the fields of the Offset section.

NOTE You can only move the object parallel to the face that been snapped to the stationary objet. Therefore, the alternate field is disabled.
7. To perform the snap, click OK.

\section*{See also}

Structure sections (page 465)
Control the position of objects on the canvas (page 466)
Move objects on the canvas (page 467)
Section Designer toolbars (page 600)

\section*{Adjust Section Designer settings}

You can adjust Section Designer settings to minimize the information that you need to enter and define how the grid of the Section Designer works. For more information, see the following paragraphs.

\section*{See also}

Control the position of objects on the canvas (page 466)
View section properties (page 476)
Return section properties to your calculations (page 478)

\section*{Adjust user options}
1. To see the user options, in the Section Designer window , click File --> User Options....

The User Options dialog box opens.


The User Options dialog box contains the following settings:

\section*{- Automatic calculation of properties}

If you select the Automatic calculation of properties option, Section Designer automatically calculates the properties of the section each time you add, remove, move or modify a section shape in any way.
This means that you can view the properties of your section at any time. However, if your section contains many shapes, it may take some time for the properties to be calculated.
To view section properties, first open the Section Properties dialog box. Then, as you modify your section, the current properties will be displayed.
- Density

Besides the type and dimensions of each primary shape (rectangle, circle, triangle, and hole), Section Designer needs to know the density of each shape.

The value that you type in the Density field is used as the default value for all shapes that you define.

If necessary, you can change the density of a shape separately.
- Input label set
allows you to select which units you want to use while creating your section.
- Output label set
allows you to select which units you want to use for output.
NOTE The Input label set and Output label set options are completely independent. Therefore, you can select different unit systems for input and output.
- Output sketch

The Output sketch options allow you to control the sketch of the section. They do not affect returning section properties to Tedds.
- If you select No, no sketch is created.
- If you select To document, a sketch is inserted in your calculation document.
- If you select To Sketch Viewer, the sketch is created and inserted in Sketch Viewer. You can then manipulate the sketch and insert it wherever you like in your document.
- Zoom to fit before copy to calcs

If you select the Zoom to fit before copy to calcs option, Section
Designer zooms the created sketch so that the section fills the sketch.
2. Once you have adjusted the settings according to your needs, click OK.

The options are registered, and the User Options... dialog box closes.

\section*{Set and use the grid}

The grid of the Section Designer window makes it easy to create accurately sized and positioned shapes. You can set the spacing of the grid points to meet your needs, modifying it as necessary while you define of the section.
- Click View --> Grid Properties....

The Grid Properties dialog box appears.


The Grid Properties dialog box contains the following options:

\section*{- Grid Visible}

The Grid Visible allows you to select whether you want to see the grid in the Section Designer window. The grid is displayed as a series of dots.
- Snap to grid on drag
allows you to determine whether you want shapes to automatically snap to the nearest grid point when you move them. If the Snap to grid on drag option is not selected, the creation and movement of shapes is unrestrained.
- Angle snap

When you rotate objects with this option checked the rotation is limited to \(15^{\circ}\) increments ( \(15^{\circ}, 30^{\circ}, 45^{\circ}\) and such like). With this option cleared, any rotation is possible.
- Grid Color
allows you to determine the color of the grid points.
- Grid Spacing
allows you to specify the spacing between the grid points both horizontally and vertically.

The units that are expected depend on the size of the canvas that you have selected.

You can change the grid spacing at any time while creating a section to allow more precise control for small shapes.

\section*{View section properties}

The Section Designer allows you to view the properties of your section at any point. You can later insert the section properties in your calculations. To view section properties, see the following instructions.
- Click View --> Section Properties.

The Section Properties list appears.
\begin{tabular}{|c|c|c|}
\hline (1) Section Properties & ? & \(\times\) \\
\hline \multicolumn{3}{|l|}{\(\ll\) * Calculated for shapes containing only rectangles at \(90^{\circ}\)} \\
\hline Description & Value & Unit \\
\hline Overall width & 598.1 & mm \\
\hline Overall height & 412.6 & mm \\
\hline Area & 26666.11 & \(\mathrm{mm}^{2}\) \\
\hline Total mass per unit length & 27 & kg/m \\
\hline X coordinate of combined centroid & -190.9 & mm \\
\hline Y coordinate of combined centroid & 264.6 & mm \\
\hline Second moment of area XX & 49007769.54 & mm \({ }^{4}\) \\
\hline Second moment of area YY & 165579642.28 & mm \({ }^{4}\) \\
\hline Elastic modulus about centroid XX & 149984.86 & mm \({ }^{3}\) \\
\hline Elastic modulus about centroid YY & 338703.11 & mm \({ }^{3}\) \\
\hline Radius of gyration about centroid XX & 42.9 & mm \\
\hline Radius of gyration about centroid YY & 78.8 & mm \\
\hline Combined angle of rotation to principle axis & 85.0 & - \\
\hline Major axis principle second moment of area & 166476027.84 & mm \({ }^{4}\) \\
\hline Minor axis principle second moment of area & 48111383.99 & mm \({ }^{4}\) \\
\hline Major axis radius of gyration about centroid & 79.0 & mm \\
\hline Minor axis radius of gyration about centroid & 42.5 & mm \\
\hline * X coordinate of equal area axis & 0.0 & mm \\
\hline * Y coordinate of equal area axis & 0.0 & mm \\
\hline * Plastic modulus at equal area axis XX & 0.00 & mm \({ }^{3}\) \\
\hline * Plastic modulus at equal area axis YY & 0.00 & mm \({ }^{3}\) \\
\hline
\end{tabular}

\section*{See also}

Adjust Section Designer settings (page 473)
Save a section to disk (page 477)
Return section properties to your calculations (page 478)

\section*{Save a section to disk}

If you wish to save a section so that it maintains the groups that you may have defined in the Section Designer, you can save the file to disk in .spt format. To save a section to disk, see the following instructions.
1. In the Section Designer window , click File --> Save As....
2. Save the file.

\section*{Return section properties to your calculations}

Once you are finished creating your section in the Section Designer, you can return the section properties to your calculation document. To do so, see the following instructions.
- Do one of the following:
- In the toolbar, click the Copy to calcs button.
- Click File --> Copy to calcs and exit.

The section is copied to your calculation document and the Section Designer window closes.

NOTE The groups that you may have defined in the Section Designer are not included in the results that are copied to your calculation document.

If you want to maintain the groups that you have defined, see Save a section to disk (page 477).

\section*{See also}

Adjust Section Designer settings (page 473)

\section*{7 Interoperability}

Tekla Tedds supports sharing your work in several ways, whether you want to integrate your calculations within a Tekla Structures model, or a Tekla Structural Designer model, or share documents iusing the Trimble Connect cloud.
- The Tekla Tedds Integrator (page 479) allows Tedds documents to be linked to Tekla Structures models.
- Integration with Tekla Structural Designer (page 480) allows you to design specific structural elements in your Tekla Structural Designer models.
- Trimble Connect (page 481) is a cloud service that allows you to store and share all information related to the project and can be used with various software, including Tekla Tedds. The Trimble Connector in Tekla Tedds allows you to upload and download documents to/from the Trimble Connect cloud.

\subsection*{7.1 Tekla Tedds Integrator}

The Tekla Tedds Integrator which can be downloaded from the Tekla Warehouse allows Tedds documents to be linked to Tekla Structures models. You can link existing documents or create new documents which you or other Tekla Structures users can then easily modify or review during your BIM workflow. Refer to the Tekla Tedds Integrator User Guide for more information.
You can also create your own integrations to existing Tekla Tedds library calculations or to your own custom calculations, refer to the Tekla Tedds Integrator Reference Document for more details.

\section*{Demonstration videos}

Tekla Tedds Integrator for Tekla Structures, steel connection workflow
Tekla Tedds Integrator for Tekla Structures
Open integration Framework: Linking your own calculations

\subsection*{7.2 Tekla Structural Designer}

Tekla Structural Designer integrates with Tekla Tedds to allow you to design specific structural elements in your Tekla Structural Designer models. Seamless integration transfers the design forces to the appropriate Tedds calculation where you can check and refine your design, the final properties for the elements will then be updated in the Tekla Structural Designer model.

For Eurocode design: Timber members and precast concrete beams and columns can be designed using Tedds.
- Tekla Structural Designer to Tekla Tedds Eurocode Precast concrete design video demonstration
- Timber design workflow using Tekla Tedds in Tekla Structural Designer (Eurocode) - video demonstration

For US design: Wood members can be designed using Tedds.
- Wood design workflow using Tekla Tedds in Tekla Structural Designer (USA) - video demonstration

Furthermore, if you link your Tekla Structural Designer model with Trimble Connect you can enable collaborators to easily access the Tedds designs - by following the below workflow, calculations can be automatically attached to the appropriate objects in the Trimble Connect 3D model.

\section*{Tekla Structural Designer > Tekla Tedds > Trimble Connect workflow}

When Tekla Tedds documentation that has been exported from Tekla Structural Designer is uploaded to a Trimble Connect project, it can be automatically attached to the appropriate objects in a 3D model so that collaborators can easily access the information.
1. Using Tekla Structural Designer:
a. Link the model to the appropriate Trimble Connect project.
b. Upload an IFC model to Trimble Connect.
c. Export the Tekla Tedds documentation to the Tedds Application.

The new Tedds project which is created will be automatically linked to the same Trimble Connect Project and the same IFC model. Each document created in the Tedds project will include a reference to the object(s) in the IFC model which that document relates to.
2. Using Tekla Tedds:
a. Upload the Tedds project to Trimble Connect.

Each uploaded PDF document will be automatically attached to the object(s) in the IFC model.
3. Using Trimble Connect:
a. Open a 3D view of the IFC model.
b. Select the Attachments window.
c. View the Tekla Tedds documentation using the attachment list or the model view.


\subsection*{7.3 Trimble Connect}

Trimble Connect is a project collaboration tool allowing project stakeholders access to reliable, up-to-date project information. It is available as a cloudbased platform (Trimble Connect Web) and a Windows application (Trimble Connect for Windows). Projects are synchronized between the Windows app and the cloud.

NOTE To learn more about Trimble Connect, see:
- https://connect.trimble.com/
- https://trimbleconnect.support.tekla.com/

Trimble Connect Project Explorer is used within Tekla Tedds to control the flow of information between the open Tedds project and a Trimble Connect project.
With Trimble Connect Project Explorer you can:
- link a Tedds project to a Trimble Connect project
- create and rename folders in a Trimble Connect project
- view a file list and rename files in a Trimble Connect project
- upload the Tedds project documents to a Trimble Connect project

NOTE A Tedds project can only be linked to a Trimble Connect project from the Trimble Connect Project Explorer and not from the web or Windows apps. The Tedds project must be linked before any information can move between Tekla Tedds and Trimble Connect.

\section*{Storing Tekla Tedds Projects and Documents}

To start using Trimble Connect for storing your Tedds projects and documents simply complete the following steps:
1. Create an online account to Get Started using Trimble Connect
2. Download and Install the Trimble Connect Sync tool for Windows from the app store within the Trimble Connect App

Once setup the file open and save commands in the Tekla Tedds application will include additional options for saving to your Trimble Connect synchronisation folder.

\section*{Launch Trimble Connect Project Explorer from the Tedds Application}
1. Open a project in the Tedds Application.
2. Log in using your Trimble Identity, (if not already signed in).
3. On the View tab, click the Trimble Connect droplist.
4. Select Trimble Connect

Trimble
Connect -
1) Trimble Connect

P Trimble Connect Web
1) Trimble Connect for Windows

Trimble Connect Project Explorer opens, either as a docked window, or as a tab on the right of the interface.
5. Confirm that the Server Location shown at the top of the window is appropriate to your location. Available projects are listed with link icons as below.
\begin{tabular}{|lc|}
\hline Trimble Connect & \(4 \times \times\) \\
\hline Projects & Project number 3 \\
Project number 2 & P \\
Project number 1 & O \\
\hline
\end{tabular}

TIP If the project in which you want to collaborate is not shown, try clicking the refresh button to synchronise with the cloud. If it still not shown you would need somebody with the appropriate permissions to create it, or grant you access, using Trimble Connect Web, or Trimble Connect for Windows.

TIP If a 'Cannot find linked project' message is displayed, this indicates either that you do not have permission to view the project; or, that the project to which the model was previously linked has been deleted - in this situation you would need to click 'Unlink' before you are able to link the model with another project.

\section*{Link or unlink a project}
1. To link to a project:
1. Click next to the project you want to link to. When the model is linked, the project name appears at the top of the window and the icon changes as shown below.


Any folders or files in the Trimble Connect project that you have read access to are also displayed.
2. To unlink from a project:
2. Click \(\hat{E}\) to unlink the project.

The full list of available projects is displayed once more.
\begin{tabular}{|l|l|}
\hline Trimble Connect & \(4 \times\) \\
\hline Projects & Project number 3 \\
Project number 2 & P \\
Project number 1 & \(\boldsymbol{O}\) \\
\hline
\end{tabular}

\section*{Create folders, rename folders, rename files}

When you link to a Trimble Connect project the existing project folder structure is displayed. You can add to this, if required.

NOTE You can only create but not delete folders in Trimble Connect Project Explorer. Folders can only be deleted in Trimble Connect Web, or Trimble Connect for Windows.

You can only rename folders and files to which you have write access.
1. To create a folder:
1. Right click in the Trimble Connect Project Explorer window.
2. Select Create folder and enter the folder name.
2. To create a subfolder:
3. Right click on an existing folder.
4. Click Create folder and enter the folder name.
3. To rename a file or folder:
5. Right click on the file/folder.
6. Select Rename

\section*{Upload the documents from your Tedds project as pdfs}
1. Right-click on the folder that you want to upload the documents to.
2. Select Upload Tedds project A progress bar is displayed while the documents are being uploaded.
3. When the upload is complete, open the folder to confirm the documents have been uploaded.

The Tedds project documents will appear in the selected folder as pdf files. After an 'assimilation' process it will be possible for collaborators to view these in Trimble Connect.

NOTE If the Tedds project is subsequently updated, you can upload a new revisions of the ifc file. To do this, right-click on the ifc file name and select Upload new version.

\section*{View the uploaded pdfs in Trimble Connect}
1. To open Trimble Connect from the ribbon:
1. If not already signed in, click log in (at the top right of the interface).
2. On the View tab, click the Trimble Connect droplist.
3. Select Trimble Connect Web, or Trimble Connect for Windows as required.

- Trimble Connect Web: This launches the in-browser web app. If the open Tedds project is associated with a Trimble Connect project, the project itself is opened, otherwise a default Trimble Connect page is opened.
- Trimble Connect for Window: This launches the Windows application. Again, if the open Tedds project is associated with a Trimble Connect project then that project is opened.
2. To open Trimble Connect from Trimble Connect Project Explorer:
4. Right-click on a folder in the Trimble Connect Project Explorer window.
5. Select Open in Trimble Connect Web, or Open in Trimble Connect for Windows as required.

The in-browser web or Windows app is launched and opened at the selected folder.
3. To view the uploaded pdfs:
6. Navigate to the folder to which the pdfs were uploaded.
7. Double click on an individual pdf to view.

\section*{Modify the identity of the linked model and objects}

If you have followed the Tekla Structural Designer > Tedds > Trimble Connect workflow to enable collaborators to access the Tedds designs, the Tedds project which is created will be automatically linked to the Trimble Connect Project and each document created in the Tedds project will include a reference to the object(s) in the IFC model which that document relates to.

Although you can modify the identity of the linked model and objects, typically you would not do this manually, although it is possible to get the information from a Trimble Connect model, in which case the GUID's can be manually entered as described below.
1. To modify the linked model identity:
1. On the View tab, click the Trimble Connect droplist.

2. Select Projects BIM Model Identity
\begin{tabular}{|lll|}
\hline Trimble Connect & & \(\times\) \\
BIM Model Identity & & \\
\hline 5KrovqfilFA & & \\
\hline & & \\
\hline & & \\
\hline
\end{tabular}
3. Enter the new GUID as required.
2. To modify the linked object identity:
4. On the View tab, click the Trimble Connect droplist.
5. Select Documents BIM Object Identities
\begin{tabular}{|l|l|}
\hline Trimble Connect \\
BIM Object Identities \\
\hline OesWCWfXT12B3PbbIs2N0y 1ApgwGTVv3kQITZ5VXZsRm 0g0dFPcDTBM9yB5AD3UMjf \\
\hline Use a space to separate each object identity & \\
\hline
\end{tabular}
6. Enter the new GUID as required.

\section*{8 References}

\section*{This section contains information on the following topics:}

Tedds fields and functions (page 488)
Expression text format (page 516)
Mathematical symbols (page 518)
Dimensional analysis (page 519)
Result formats and precision (page 523)
Units (page 526)
Pre-defined system variables (page 540)
Error messages (page 554)
Toolbars and buttons (page 575)
Import Tedds documents into Tedds for Word (page 605)
Shortcut keys (page 606)

\subsection*{8.1 Tedds fields and functions}

This section covers the syntax of Tedds fields and the functions that you can use when modifying existing Tedds fields.

\section*{Syntax conventions}

The Tedds user guide uses a consistent set of conventions when describing the syntax of available fields and functions. For more information on syntax conventions, see the following paragraphs.

In the following table, see the nomenclature that is used when presenting a particular field or function syntax:
\begin{tabular}{|c|c|}
\hline Symbols & Meaning \\
\hline \$ \$ & \begin{tabular}{l}
The parameter is one of the following: \\
- A string: \$prompt\$ "Input the length" \\
- A string variable: \(\$\) prompt \(\$\) Getlength \\
- A string function:\$prompt\$"Length (max=" + string(L_\{max\}," \(\left.\left.{ }^{0} 0^{\prime \prime}, " m m^{\wedge}(2)^{\prime \prime}\right)+" m m\right)^{\prime \prime}\)
\end{tabular} \\
\hline \# \# & \begin{tabular}{l}
The parameter is one of the following: \\
- A number: \#prompt\# 235 \\
- A number variable: \#prompt\# L_\{max\} \\
- An expression: \#prompt\# 0.75*L_\{max\}
\end{tabular} \\
\hline i i & \begin{tabular}{l}
The parameter is one of the following: \\
- A logical value: iprompti 0 \\
- A logical variable: iprompt; Output \\
- A logical expression: iprompt; if ( \(a>b, 1,0\) )
\end{tabular} \\
\hline ... & More variables of the same type can be added to the function: median(\#number\#, ..., ...) \\
\hline [] & The parameter is optional: Input(\$prompt\$,\$variable\$,\$units\$,\#default\#, [icontrol flagi]) \\
\hline
\end{tabular}

\section*{See also}

Enhancing Tedds for Word calculations with Tedds fields (page 380)

\section*{Major Tedds field syntax}

Using the particular Tedds field syntax allows you to create Tedds fields simply by modifying a field in your document. For more information on the particular syntax of each major Tedds field, see the following paragraphs.
The common syntax of all Tedds fields is the following:
\(\{=\) CSC |CALL <particular Tedds field syntax>\}
The elements are:
- \(\}\) at the beginning and end of the call indicate that the text is a Word field.
- =CSC|CALL means that the field is a Tedds field, rather than a result field or an error field.
- The particular Tedds field syntax tells Tedds for Word which type of Tedds field it is to invoke, and gives Tedds for Word the information which it needs to create the Tedds field.

\section*{See also}

Enhancing Tedds for Word calculations with Tedds fields (page 380)

\section*{Input field syntax}

The particular syntax for Input fields is the following:
Input(prompt, name, units, default, show)
The parameters are:
- prompt
is the prompt text displayed in the dialog box.
- name
is the name of the variable.
- units
are the units of the variable.
- default
is the default value of the variable.
- show
is the setting that defines whether the dialog box is displayed and what the initial value of the variable.
( \(0=\) Only if variable not defined, 1 = Always with current value, 2 = Always with default value, 3 = Use system option)

Example
\{=CSC|CALL Input("Length of beam ","L","m","1",1)\}

\section*{Show field syntax}

The particular syntax for Show fields is the following:
Show(text, show, log, resultsStyle)
The parameters are:
- text
is the text to show in the document as the field result.
- show
is an optional value which determines whether the show result is displayed.
(0 = Hide, 1 = Display)
The default value is 1.
- \(\quad \log\) is an optional value that determines whether the show text is added to the Progress Log.
If True (1), theShow field text is added to the Progress Log.
The default value is 1.
- resultsStyle
is an optional value that determines whether to show the field result in the current final results style ( \(1=\) True), or the current paragraph style \((0=\) False).

The default value is 1.
Example
\(\{=C S C \mid C A L L\) Show("The value of \(L\) is "+string(L,"f0","m")+" m"")\}

\section*{Message field syntax}

The particular syntax for Message fields is the following:
Message(message, title, show)
The parameter are:
- message
is the message to show.
- title
is the title of the message box.
- show
is an optional flag that determines if the message is displayed.
(0 = hide, 1 = display)
Example
\(\{=C S C \mid C A L L\) Message("The value of \(L\) is "+string(L,"f0","m")+" m", "Length")\}

\section*{Log field syntax}

The particular syntax for Log fields is the following:
LogText(text)
The parameters are:
- text
is the message to add to the Progress Log.

\section*{Example}
\(\{=C S C \mid C A L L ~ L o g T e x t(" T h e ~ v a l u e ~ o f ~ L ~ i s ~ "+s t r i n g(L, " f 0 ", " m ")+" ~ m ")\} ~\)

\section*{Excel Link field syntax}

The particular syntax for Excel Link fields is the following:
ExceI_Link(fileName, linkSheet, linkFromTedds, linkToTedds, showExcel, save, startMacro, endMacro, taskMacro, outputCellRef, waitForClose, readPassword, writePassword)

The parameters are:
- fileName
is the string that contains the full path to the Excel workbook file.
- linksheet
is an optional string that contains the name of the worksheet which includes the tables for linking variables to and from Excel.
- linkFromTedds
is an optional True/False value which determines if variables are linked from Tedds to Excel.
- linkToTedds
is an optional True/False value which determines if variables are linked from Excel to Tedds.
- showExcel
is an optional True/False value that determines if the Excel user interface is displayed.
- save
is an optional True/False value that determines if the workbook is saved after the linking process is finished.
If this option is False, the workbook is opened in read-only mode.
- startMacro
is an optional string that contains the name of an Excel macro to run at the start of the linking process.
- endMacro
is an optional string that contains the name of an Excel macro to run at the end of the linking process.
- taskMacro
is an optional string that contains the name of an Excel macro to run during the linking process.
- outputCellRef
is an optional string that contains the cell reference to a region in the Excel workbook that is output to the field result as a table or chart.

NOTE If the outputCellRef parameter is used to output a table or chart to the document, the size of the image is determined by the Tedds sketch scale setting. For more information, see Sketch options (page 142).
- waitForClose
is an optional True/False value that determines if the field should wait for the workbook to be closed by the user before finishing the linking process.
- readPassword
is an optional string that contains the password to open a protected workbook.

If the readPassword argument is omitted and the workbook requires a password, the user is prompted for the password.
- writePassword
is an optional string that contains the password required to write to a write-reserved workbook.

If the writePassword argument is omitted and the workbook requires a password, the user is prompted for the password.

\section*{Data List field syntax}

The particular syntax for Data List fields is the following:
DataList(fileName, defaultPage, defaultttem, prefix, suffix, itemVar, pageVar, show, output, prompt)
The parameters are:
- fileName
is the name of the data list file to be opened.
- defaultPage
is an optional name of the page to select by default if there is no selected page.
- defaulttem
is an optional formatted name of the item to select if there is no selected item.
- prefix
is optional text prefixed to the field result.
- suffix
is optional text appended to all variables names for the selection.
- itemVar
is an optional name of the variable to use for storing the selected item.
- pageVar
is an optional name of the variable to use for storing the selected page.
- show
is an optional condition that determines if the data list is shown.
If True (1), the data list is always shown. If False (0), the data list is only shown if the current selection cannot be determined.
- output
is an optional condition that determines if text is output to the field result.
(1 = append, 0 = discard)
- prompt
is the message prompt to display at the top of the Data List dialog box.
Example
\{=CSC|CALL DataList("Euro.dls", "Universal Beams", "457(152(52))", "I Section: ", "1", "selectedltem", "selectedPage", "Show", "Append", "Select an I section")\}

\section*{Data Table field syntax}

The particular syntax for Data Table fields is the following:
DataTable(filename(s), prefix, suffix, show, output)
The parameters are:
- filename(s)
is the name of the data table to be opened.
TIP To open more than one data table simultaneously, separate each file name with a comma.
- prefix
is optional text prefixed to the field result.
- suffix
is an optional text appended to all variables names for the selection.
- show
is an optional condition that determines if the data table is shown.

If True(1), the data table is always shown. If False(0), the data table is only shown if the current selection cannot be determined.
You can also use the pre-defined system variables Show and Hide for this parameter.
- output
is an optional condition that determines if text is output to the field result.
( 0 = discard, 1 = append)
Example
\{=CSC|CALL DataTable("5950-21a.tbl", "Example DataTable: ", "1", "Show",
"Append")\}

\section*{Data Graph field syntax}

The particular syntax for Data Graph fields is the following:
DataGraph(fileName, prefix, suffix, var1, var2, show, output)
The parameters are:
- fileName
is the name of the data graph to be opened.
- prefix
is optional text prefixed to the field result.
- suffix
is optional text appended to all variables names for the selection.
- var1
is the name of the first variable to use for selection.
- var2
is the name of the second variable to use for selection.
- show
is an optional True/False condition that determines if the data graph should be shown.
If True (1) the data graph is always shown. If False (0), the data graph is only shown if the current selection cannot be determined.
- output
is an optional condition that determines if text is output to the field result.
(1 = append, 0 = discard)
Example
\{=CSC|CALL DataGraph("5950-21a.dgt","Example Datagraph:
","_\{1\}","","",Show,Append)\}

\section*{Calc Item field syntax}

The particular syntax for Calc Item fields is the following:
EvalCalcItem(fileName, itemName, output)
Parameters:
- filename
is the full path to the calculation library.
- itemName
is the name of the calculation item.
- output
determines whether to output (Append) or discard (Discard) the calculated item.

Example
\{=CSC|CALL EvalCalcItem("\$(SysLbrDir)LibraryName.Ibr", "ItemName", Discard)\}

\section*{Other Tedds fields}

In addition to the major Tedds fields, Tedds for Word contains a number of additional fields. You can use the other Tedds fields to add specific functionality to your documents, such as calculating a library item or running a Word macro. For more information on other Tedds fields, see the following paragraphs.

NOTE The following only applies to Tedds for Word.

TIP You can access all Tedds fields in the Library Access System. Go to Writing your own custom calculations --> Calculation writing documentation --> Tedds fields.

\section*{See also}

Enhancing Tedds for Word calculations with Tedds fields (page 380)

\section*{Evaluate script calc item fields}

An Evaluate script calc item field calculates a selected script calc library item, created with the Calc designer.

To create an Evaluate script calc item field, do the following:
1. In the Calculating folder, select EvalScriptCaIcItem (field).
2. Modify the template according to the syntax below.
3. Perform your calculations.

The particular syntax for Evaluate script calc item fields is the following:
EvalScriptCalcItem(fileName, itemName, subModuleName)
The parameters are:
- filename
is the full path to the calc library.
- itemName
is the name of the calc item.
- subModuleName
is an optional field, intended for the name of a submodule to be executed.
Example
\{=CSC|CALL EvalScriptCalcItem(\$(SysLbrDir)LibraryName.Ibr", "ItemName", "Submodule1")\}

\section*{Evaluate metafile calc item fields}

An Evaluate metafile calc item field calculates a selected metafile calc library item or a sketch. The sketch can either be inserted in the document or discarded.

To create a Evaluate metafile calc item field, do the following:
1. In the Calculating folder, select EvalMetaFileCalcItem (field).
2. Modify the template according to the syntax below.
3. Perform your calculations.

The particular syntax for Evaluate metafile calc item fields is the following:
EvalMetaFileCalcltem(fileName, itemName, output)
The parameters are:
- filename
is the full path to the calc library.
- itemName
is the name of the calc item.
- output
determines whether to output (Append) or discard (Discard) the calculated item.

\section*{Example}
\{=CSC|CALL EvalMetaFileCalcItem("\$(SysLbrDir)Misketch.lbr", "Sketch - Open Plan", Append)\}

\section*{Evaluate RTF calc item fields}

An Evaluate RTF calc item field calculates an RTF calc item. The item can either be inserted in the document or discarded.

To create an Evaluate RTF calc item field, do the following:
1. In the Calculating folder, select EvalRtfCalcItem (field).
2. Modify the template according to the syntax below.
3. Perform your calculations.

The particular syntax for Evaluate RTF calc item fields is the following:
EvalRTFCalcItem(fileName, itemName, output, replace)
The parameters are:
- filename
is the full path to the calc library.
- itemName
is the name of the calc item.
- output
determines whether to output (Append) or discard (Discard) the calculated item.
- replace
is an optional formatted string of replacement text.
If the calc item contains replacement fields, each field will be replaced with the text in the replace parameter before the item is calculated.

NOTE - replace 1 is the text that will be replaced in the item for the first occurrence of a replacement field.
- replace[n] is the text that will be replaced in the item for the \(\mathrm{n}^{\text {th }}\) occurrence of a replacement field.

\section*{Evaluate interface calc item fields}

An Evaluate interface calc item field calculates a selected user interface calc library item created with the Interface Designer.
To create an Evaluate interface calc item field, do the following:
1. In the Calculating folder, select EvalInterfaceCalcItem (field).
2. Modify the template according to the syntax below.
3. Perform your calculations.

The particular syntax for Evaluate interface calc item fields is the following:

EvalInterfaceLib/tem(fileName, itemName)
The parameters are:
- filename
is the full path to the calc library.
- itemName
is the name of the calc item.
Example
\{=CSC|CALL EvalInterfaceLibItem(\$(SysLbrDir)LibraryName.Ibr", "ItemName")\}

\section*{Time fields}

Time fields display the time when the selected fields were last calculated.
To create a Time field, do the following:
1. In the Date and time folder, select Time (field).
2. Modify the template according to the syntax below.
3. Perform your calculations.

The particular syntax for Time fields is the following:
Time(format)
The parameters are:
- format
is the format to output the data in.
Example
\(\{=C S C \mid C A L L ~ T i m e(" H H: m m ~ M M M-d, ~ y y ")\}\)

\section*{See also}

Time and date formatting options (page 501)

\section*{Date fields}

Date fields display the date when the selected fields were last calculated.
To create a Date field, do the following:
1. In the Date and time folder, select Date (field).
2. Modify the template according to the syntax below.
3. Perform your calculations.

The particular syntax for Date fields is the following:
Date(format)
The parameters are:
- format
is the format to output the data in.
Example
\(\{=C S C \mid\) CALL Date("dddd, MMMM, d, yyyy")\}

\section*{See also}

Time and date formatting options (page 501)

\section*{Date and time fields}

Date and time fields display the date and time when the selected fields were last calculated.
To create a Date and time field, do the following:
1. In the Date and time folder, select DateTime (field).
2. Modify the template according to the syntax below.
3. Perform your calculations.

The particular syntax for Date and time fields is the following:
DateTime(format)
The parameters are:
- format
is the format to output the data in.
Example
\{=CSC|CALL DateTime("HH:mm MMM-d, yy")\}

\section*{See also}

Time and date formatting options (page 501)

\section*{Run macro fields}

A Run macro field runs a Word macro that is available to the current document.

To create a Run macro field, do the following:
1. In the Miscellaneous folder, select RunMacro (field).
2. Modify the template according to the syntax below.
3. Perform your calculations.

The particular syntax for Run macro fields is the following:
runMacro(\$macroName\$)
The parameters are:
- macroName
is the name of the Word macro to run.
Example
\{=CSC|CALL RunMacro("MyMacro")\}

\section*{Time and date formatting options}

In Tedds for Word, you can display the time and date in virtually any format that you require. The valid time and date formatting options are shown in the table below. For simplicity, the results are shown for 09:05:07 on Thursday 5 June 2013.

\begin{tabular}{|c|c|c|c|}
\hline \multicolumn{4}{|c|}{ Time formatting options } \\
\hline \begin{tabular}{c} 
Perio \\
d of \\
time
\end{tabular} & Code & Result & Comment \\
\hline Hour & h & 9 & Based on 12-hour clock \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|c|}
\hline \multicolumn{4}{|c|}{Time formatting options} \\
\hline Perio d of time & Code & Result & Comment \\
\hline \multirow[t]{3}{*}{} & H & 9 & Based on 24-hour clock \\
\hline & hh & 09 & Based on 12-hour clock \\
\hline & HH & 09 & Based on 24-hour clock \\
\hline \multirow[t]{2}{*}{Minut e} & m & 5 & \multirow[b]{2}{*}{NOTE Use a lower case \(m\) to differentiate minutes from months (M).} \\
\hline & mm & 05 & \\
\hline \multirow[t]{2}{*}{\[
\begin{aligned}
& \text { Secon } \\
& \text { d }
\end{aligned}
\]} & s or S & 7 & \multirow[t]{2}{*}{Not applicable} \\
\hline & ss or SS & 07 & \\
\hline 'text' & \multicolumn{3}{|l|}{\begin{tabular}{l}
Specify text in single quotation marks to include it in the appropriate format. \\
For example, Time("hh' Greenwich mean time' ") displays "09 Greenwich mean time".
\end{tabular}} \\
\hline charac ter & \multicolumn{3}{|l|}{\begin{tabular}{l}
Includes the specified character in the date or time. \\
For example, Time("HH:mm MMM-d, yyyy") displays "11:15 Nov-6, 2013".
\end{tabular}} \\
\hline
\end{tabular}

\section*{See also}

Other Tedds fields (page 496)

\section*{Mathematics}

In the following paragraphs, we cover the mathematical operators and functions available in Tedds for Word.

\section*{Operators}

The following mathematical operators are available in Tedds for Word.
TIP You can find the symbol form of most of the following operators in the Library Access System. Go to Writing your own custom calculations --> Calculation writing documentation --> Math symbols.
\begin{tabular}{|l|l|}
\hline Operator & \multicolumn{1}{c|}{ Description } \\
\hline+ & Addition \\
\hline
\end{tabular}
\begin{tabular}{|l|l|}
\hline \multicolumn{1}{|c|}{ Operator } & \\
\hline- & Subtraction \\
\hline * or \(\times\) & Multiplication \\
\hline / or \(\div\) & Division \\
\hline \(\mathrm{y}^{\mathrm{x}}\) & Raises y to the power of x \\
\hline
\end{tabular}

NOTE The maximum and minimum numbers that Tedds can handle are \(10^{308}\) and \(10^{-308}\).

\section*{Mathematical functions}

The following mathematical functions are available in Tedds for Word.
TIP You can find most of the following functions in the Library Access System. Go to Writing your own custom calculations --> Calculation writing documentation --> Maths functions.
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|r|}{General mathematical functions} \\
\hline Function & Description & Limits and notes \\
\hline \(\mathrm{x}^{\text {y }}\) & Raise x to the power y & \(x>0\) \\
\hline sqrt(x) & Square root of \(x\) & \(x>0\) \\
\hline \(\sqrt{ }(\mathrm{x})\) & Square root of \(x\) & \(x>0\) \\
\hline \(\exp (\mathrm{x})\) & Exponential \(\mathrm{e}^{\mathrm{x}}\) & Not applicable \\
\hline \(\ln (\mathrm{x})\) & Natural log of \(x\) & \(x>0\) \\
\hline \(\log (\mathrm{x})\) & Log to the base 10 of \(x\) & \(x>0\) \\
\hline abs(x) & Absolute value of \(x\) & Not applicable \\
\hline \[
\begin{aligned}
& \text { degrees(x, } \\
& y, z)
\end{aligned}
\] & Converts \(x^{\circ} y^{\prime} z^{\prime \prime}\) to \(x . d d d\) & Not applicable \\
\hline \[
\begin{aligned}
& \max (x, y, z, \\
& \ldots .)
\end{aligned}
\] & Maximum number in list & Not applicable \\
\hline \(\min (x, y, z, \ldots\). & Minimum number in list & Not applicable \\
\hline \[
\begin{aligned}
& \operatorname{sum}(x, y, z, \\
& \ldots)
\end{aligned}
\] & Summation of numbers in list & Not applicable \\
\hline \[
\begin{aligned}
& \text { average( } x, y \text {, } \\
& z, \ldots . .)
\end{aligned}
\] & Average of number in list & Not applicable \\
\hline \[
\begin{aligned}
& \text { median( } x, y \text {, } \\
& z, \ldots . .)
\end{aligned}
\] & Median number in list & Not applicable \\
\hline \[
\begin{aligned}
& \text { quotient }(x, y \\
& \text { ) }
\end{aligned}
\] & Integer portion of \(\mathrm{x} / \mathrm{y}\) & Not applicable \\
\hline
\end{tabular}
\begin{tabular}{|l|l|l|}
\hline \multicolumn{3}{|c|}{ General mathematical functions } \\
\hline Function & \multicolumn{1}{|c|}{ Description } & \multicolumn{1}{c|}{ Limits and notes } \\
\hline mod( \(x, y\) ) & \begin{tabular}{l} 
Remainder on dividing \(x\) \\
by \(y\)
\end{tabular} & Not applicable \\
\hline int( \(x\) ) & Integer part of \(x\) & Not applicable \\
\hline int( \(x\), "unit") & \begin{tabular}{l} 
Integer of \(x\) when \\
expressed in terms of \\
"unit"
\end{tabular} & Not applicable \\
\hline round( \(x, y\) y) & \begin{tabular}{l} 
Rounds \(x\) to \(y\) decimal \\
places
\end{tabular} & -15 < \(y<15\) \\
\hline \begin{tabular}{l} 
round( \((, y, "\) \\
unit")
\end{tabular} & \begin{tabular}{l} 
Rounds \(x\) to \(y\) decimal \\
places when expressed \\
in terms of "unit"
\end{tabular} & Not applicable \\
\hline rand() & \begin{tabular}{l} 
Random number \\
between 0 and 999
\end{tabular} & Not applicable \\
\hline \begin{tabular}{l} 
increment( \\
\(x)\) \\
increment( \\
\(x, y)\)
\end{tabular} & \begin{tabular}{l} 
Increment \(x\) by \(y\), if \(y\) not \\
specified increment \(x\) \\
1
\end{tabular} & No limits; works with units \\
\hline floor \((x, y)\) & \begin{tabular}{l} 
Rounds \(x\) down to the \\
multiple of significance y
\end{tabular} & No limits; works with units \\
\hline ceiling \((x, y)\) & \begin{tabular}{l} 
Rounds \(x\) up to the \\
multiple of significance y
\end{tabular} & No limits; works with units \\
\hline
\end{tabular}
\begin{tabular}{|l|l|l|}
\hline \multicolumn{3}{|c|}{ Trigonometric mathematical functions } \\
\hline \multicolumn{1}{|c|}{ Function } & \multicolumn{1}{|c|}{ Description } & \multicolumn{1}{c|}{ Limits } \\
\hline \(\sin (x)\) & Sine ( \(x\) in degrees) & Not applicable \\
\hline \(\cos (x)\) & Cosine ( \(x\) in degrees) & Not applicable \\
\hline \(\tan (x)\) & Tangent ( \(x\) in degrees) & Not applicable \\
\hline \(\operatorname{cosec}(x)\) & Cosecant ( \(x\) in degrees) & Not applicable \\
\hline \(\sec (x)\) & Secant ( \(x\) in degrees) & Not applicable \\
\hline \(\cot (x)\) & Cotangent ( \(x\) in degrees) & Not applicable \\
\hline \(\operatorname{asin}(x)\) & \begin{tabular}{l} 
Inverse sine (result in \\
degrees)
\end{tabular} & \(-1<=x<=1\) \\
\hline \(\operatorname{acos}(x)\) & \begin{tabular}{l} 
Inverse cosine (result in \\
degrees)
\end{tabular} & \(-1<=x<=1\) \\
\hline \(\operatorname{atan}(x)\) & \begin{tabular}{l} 
Inverse tangent (result in \\
degrees)
\end{tabular} & Not applicable \\
\hline \(\sinh (x)\) & Hyperbolic sine & Not applicable \\
\hline \(\cosh (x)\) & Hyperbolic cosine & Not applicable \\
\hline \(\tanh (x)\) & Hyperbolic tangent & Not applicable \\
\hline
\end{tabular}
\begin{tabular}{|l|l|l|}
\hline \multicolumn{3}{|c|}{ Trigonometric mathematical functions } \\
\hline Function & \multicolumn{1}{|c|}{ Description } & \multicolumn{1}{c|}{ Limits } \\
\hline \(\operatorname{asinh}(x)\) & Inverse hyperbolic sine & Not applicable \\
\hline \(\operatorname{acosh}(x)\) & \begin{tabular}{l} 
Inverse hyperbolic \\
cosine
\end{tabular} & \(x>=1\) \\
\hline \(\operatorname{atanh}(x)\) & \begin{tabular}{l} 
Inverse hyperbolic \\
tangent
\end{tabular} & \(-1<=x<=1\) \\
\hline
\end{tabular}

NOTE All functions that take angle arguments expect them in degrees, and all functions that return angle arguments return them in degrees.

\section*{Tedds functions}

The following Tedds functions are available in Tedds for Word.
You can find most of the following functions inLibrary Access System. Go to Writing your own custom calculations --> Calculation writing documentation --> Tedds functions.
\begin{tabular}{|l|l|}
\hline \multicolumn{2}{|c|}{ String functions } \\
\hline \multicolumn{1}{|c|}{ Function } & \multicolumn{1}{c|}{ Description } \\
\hline StrLength("String1") & \begin{tabular}{l} 
Returns the number of characters in the given \\
string. \\
If a string variable is given as the parameter, the \\
function returns the number of characters in the \\
variable.
\end{tabular} \\
\hline \begin{tabular}{l} 
StrCompare("String1", \\
"String2", \\
Caselnsensitive)
\end{tabular} & \begin{tabular}{l} 
Compares two strings to see if they are equal. \\
The comparison can be case sensitive or case \\
insensitive. \\
If the strings are equal, the function returns 0. If \\
String1 is less than String2, the function returns -1. \\
If String1 is greater than String2, the function \\
returns 1.
\end{tabular} \\
\hline \begin{tabular}{l} 
StrEndsWith("String1", \\
"String2")
\end{tabular} & \begin{tabular}{l} 
Checks to see if String1 ends with String2, returning \\
1 if it does and 0 if it does not.
\end{tabular} \\
The comparison is always case sensitive, and the \\
function recognizes spaces.
\end{tabular}\(|\)\begin{tabular}{l} 
Inserts String2 into String1 at the position specified \\
by the InsertPosition parameter.
\end{tabular}
\begin{tabular}{|l|l|}
\hline \multicolumn{1}{|c|}{ String functions } \\
\hline \multicolumn{1}{|c|}{ Function } & \multicolumn{1}{c|}{ Description } \\
\hline \(\begin{array}{l}\text { StrFirstIndexOf } \\
\text { ("String1", "String2", } \\
\text { SearchStartPosition, } \\
\text { SearchRangeLength) }\end{array}\) & \(\begin{array}{l}\text { Finds the first instance of String2 within String1 } \\
\text { after SearchStartPosition and returns the position } \\
\text { of the first character. } \\
\text { If String2 is not found within SearchRangeLength } \\
\text { characters, the function returns -1. } \\
\text { SearchStartPosition (the number of characters } \\
\text { from the start of String1 at which the search will } \\
\text { start) and SearchRangeLength are optional. }\end{array}\) \\
\hline \(\begin{array}{l}\text { StrLastIndexOf("String1", } \\
\text { "String2", } \\
\text { SearchStartPosition, } \\
\text { SearchRangeLength) } \\
\text { after SearchStartPosition, and returns the position } \\
\text { of the first character. } \\
\text { If String2 is not found within SearchRangeLength } \\
\text { characters, the function returns -1. }\end{array}\) \\
\hline \(\begin{array}{l}\text { SearchStartPosition (the number of characters } \\
\text { from the start of String1 at which the search will } \\
\text { start) and SearchRangeLength are optional. }\end{array}\) \\
\hline \(\begin{array}{l}\text { StrPadLeft("String1" the } \\
\text { function } \\
\text { returnstringLength, } \\
\text { "String2") }\end{array}\) & \(\begin{array}{l}\text { Pads the left hand side of String 1 with sufficient } \\
\text { characters to make it as long as the length } \\
\text { specified by ReturnStringLength. }\end{array}\) \\
\hline \(\begin{array}{l}\text { String2 is optional. If String 2 is not specified, } \\
\text { String1 will be padded with spaces. Otherwise, it } \\
\text { will be padded by the characters of String2. }\end{array}\) \\
the functiont("String1" \\
returnstringLength, \\
"String2")
\end{tabular} \(\left.\begin{array}{l}\text { Pads the right hand side of String 1 with sufficient } \\
\text { characters to make it as long as the length } \\
\text { specified by ReturnStringLength. } \\
\text { String2 is optional. If String 2 is not specified, } \\
\text { String1 will be padded with spaces. Otherwise, it } \\
\text { will be padded by the characters of String2. }\end{array}\right\}\)
\begin{tabular}{|l|l|}
\hline \multicolumn{2}{|c|}{ String functions } \\
\hline \multicolumn{1}{|c|}{ Function } & \multicolumn{1}{c|}{ Description } \\
\hline \begin{tabular}{l} 
StrStartsWith("String1", \\
"String2")
\end{tabular} & \begin{tabular}{l} 
Checks to see if String1 starts with String2, \\
returning 1 if it does and 0 if it does not. \\
The comparison is always case sensitive, and the \\
function recognizes spaces.
\end{tabular} \\
\hline \begin{tabular}{l} 
StrSubstring("String1", \\
SubstringStart, \\
SubstringLength)
\end{tabular} & \begin{tabular}{l} 
Obtains a string from the middle of String1 which is \\
has as many characters as defined in \\
SubstringLength, starting at SubstringStart. \\
If you don't specify SubstringLength, the returned \\
string will be the remainder of String1 from \\
SubstringStart.
\end{tabular} \\
\hline StrToLower("String1") & Converts String1 to lower case characters. \\
\hline StrToUpper("String1") & Converts String1 to upper case characters. \\
\hline \begin{tabular}{l} 
StrTrim("String1", \\
"UnwantedCharacters")
\end{tabular} & \begin{tabular}{l} 
Removes UnwantedCharacters from the start and \\
end of String1. \\
The UnwantedCharacters parameter is optional. If \\
not specified, the function removes spaces from \\
the start and end of String1.
\end{tabular} \\
\hline \begin{tabular}{l} 
StrTrimStart("String1", \\
"UnwantedCharacters")
\end{tabular} & \begin{tabular}{l} 
Removes UnwantedCharacters from the start of \\
String1. \\
The UnwantedCharacters parameter is optional. If \\
not specified, the function removes spaces from \\
the start of String1.
\end{tabular} \\
\hline \begin{tabular}{l} 
StrTrimEnd("String1", \\
"UnwantedCharacters")
\end{tabular} & \begin{tabular}{l} 
Removes UnwantedCharacters from the end of \\
String1. \\
The UnwantedCharacters parameter is optional. If \\
not specified, the function removes spaces from \\
the end of String1.
\end{tabular} \\
\hline \begin{tabular}{l} 
StrEnd("String1", \\
SubstringLength)
\end{tabular} & \begin{tabular}{l} 
Obtains a string which has as many characters as \\
defined in SubstringLength from the start of \\
String1.
\end{tabular} \\
\hline \begin{tabular}{l} 
StrFormat("String1", \\
Value1, Value2, ...)
\end{tabular} & \begin{tabular}{l} 
Crains a string which has as many characters as \\
defined in SubstringLength from the end of String1.
\end{tabular} \\
SubstringLength) \\
Placeholders represent the position of the values in \\
the string, and can specify formatting information \\
for the value.
\end{tabular}\(|\)
\begin{tabular}{|l|l|}
\hline \multicolumn{2}{|c|}{ String functions } \\
\hline \multicolumn{1}{|c|}{ Function } & \multicolumn{1}{c|}{ Description } \\
\hline \begin{tabular}{l} 
String ("VariableName or \\
formula", "format", \\
"unit")
\end{tabular} & \begin{tabular}{l} 
Converts a number variable (or a formula yielding a \\
number) into a string, and controls the formatting \\
of the string value. \\
The format parameter is optional. If it is omitted, \\
the default format is adopted. \\
The unit parameter is optional. If it is not used and \\
the value has dimensions, base system units are \\
used.
\end{tabular} \\
\hline \begin{tabular}{l} 
Str ("VariableName or \\
formula")
\end{tabular} & \begin{tabular}{l} 
Converts an integer number variable (or a formula \\
yielding an integer number) into a string.
\end{tabular} \\
\hline EvalString("String1") & \begin{tabular}{l} 
Evaluates the string as though it were an \\
expression.
\end{tabular} \\
\hline
\end{tabular}
\begin{tabular}{|l|l|l|}
\hline \multicolumn{3}{|c|}{ Unit functions } \\
\hline \multicolumn{1}{|c|}{ Function } & \multicolumn{1}{|c|}{ Description } & \multicolumn{1}{c|}{ Note } \\
\hline \begin{tabular}{l} 
addunit("x", \\
a,b,c,d,f)
\end{tabular} & \begin{tabular}{l} 
Adds unit x to the unit \\
database. \\
a, b, c and d are the \\
powers of the unit \\
dimensions (Ma, Lb,, c, \\
Dd), and f is the \\
multiplication factor to \\
turn the base unit \\
combination to the unit \\
to be added.
\end{tabular} & \begin{tabular}{l} 
In order to use this function, you \\
must be the only one using the units \\
database file.
\end{tabular} \\
\hline getunit("x") & \begin{tabular}{l} 
Lists the dimensions and \\
the multiplication factor \\
for unit x.
\end{tabular} & Not applicable \\
\hline listallunits() & \begin{tabular}{l} 
Lists all units in the units \\
database.
\end{tabular} & Not applicable \\
\hline \begin{tabular}{l} 
removeuni \\
t("x")
\end{tabular} & \begin{tabular}{l} 
Removes unit x from the \\
units database.
\end{tabular} & \begin{tabular}{l} 
In order to use this function, you \\
must be the only one using the units \\
database file.
\end{tabular} \\
\hline \begin{tabular}{l} 
showdims(" \\
x")
\end{tabular} & \begin{tabular}{l} 
Shows the dimensions of \\
variable x.
\end{tabular} & Not applicable \\
\hline
\end{tabular}
\begin{tabular}{|l|l|}
\hline \multicolumn{2}{|c|}{ Logic functions } \\
\hline \multicolumn{1}{|c|}{ Function } & \multicolumn{1}{c|}{ Description } \\
\hline If(condition, \(\mathrm{x}, \mathrm{y})\) & \begin{tabular}{l} 
If condition is true, the function returns x. \\
Otherwise, the function returns y.
\end{tabular} \\
\hline
\end{tabular}
\begin{tabular}{|l|l|}
\hline \multicolumn{2}{|c|}{ Logic functions } \\
\hline \multicolumn{1}{|c|}{ Function } & \multicolumn{1}{c|}{ Description } \\
\hline \begin{tabular}{l} 
if \((a n d(a<b, c>d), x, y)\), \\
if( \((a<b) \& \& \& \&(c>d), x, y)\)
\end{tabular} & \begin{tabular}{l} 
If both conditions are true, the function returns \(x\). . \\
Otherwise, the function returns \(y\).
\end{tabular} \\
\hline \begin{tabular}{l} 
if(or \((a<b, c>d), x, y)\), \\
if( \((a<b)|\mid(c>d), x, y)\)
\end{tabular} & \begin{tabular}{l} 
If either condition is true, the function returns . \\
Otherwise, if not then returns \(y\).
\end{tabular} \\
\hline \begin{tabular}{l} 
ifelseif( \(a>b, v, c<d, w\), \\
\(a==0, x, d<>a, y, z)\)
\end{tabular} & \begin{tabular}{l} 
If \(a>b\), the function returns v. If not, the function \\
checks if \(c<d\), and if it is true, the function returns \\
w. The function continues working this way, and if \\
no conditions are matched the function returns z.
\end{tabular} \\
\hline Not(a>b) & \begin{tabular}{l} 
If the specified condition is met (a>b), the function \\
returns 0. Otherwise, the function returns 1.
\end{tabular} \\
\hline \begin{tabular}{l} 
Select(variable name, \\
variable value 1,return \\
value1, variablevalue 2, \\
return value2,variable \\
value 3, returnvalue3, \\
variable value 4,return \\
value4, return value 5)
\end{tabular} & \begin{tabular}{l} 
Returns the value of a variable based on the value \\
of another variable. \\
Example:
\end{tabular} \\
\begin{tabular}{l} 
Day = "Sun" \\
Select(day,"Mon",2,"Tue",3,"Wed",4,"Thur",5,"Fri",6,"Sa \\
\(t ", 7,1)=1\).
\end{tabular} \\
The function returns 1 because it does not match \\
any of the values. If day were "Wed", the function \\
would return 4.
\end{tabular}
\begin{tabular}{|l|l|}
\hline \multicolumn{2}{|c|}{ Conditions that apply to logic functions } \\
\hline \multicolumn{1}{|c|}{ Conditions } & \multicolumn{1}{c|}{ Description } \\
\hline\(x>y, x>y\) & \begin{tabular}{l} 
Greater than. \\
The function returns 1 if true, 0 if false.
\end{tabular} \\
\hline\(x>=y, x \geq y\) & \begin{tabular}{l} 
Greater than or equal to. \\
The function returns 1 if true, 0 if false.
\end{tabular} \\
\hline\(x==y, x==y\) & \begin{tabular}{l} 
Equal to. \\
The function returns 1 if true, 0 if false.
\end{tabular} \\
\hline\(x<>y, x \neq y, x!=y\) & \begin{tabular}{l} 
Not equal to. \\
The function returns 1 if true, 0 if false.
\end{tabular} \\
\hline\(x<=y, x \leq y\) & \begin{tabular}{l} 
Less than or equal to. \\
The function returns 1 if true, 0 if false.
\end{tabular} \\
\hline\(x<y, x<y\) & \begin{tabular}{l} 
Less than. \\
The function returns 1 if true, 0 if false.
\end{tabular} \\
\hline
\end{tabular}
\begin{tabular}{|c|c|}
\hline \multicolumn{2}{|r|}{Equality functions} \\
\hline Function & Description \\
\hline _eq(x,y,Tolerance) & \begin{tabular}{l}
Checks that x and y are equal within the specified Tolerance. \\
The function returns 1 if it is true, 0 if not. \\
Tolerance is an optional parameter. If it is not specified, \(x\) and \(y\) must be equal to the full accuracy of Tedds calculations.
\end{tabular} \\
\hline equal( \(x, y\),Tolerance) & \begin{tabular}{l}
Checks that x and y are equal within the specified Tolerance. \\
The function returns 1 if it is true, 0 if not. \\
Tolerance is an optional parameter. If it is not specified, \(x\) and \(y\) must be equal to the full accuracy of Tedds calculations.
\end{tabular} \\
\hline _It(x,y,Tolerance) & \begin{tabular}{l}
Checks that x is less than y within the specified Tolerance. \\
The function returns 1 if it is true, 0 if not. \\
Tolerance is an optional parameter. If it is not specified, x must be less than y to the full accuracy of Tedds calculations.
\end{tabular} \\
\hline lessthan( \(\mathrm{x}, \mathrm{y}\), Tolerance) & \begin{tabular}{l}
Checks that x is less than y within the specified Tolerance. \\
The function returns 1 if it is true, 0 if not. \\
Tolerance is an optional parameter. If it is not specified, \(x\) must be less than \(y\) to the full accuracy of Tedds calculations.
\end{tabular} \\
\hline _gt( \(x\) y, Tolerance) & \begin{tabular}{l}
Checks that x is greater than y within the specified Tolerance. \\
The function returns 1 if it is true, 0 if not. \\
Tolerance is an optional parameter. If it is not specified, \(x\) must be greater than \(y\) to the full accuracy of Tedds calculations.
\end{tabular} \\
\hline \[
\begin{aligned}
& \text { greaterthan }(x, y \text {, } \\
& \text { Tolerance) }
\end{aligned}
\] & \begin{tabular}{l}
Checks that x is greater than y within the specified Tolerance. \\
The function returns 1 if it is true, 0 if not. \\
Tolerance is an optional parameter. If it is not specified, \(x\) must be greater than \(y\) to the full accuracy of Tedds calculations.
\end{tabular} \\
\hline
\end{tabular}
\begin{tabular}{|l|l|}
\hline \multicolumn{1}{|c|}{ Function } & \multicolumn{1}{|c|}{ Equality functions } \\
\hline _le( \(x, y\), Tolerance) & \begin{tabular}{l} 
Checks that \(x\) is less than or equal to \(y\) within the \\
specified Tolerance. \\
The function returns 1 if it is true, 0 if not. \\
Tolerance is an optional parameter. If it is not \\
specified, \(x\) must be less than or equal to \(y\) to the \\
full accuracy of Tedds calculations.
\end{tabular} \\
\hline \begin{tabular}{l} 
lessorequal \((x, y\), \\
Tolerance)
\end{tabular} & \begin{tabular}{l} 
Checks that \(x\) is less than or equal to \(y\) within the \\
specified Tolerance. \\
The function returns 1 if it is true, 0 if not.
\end{tabular} \\
Tolerance is an optional parameter. If it is not \\
specified, \(x\) must be less than or equal to \(y\) to the \\
full accuracy of Tedds calculations.
\end{tabular}\(\left|\begin{array}{l}\text { Checks that } x \text { is greater than or equal to } y \text { within } \\
\text { the specified Tolerance. } \\
\text { The function returns } 1 \text { if it is true, } 0 \text { if not. } \\
\text { Tolerance is an optional parameter. If it is not } \\
\text { specified, } x \text { must be greater than or equal to } y \text { to } \\
\text { the full accuracy of Tedds calculations. }\end{array}\right|\)
\begin{tabular}{|l|l|}
\hline \multicolumn{1}{|c|}{ Function } & \multicolumn{1}{c|}{ Variable functions } \\
\hline \multicolumn{1}{|c|}{ Description } \\
\hline \begin{tabular}{l} 
Delete \\
VarsInSection(" \(x ", " y ", " z " ~\) \\
\(\ldots)\)
\end{tabular} & \begin{tabular}{l} 
Deletes the variables \(x, y\) and \(z\) in the current \\
calculation section. \\
If no variables are specified, the function deletes all \\
variables in the current section.
\end{tabular} \\
\hline \begin{tabular}{l} 
Delete \\
VarsInAllSections(("x","y" \\
\(, " z " . .)) ~\).
\end{tabular} & \begin{tabular}{l} 
Deletes the variables \(x, y\) and \(z\) in the current \\
document. \\
If no variables are specified, the function deletes all \\
variables in the document.
\end{tabular} \\
\hline
\end{tabular}

\begin{tabular}{|l|l|}
\hline \multicolumn{1}{|c|}{ Calculation section functions } \\
\hline \multicolumn{1}{|c|}{ Function } & \multicolumn{1}{c|}{ Description } \\
\hline GetSectionId() & \begin{tabular}{l} 
Returns the ID of the calculation section that \\
contains the insertion point. \\
If the insertion point is not in a calculation section, \\
the function returns 0.
\end{tabular} \\
\hline GetSectionName() & \begin{tabular}{l} 
Returns the name of the calculation section that \\
contains the insertion point. \\
If the insertion point is not in a calculation section, \\
the function returns "".
\end{tabular} \\
\hline \begin{tabular}{l} 
GetSectionVar(SectionId, \\
"VariableName", \\
defaultValue)
\end{tabular} & \begin{tabular}{l} 
Gets the value of a variable in the section with the \\
ID Sectionld. \\
If the specified variable does not exist, the function \\
sets the variable to the default value.
\end{tabular} \\
The defaultValue parameter is optional. However, \\
the function generates an error if the variable is \\
not found.
\end{tabular}
\begin{tabular}{|l|l|}
\hline \multicolumn{1}{|c|}{ Calc library functions } \\
\hline \multicolumn{1}{|c|}{ Function } & \multicolumn{1}{c|}{ Description } \\
\hline \begin{tabular}{l} 
CalcItemExists \\
("fileName", \\
"itemName")
\end{tabular} & \begin{tabular}{l} 
Checks to see if an item named itemName exists in \\
the library named fileName. \\
The function returns 1 if it does, 0 if it does not.
\end{tabular} \\
\hline \begin{tabular}{l} 
GetCalcItemLongName \\
("fileName", \\
"itemName")
\end{tabular} & \begin{tabular}{l} 
If an item named itemName exists in the library \\
named fileName, the function returns its long \\
name. If it does not, the function returns the empty \\
string "".
\end{tabular} \\
\hline \begin{tabular}{l} 
GetCalcltemDescription \\
("fileName",
\end{tabular} & \begin{tabular}{l} 
If an Item named itemName exists in the library \\
named fileName, the function returns its \\
description. If it does not, the function returns the \\
empty string "".
\end{tabular} \\
\hline
\end{tabular}
\begin{tabular}{|l|l|}
\hline \multicolumn{1}{|c|}{ Function } & \multicolumn{1}{c|}{ Calc library functions } \\
\hline \multicolumn{1}{|c|}{ Description } \\
\hline \(\begin{array}{l}\text { GetCalcltemVersion } \\
\text { ("fileName", } \\
\text { "itemName") }\end{array}\) & \(\begin{array}{l}\text { If an item named itemName exists in the library } \\
\text { named fileName, the function returns its Version } \\
\text { information. If it does not, the function returns the } \\
\text { empty string "". }\end{array}\) \\
\hline \(\begin{array}{l}\text { GetCalcItemAuthor } \\
\text { ("fileName", } \\
\text { "itemName") }\end{array}\) & \(\begin{array}{l}\text { If an item named itemName exists in the library } \\
\text { named fileName, the function returns its Author } \\
\text { information. If it does not, the function returns the } \\
\text { empty string "". }\end{array}\) \\
\hline \(\begin{array}{l}\text { GetCalcItemStatus } \\
\text { ("fileName", }\end{array}\) & \(\begin{array}{l}\text { If an item named itemName exists in the library } \\
\text { named fileName, the function returns its Status } \\
\text { information. If it does not, the function returns the } \\
\text { empty string "". }\end{array}\) \\
\hline \(\begin{array}{l}\text { GetCalcltemText } \\
\text { ("fileName", }\end{array}\) \\
"itemName")
\end{tabular} \(\left.\begin{array}{l}\text { If an item named itemName exists in the library } \\
\text { named fileName and is a text item, the function } \\
\text { returns its contents. If the item does not exist or is } \\
\text { not a text item, the function returns the empty } \\
\text { string "". }\end{array}\right\}\)
\begin{tabular}{|l|l|}
\hline \multicolumn{2}{|c|}{ Calc library functions } \\
\hline \multicolumn{1}{|c|}{ Function } & \multicolumn{1}{c|}{ Description } \\
\hline "newVersion", & Status to "newStatus" and its Author to \\
"newStatus", & "newAuthor". \\
"newAuthor") & \\
\hline
\end{tabular}
\begin{tabular}{|l|l|}
\hline \multicolumn{2}{|c|}{ Locale functions } \\
\hline \multicolumn{1}{|c|}{ Function } & \multicolumn{1}{c|}{ Description } \\
\hline GetLocale() & Returns the current locale to which Tedds is set. \\
\hline GetCountry() & Returns the current country to which Tedds is set. \\
\hline
\end{tabular}
\begin{tabular}{|l|l|}
\hline \multicolumn{2}{|c|}{ Version functions } \\
\hline \multicolumn{1}{|c|}{ Function } & \multicolumn{1}{c|}{ Description } \\
\hline GetTeddsVersion() & Returns the version number of Tedds for Word. \\
\hline GetTeddsSPVersion() & Returns the service pack version number of Tedds. \\
\hline GetExceIVersion() & Returns the version number of Excel. \\
\hline
\end{tabular}
\begin{tabular}{|l|l|}
\hline \multicolumn{1}{|c|}{ Miscellaneous functions } \\
\hline \multicolumn{1}{|c|}{ Function } & \multicolumn{1}{c|}{ Description } \\
\hline \begin{tabular}{l} 
subcall("original function \\
name",",parameter 1 of \\
the original \\
function","parameter 2 \\
of the original function" \\
...)
\end{tabular} & \begin{tabular}{l} 
Runs any Tedds for Word function in an interface. \\
You can use this function to run a data list or a \\
data table by pressing a button in an interface.
\end{tabular} \\
\hline GetLanguage() & \begin{tabular}{l} 
Returns the user interface language identifier as a \\
two-character string code ("EN" = English, "FR" = \\
French, "DE" = German, "ES" = Spanish).
\end{tabular} \\
\hline GetTeddsAppName() & \begin{tabular}{l} 
Returns the name of the Tedds application (Tedds \\
or Tedds for Word) calculating the current \\
document.
\end{tabular} \\
\hline GetTimer() & \begin{tabular}{l} 
Returns the numeric value of the timer. \\
\hline Pause( time )
\end{tabular} \begin{tabular}{l} 
Returns the time of a pause in milliseconds. \\
Example: \\
Pause( 5000 ) = 1.000 indicates a pause for 5 \\
seconds.
\end{tabular} \\
\hline ProgressText( text ) & \begin{tabular}{l} 
Sets the status text displayed in the Tedds progress \\
window. \\
Example:
\end{tabular} \\
\hline
\end{tabular}
\begin{tabular}{|l|l|}
\hline \multicolumn{2}{|l|}{ Miscellaneous functions } \\
\hline \multicolumn{1}{|c|}{ Function } & \multicolumn{1}{c|}{ Description } \\
\hline & \begin{tabular}{l} 
ProgressText( "This is the progress text") \(=1.000\) \\
Pause( 3000) = 1.000. \\
That indicates a pause, so that you can read the \\
text in the progress window.
\end{tabular} \\
\hline ResetTimer() & Resets the timer to zero. \\
\hline ToHex( value ) & \begin{tabular}{l} 
Returns a value as a hexadecimal formatted string. \\
Example: \\
ToHex( 1) \(=\) "0x1" ToHex( "a" \()=\) "0x61"
\end{tabular} \\
\hline
\end{tabular}

\subsection*{8.2 Expression text format}

In Tedds, superscript and subscript characters are represented truly wherever possible. However, in some instances, representing the characters truly is not possible. In these cases, case superscripts and subscripts are displayed using expression text format.

\section*{Use expression text format}
- Subscript characters

To create a subscript character, type_\{characters\}.
For example, typing \(p_{-}\{c x\}\) creates the variable \(p_{c x}\).
- Superscript characters

To create a superscript character, type ^(characters).
For example, typing \(\mathrm{N} / \mathrm{mm}^{\wedge}(2)\) creates the unit \(\mathrm{N} / \mathrm{mm}^{2}\).
NOTE Superscript characters are normally only used for units. If used within a variable name, Tedds interprets it as the variable raised to the specified superscript value.
- Units

Most units can be entered using subscript and superscript characters as above. However, the units for angles and temperature require special consideration.
See codes for the units in the following table.
\begin{tabular}{|l|l|}
\hline \multicolumn{2}{|c|}{ Angle and temperature units } \\
\hline \multicolumn{1}{|c|}{ Name } & Code \\
\hline degrees \(\left({ }^{\circ}\right)\) & BB0 \\
\hline
\end{tabular}
\begin{tabular}{|c|l|l|}
\hline \multicolumn{2}{|c|}{ Angle and temperature units } & \multirow{3}{*}{ Code } \\
\hline Name & \\
\cline { 1 - 2 } degrees centigrade \(\left({ }^{\circ} \mathrm{C}\right)\) & \BOC & \\
\hline
\end{tabular}
－Greek characters
To type a Greek character，type Icharactercode．
For example，typing 162 creates the character \(\beta\) ．
See the codes for all characters in the following table．
\begin{tabular}{|c|c|c|c|c|c|}
\hline \[
\begin{gathered}
\text { Nam } \\
\text { e }
\end{gathered}
\] & Upper case & Code & Lowercase & Code & Roman equivalent \\
\hline alpha & A & \(\backslash 41\) & a & 161 & A a \\
\hline beta & B & \(\backslash 42\) & \(\beta\) & 162 & B b \\
\hline chi & X & 143 & \(\chi\) & 163 & C c \\
\hline delta & \(\Delta\) & \(\backslash 44\) & \(\delta\) & 164 & D d \\
\hline epsilo & E & \(\backslash 45\) & \(\varepsilon\) & 165 & Ee \\
\hline phi & Ф & \(\backslash 46\) & \(\varphi\) & 166 & Ff \\
\hline \begin{tabular}{l}
gam \\
ma
\end{tabular} & 「 & \(\backslash 47\) & Y & 167 & G g \\
\hline eta & H & \(\backslash 48\) & \(\eta\) & 168 & H h \\
\hline iota & I & 149 & し & 169 & Ii \\
\hline \begin{tabular}{l}
kapp \\
a
\end{tabular} & K & \4B & K & 16B & K k \\
\hline \[
\begin{aligned}
& \text { lamb } \\
& \text { da }
\end{aligned}
\] & \(\wedge\) & \4C & \(\lambda\) & 16C & LI \\
\hline mu & M & \4D & \(\mu\) & \6D & M m \\
\hline nu & N & \4E & \(v\) & 16E & N n \\
\hline omicr on & 0 & \4F & o & 16F & O o \\
\hline pi & \(\Pi\) & \(\backslash 50\) & \(\pi\) & 170 & P p \\
\hline theta & \(\Theta\) & \(\backslash 51\) & \(\theta\) & 171 & Q q \\
\hline rho & P & \(\backslash 52\) & \(\rho\) & 172 & R r \\
\hline sigma & \(\Sigma\) & \(\backslash 53\) & \(\sigma\) & 173 & S s \\
\hline tau & T & \(\backslash 54\) & \(\tau\) & 174 & Tt \\
\hline upsil on & Y & \(\backslash 55\) & U & 175 & Uu \\
\hline \begin{tabular}{l}
omeg \\
a
\end{tabular} & \(\Omega\) & \(\backslash 57\) & \(\omega\) & 177 & W w \\
\hline xi & 三 & 158 & \(\xi\) & 178 & X x \\
\hline
\end{tabular}
\begin{tabular}{|l|l|l|l|l|l|}
\hline \begin{tabular}{c} 
Nam \\
\(\mathbf{e}\)
\end{tabular} & Upper case & Code & Lowercase & Code & \begin{tabular}{c} 
Roman \\
equivalent
\end{tabular} \\
\hline psi & \(\Psi\) & 159 & \(\Psi\) & 179 & Y y \\
\hline zeta & Z & 15 A & \(\zeta\) & 17 A & Z z \\
\hline
\end{tabular}

TIP For Tedds for Word users:
You can access all Greek characters via Library Access System.
Go to Writing your own custom calculations --> Calculation writing documentation --> Greek characters.

\subsection*{8.3 Mathematical symbols}

Tedds recognizes and uses several mathematical symbols. However, there are some mathematical symbols that do not have a function in calculations. For more information, see the following paragraphs.

NOTE For Tedds for Word users:
The following mathematical symbols are available via the Library Access System.

To access any one the symbols, go to Writing your own custom calculations --> Calculation writing documentation --> Math symbols.

All the characters use Windows Symbol font.
\begin{tabular}{|l|l|l|}
\hline \multicolumn{2}{|c|}{ Mathematical symbols recognized in Tedds } \\
\hline \multicolumn{1}{|c|}{ Name } & \multicolumn{1}{c|}{ Symbol } & \multicolumn{1}{c|}{\begin{tabular}{c} 
Function in \\
calculations
\end{tabular}} \\
\hline minus & - & substract \\
\hline plus & + & add \\
\hline multiply & \(\div\) & multiply \\
\hline divide & I & divide \\
\hline divide & \(=\) & divide \\
\hline equals & \(V()\) & equal to \\
\hline square root & \(<\) & square root \\
\hline less than & \(\leq\) & less than \\
\hline less than or equal to & less than or equal to \\
\hline equal to & \(\neq\) & equal to \\
\hline not equal to & = & not equal to \\
\hline
\end{tabular}
\begin{tabular}{|l|l|l|}
\hline \multicolumn{3}{|c|}{ Mathematical symbols recognized in Tedds } \\
\hline \multicolumn{1}{|c|}{ Name } & \multicolumn{1}{c|}{ Symbol } & \begin{tabular}{c} 
Function in \\
calculations
\end{tabular} \\
\hline greater than or equal to & \(\geq\) & greater than or equal to \\
\hline greater than & \(>\) & greater than \\
\hline
\end{tabular}
\begin{tabular}{|l|l|l|}
\hline \multicolumn{3}{|c|}{ Mathematical symbols not recognized in Tedds } \\
\hline \multicolumn{1}{|c|}{ Name } & \multicolumn{1}{c|}{ Symbol } & \multicolumn{1}{c|}{\begin{tabular}{c} 
Function in \\
calculations
\end{tabular}} \\
\hline approximately equal to & \(\approx\) & no function \\
\hline equivalent to & \(\equiv\) & no function \\
\hline therefore & \(\therefore\) & no function \\
\hline degrees & \(\circ\) & angle unit \\
\hline infinity & \(\infty\) & no function \\
\hline plus/minus & \(\pm\) & no function \\
\hline proportional to & \(\propto\) & no function \\
\hline perpendicular to & \(\perp\) & no function \\
\hline superscript star & \(\star\) & no function \\
\hline
\end{tabular}

\subsection*{8.4 Dimensional analysis}

Dimensional analysis allows you to verify that your calculations are dimensionally correct. The following paragraphs explain how to switch on dimensional analysis, and detail the dimensions of variables that can be used with mathematical operators or functions.

\section*{Switch on dimensional analysis (the Tedds Application)}
1. On the Home tab, click Options.

The Options - Default dialog appears.
2. In the side pane, click Calculating.
3. Select the Perform dimensional checks option.

Switch on dimensional analysis (Tedds for Word)
1. In the Tedds ribbon group, click More --> Tedds Options.

The Options - Default dialog appears.
2. In the side pane, click Calculating.
3. Select the Perform dimensional checks option.

\section*{Operators}

TIP For Tedds for Word users:
You can access most of the operators in the Library Access System. Go to Writing your own custom calculations --> Calculation writing documentation --> Math symbols.
\begin{tabular}{|c|c|c|c|}
\hline \multicolumn{4}{|r|}{Dimensional analysis operators} \\
\hline Fu nct ion & Input dimensi ons & Result dimensions & Example \\
\hline \[
\begin{aligned}
& \mathrm{x}+ \\
& \mathrm{y}= \\
& \mathrm{z} \\
& \mathrm{x}- \\
& \mathrm{y}= \\
& \mathrm{z}
\end{aligned}
\] & \(x\) and \(y\) must have identical dimensio ns & \(z\) has the same dimensions as \(x\) and \(y\) & \((1 m)+(1 m)=2 m\) \\
\hline \[
\begin{aligned}
& x \times \\
& y= \\
& z \\
& x \div \\
& y= \\
& z
\end{aligned}
\] & \(x\) and \(y\) may have any dimensio ns & Dimensions of z result from those of \(x\) and \(y\) being multiplied and divided according to \(\times\) or \(\div\) function & \((1 m) *(1 m)=1 m^{2}\) \\
\hline \[
\begin{array}{|l}
\hline(((\ldots . \\
)))
\end{array}
\] & Any & No change to dimensions & None \\
\hline \[
\begin{aligned}
& y^{x}= \\
& z \\
& 10^{x}
\end{aligned}
\] & \(x\) has to be dimensio nless, y may have any dimensio n & z's dimension exponent is y's dimension altered by exponent x & \((1 m)^{5}=1 m^{5}\) \\
\hline
\end{tabular}

\section*{Functions}

TIP For Tedds for Word users:
You can access most of the operators in the Library Access System. Go to Writing your own custom calculations --> Calculation writing documentation --> Maths functions.
\begin{tabular}{|c|c|c|c|}
\hline \multicolumn{4}{|c|}{General dimensional analysis functions} \\
\hline Function & Input dimensions & Result dimensions & Example \\
\hline \(\operatorname{sqrt}(\mathrm{x})=\mathrm{z}\) & x may have any dimension & z's dimension exponent is x 's halved & \[
\begin{aligned}
& \operatorname{sqrt((1~m}))=1 \\
& \mathrm{~m}^{0.5}
\end{aligned}
\] \\
\hline \[
\begin{aligned}
& \operatorname{abs}(x)=z \\
& \operatorname{int}(x)=z \\
& \operatorname{int}(x, " u n i t ")=z \\
& \operatorname{round}(x, y)=z \\
& \operatorname{round}(x, y, " u n i t s ") \\
& =z \\
& \bmod (x, y)=z \\
& \text { quotient }(x, y)=z
\end{aligned}
\] & \(x\) may have any dimension, \(y\) has to be dimensionless & \(z\) has the same dimension as X & \(\mathrm{abs}((-1 \mathrm{~m})\) ) \(=1 \mathrm{~m}\) \\
\hline \[
\begin{aligned}
& \operatorname{sum}(x, y, z, \ldots)=z \\
& \max (x, y, z, \ldots)=z \\
& \min (x, y, z, \ldots)=z \\
& \operatorname{average}(x, y, z, \ldots)= \\
& z \operatorname{median}(x, y, z, \ldots) \\
& =z
\end{aligned}
\] & All items being considered in the list ( \(x, y, \ldots\) ) must have identical dimensions & z has the same dimensions as \(x\) and \(y\) & \[
\begin{aligned}
& \operatorname{sum}((1 m),(1 m))= \\
& 2 \mathrm{~m}
\end{aligned}
\] \\
\hline rand() \(=\) z & None & z is dimensionless & None \\
\hline
\end{tabular}
\begin{tabular}{|l|l|l|l|}
\hline \multicolumn{4}{|c|}{ Logarithmic and exponential dimensional analysis functions } \\
\hline \multicolumn{1}{|c|}{ Function } & \begin{tabular}{c} 
Input \\
dimensions
\end{tabular} & \begin{tabular}{c} 
Result \\
dimensions
\end{tabular} & Example \\
\hline \(\ln (x)=z\) & \begin{tabular}{l}
\(x\) has to be \\
dimensionless \\
\(\log (x)=z\) \\
\(\exp (x)=z\)
\end{tabular} & \(z\) is dimensionless & None \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|c|}
\hline \multicolumn{4}{|c|}{Trigonometric dimensional analysis functions} \\
\hline Function & Input dimensions & Result dimensions & Example \\
\hline degrees \((x, y, z)=a\) & \begin{tabular}{l}
\(x, y\) and \(z\) have to be dimensionless. \\
\(x\) can be in degrees or radians because those units are dimensionless.
\end{tabular} & \(a\) is dimensionless, but may be in degrees or radians since they are dimensionless & \[
\begin{aligned}
& \text { degrees }((1,30,0)= \\
& 1.5^{\circ}
\end{aligned}
\] \\
\hline \[
\begin{aligned}
& \sin (x)=z \\
& \cos (x)=z \\
& \tan (x)=z \\
& \operatorname{cosec}(x)=z \\
& \sec (x)=z \\
& \cot (x)=z
\end{aligned}
\] & x has to be dimensionless because degrees and radians are dimensionless & z is dimensionless & \(\sin \left(90^{\circ}\right)=1\) \\
\hline \[
\begin{aligned}
& \operatorname{asin}(x)=z \operatorname{acos}(x) \\
& =z \operatorname{atan}(x)=z
\end{aligned}
\] & \(x\) has to be dimensionless & z is dimensionless - but may be in degrees or radians since they are dimensionless & \(\operatorname{asin}(1)=90^{\circ}\) \\
\hline
\end{tabular}
\begin{tabular}{|l|l|l|l|}
\hline \multicolumn{4}{|c|}{ Hyperbolic dimensional analysis functions } \\
\hline \multicolumn{1}{|c|}{ Function } & \begin{tabular}{c} 
Input \\
dimensions
\end{tabular} & \begin{tabular}{c} 
Result \\
dimensions
\end{tabular} & Example \\
\hline \(\sinh (x)=z\) & \begin{tabular}{l}
\(x\) has to be \\
dimensionless \\
\(\cosh (x)=z\)
\end{tabular} & \(z\) is dimensionless & None \\
\(\tanh (x)=z\) & & & \\
\(\operatorname{asinh}(x)=z\) & & & \\
\(\operatorname{acosh}(x)=z\) & & & \\
\(\operatorname{atanh}(x)=z\) & & & \\
\hline
\end{tabular}
\begin{tabular}{|l|l|l|l|}
\hline \multicolumn{4}{|c|}{ Logical dimensional analysis functions } \\
\hline \multicolumn{1}{|c|}{ Function } & \multicolumn{1}{|c|}{\begin{tabular}{l} 
Input \\
dimensions
\end{tabular}} & \multicolumn{1}{c|}{\begin{tabular}{c} 
Result \\
dimensions
\end{tabular}} & Example \\
\hline \begin{tabular}{lll} 
if(condition, \(x, y)\) \\
and \((x, y, z, \ldots)\) \\
\((x \& \& y)\) or \\
\((x, y, z, \ldots)\)
\end{tabular} & \begin{tabular}{l} 
All logical \\
comparisons \\
must be between \\
values with \\
identical \\
dimensions
\end{tabular} & \begin{tabular}{l} 
No change to \\
dimensions, true \\
and false are \\
dimensionless
\end{tabular} & None \\
dim & & \\
\hline
\end{tabular}
\begin{tabular}{|l|l|l|l|}
\hline \multicolumn{4}{|c|}{ Logical dimensional analysis functions } \\
\hline \multicolumn{1}{|c|}{ Function } & \begin{tabular}{c} 
Input \\
dimensions
\end{tabular} & \begin{tabular}{c} 
Result \\
dimensions
\end{tabular} & Example \\
\hline\(x>y\) & & & \\
\(x>=y, x \geq y\) & & & \\
\(x==y\) & & & \\
\(x<>y, x \neq y\) & & & \\
\(x<=y, x \leq y\) & & & \\
\(x<y\) & & & \\
\hline
\end{tabular}

\subsection*{8.5 Result formats and precision}

You can define both the format and precision of final and intermediate results. For more information on the available formats and precision options, see the following paragraphs.

\section*{Format strings}

To define a non-default format of results, after the appropriate results symbol, type:
1. A letter to define the format
2. A number to define the precision of the results (not applicable to the Output format)
See the valid letters to define the format in the table below:
\begin{tabular}{|l|l|}
\hline \multicolumn{1}{|c|}{ Letter } & \\
\hline F & Fixed format \\
\hline \(\mathbf{S}\) & Scientific format \\
\hline \(\mathbf{G}\) & General format \\
\hline \(\mathbf{E}\) & Engineering format \\
\hline \(\mathbf{O}\) & Output format \\
\hline
\end{tabular}

The number after the letter indicates the precision of the required results, and should be in the range 15 to -15 .
- A positive number indicates the required number of decimal places or significant figures.
- A negative number indicates that the result is to be rounded to the nearest value, which depends on the magnitude of the negative number ( -1 signifies 10, -2 signifies 100, -3 signifies 1000 , and so on).

General and scientific formats are identical for numbers \(\geq 10^{7}\) and \(\geq 10^{-7}\). Otherwise, the general format is similar to the fixed format, except that any trailing zeros after the decimal point are removed.

The engineering format gives a number between 1 and \(999 \times 10\) ? where ? is a multiple of 3 ( \(3,6,9,-3\) and so on).

The following examples show some typical formats:
- ?E3 - final results field, engineering format, 3 significant figures
- \#2 - intermediate results field, default format, 2 decimal places / significant figures
- ?S-3 - final results field, scientific format, rounded to the nearest 1000

\section*{When is Output format used?}

Output ( \(O\) ) is a special result format for transferring numeric values as strings which ensures that precision is maintained for data Input/Output operations or interoperability with other software applications.
It should be noted that none of the other result formats (Fixed, General, Scientific and Engineering) guarantee to maintain precision when exporting data.

\section*{Example formats}

See examples of the different format settings in the tables below.
Large numbers, for example: \(1065.1 \times 10^{16}\)
\begin{tabular}{|c|c|c|c|c|c|}
\hline \begin{tabular}{l}
Deci \\
mal place s or signif icant figur es
\end{tabular} & Fixed format (decimal places) & Scientifi c format (decima I places) & General format (decima I places) & Enginee ring format (signific ant figures) & Output format (significant figures) \\
\hline -3 & \[
\begin{aligned}
& 106510000000000 \\
& 00000
\end{aligned}
\] & \[
\begin{aligned}
& 1.065 \times \\
& 10^{19}
\end{aligned}
\] & \[
\begin{aligned}
& 1.065 \times \\
& 10^{19}
\end{aligned}
\] & \[
\begin{aligned}
& 10.7 \times \\
& 10^{18}
\end{aligned}
\] & \[
\begin{aligned}
& 106510000000000 \\
& 00000
\end{aligned}
\] \\
\hline -2 & \[
\begin{aligned}
& 106510000000000 \\
& 00000
\end{aligned}
\] & \[
\begin{aligned}
& 1.07 \times \\
& 10^{19}
\end{aligned}
\] & \[
\begin{aligned}
& 1.07 \times \\
& 10^{19}
\end{aligned}
\] & \[
\begin{array}{|l|l}
\hline 11 \times \\
10^{18}
\end{array}
\] & \[
\begin{aligned}
& 106510000000000 \\
& 00000
\end{aligned}
\] \\
\hline -1 & \[
\begin{aligned}
& 106510000000000 \\
& 00000
\end{aligned}
\] & \[
\begin{aligned}
& 1.1 \times \\
& 10^{19}
\end{aligned}
\] & \[
\begin{aligned}
& 1.1 \times \\
& 10^{19}
\end{aligned}
\] & \[
\begin{array}{|l|l}
\hline 10 \times \\
10^{18}
\end{array}
\] & \[
\begin{aligned}
& 106510000000000 \\
& 00000
\end{aligned}
\] \\
\hline 0 & \[
\begin{aligned}
& 106510000000000 \\
& 00000
\end{aligned}
\] & \(1 \times 10^{19}\) & \(1 \times 10^{19}\) & \[
\begin{array}{|l|l}
\hline 10 \times \\
10^{18}
\end{array}
\] & \[
\begin{aligned}
& 106510000000000 \\
& 00000
\end{aligned}
\] \\
\hline 1 & \[
\begin{aligned}
& 106510000000000 \\
& 00000
\end{aligned}
\] & \[
\begin{aligned}
& 1.1 \times \\
& 10^{19}
\end{aligned}
\] & \[
\begin{aligned}
& 1.1 \times \\
& 10^{19}
\end{aligned}
\] & \[
\begin{array}{|l|l}
\hline 10 \times \\
10^{18}
\end{array}
\] & \[
\begin{aligned}
& 106510000000000 \\
& 00000
\end{aligned}
\] \\
\hline
\end{tabular}
\begin{tabular}{|l|l|l|l|l|l|}
\hline \begin{tabular}{c} 
Deci \\
mal \\
place \\
s or \\
signif \\
icant \\
figur \\
es
\end{tabular} & \begin{tabular}{c} 
Fixed format \\
(decimal places)
\end{tabular} & \begin{tabular}{c} 
Scientifi \\
c \\
format
\end{tabular} & \begin{tabular}{c} 
General \\
format \\
(decima \\
(decima \\
I places) \\
places)
\end{tabular} & \begin{tabular}{c} 
Enginee \\
ring \\
format \\
(signific \\
ant \\
figures)
\end{tabular} & \begin{tabular}{c} 
Output format \\
(significant \\
figures)
\end{tabular} \\
\hline 2 & 106510000000000 & \(1.07 \times\) & \(1.07 \times\) & \(11 \times\) & 106510000000000 \\
& 00000 & \(10^{19}\) & \(10^{19}\) & \(10^{18}\) & 00000 \\
\hline 3 & 106510000000000 & \(1.065 \times\) & \(1.065 \times\) & \(10.7 \times\) & 106510000000000 \\
& 00000 & \(10^{19}\) & \(10^{19}\) & \(10^{18}\) & 00000 \\
\hline 4 & \begin{tabular}{l}
106510000000000
\end{tabular} & \begin{tabular}{l}
\(1.0651 \times\) \\
00000
\end{tabular} & \(1.065 \times\) & \(10.65 \times\) & 106510000000000 \\
\hline
\end{tabular}

Small numbers, for example: \(7.8831 \times 10^{-15}\)
\begin{tabular}{|l|l|l|l|l|l|}
\hline \begin{tabular}{c} 
Decimal \\
places or \\
significa \\
nt \\
figures
\end{tabular} & \begin{tabular}{c} 
Fixed \\
format \\
(decimal \\
places)
\end{tabular} & \begin{tabular}{c} 
Scientific \\
format \\
(decimal \\
places)
\end{tabular} & \begin{tabular}{c} 
General \\
format \\
(decimal \\
places)
\end{tabular} & \begin{tabular}{c} 
Engineering \\
format \\
(significant \\
figures)
\end{tabular} & \begin{tabular}{c} 
Output \\
format \\
(significant \\
figures)
\end{tabular} \\
\hline-3 & 0 & \(7.883 \times 10^{-15}\) & 0 & \(7.88 \times 10^{-15}\) & \begin{tabular}{l}
0.0000000000 \\
000078831
\end{tabular} \\
\hline-2 & 0 & \(7.88 \times 10^{-15}\) & 0 & \(7.9 \times 10^{-15}\) & \begin{tabular}{l}
0.0000000000 \\
000078831
\end{tabular} \\
\hline-1 & 0 & \(7.9 \times 10^{-15}\) & 0 & \(8 . \times 10^{-15}\) & \begin{tabular}{l}
0.0000000000 \\
000078831
\end{tabular} \\
\hline 0 & 0 & \(8 \times 10^{-15}\) & 0 & \(8 . \times 10^{-15}\) & \begin{tabular}{l}
0.0000000000 \\
000078831
\end{tabular} \\
\hline 1 & 0.0 & \(7.9 \times 10^{-15}\) & 0 & \(8 . \times 10^{-15}\) & 0.0000000000 \\
\hline 2 & 0.00 & \(7.88 \times 10^{-15}\) & 0 & \(7.9 \times 10^{-15}\) & \begin{tabular}{l}
0.000000000000 \\
000078831
\end{tabular} \\
\hline 3 & 0.000 & \(7.883 \times 10^{-15}\) & 0 & \(7.88 \times 10^{-15}\) & 0.0000000000 \\
\hline & 0.0000 & \(7.8831 \times 10^{-15}\) & 0 & \(7.883 \times 10^{-15}\) & \begin{tabular}{l}
0.00000000000 \\
000078831
\end{tabular} \\
\hline 4 & & & & & \\
\hline
\end{tabular}

Normal numbers, for example: 0.8396
\begin{tabular}{|l|l|l|l|l|l|}
\hline \begin{tabular}{c} 
Decima \\
I places \\
or \\
signific \\
ant \\
figures
\end{tabular} & \begin{tabular}{c} 
Fixed \\
format \\
(decimal \\
places)
\end{tabular} & \begin{tabular}{c} 
Scientific \\
format \\
(decimal \\
places)
\end{tabular} & \begin{tabular}{c} 
General \\
format \\
(decimal \\
places)
\end{tabular} & \begin{tabular}{c} 
Engineerin \\
gformat \\
(significant \\
figures)
\end{tabular} & \begin{tabular}{c} 
Output \\
format \\
(significant \\
figures)
\end{tabular} \\
\hline-3 & 0 & \(8.396 \times 10^{-1}\) & 0 & \(840 \times 10^{-3}\) & 0.8396 \\
\hline-2 & 0 & \(8.40 \times 10^{-1}\) & 0 & \(840 \times 10^{-3}\) & 0.8396 \\
\hline-1 & 0 & \(8.4 \times 10^{-1}\) & 0 & \(800 \times 10^{-3}\) & 0.8396 \\
\hline 0 & 1 & \(8 \times 10^{-1}\) & 1 & \(800 \times 10^{-3}\) & 0.8396 \\
\hline 1 & 0.8 & \(8.4 \times 10^{-1}\) & 0.8 & \(800 \times 10^{-3}\) & 0.8396 \\
\hline 2 & 0.84 & \(8.40 \times 10^{-1}\) & 0.84 & \(840 \times 10^{-3}\) & 0.8396 \\
\hline 3 & 0.840 & \(8.396 \times 10^{-1}\) & 0.84 & \(840 \times 10^{-3}\) & 0.8396 \\
\hline 4 & 0.8396 & \(8.3960 \times\) & 0.8396 & \(839.6 \times 10^{-3}\) & 0.8396 \\
\hline
\end{tabular}

Normal numbers, for example: 8396
\begin{tabular}{|l|l|l|l|l|l|}
\hline \begin{tabular}{c} 
Decima \\
I places \\
or
\end{tabular} & \begin{tabular}{c} 
Fixed \\
format \\
signific \\
ant \\
figures
\end{tabular} & \begin{tabular}{c} 
Scimal \\
places)
\end{tabular} & \begin{tabular}{c} 
format \\
(decimal \\
places)
\end{tabular} & \begin{tabular}{c} 
General \\
format \\
(decimal \\
places)
\end{tabular} & \begin{tabular}{c} 
Engineerin \\
g format \\
(significant \\
figures)
\end{tabular} \\
\hline-3 & 8000 & \(8.396 \times 10^{3}\) & \begin{tabular}{c} 
Output \\
format \\
(significant \\
figures)
\end{tabular} \\
\hline-2 & 8400 & \(8.40 \times 10^{3}\) & 8400 & \(8.40 \times 10^{3}\) & 8396 \\
\hline-1 & 8400 & \(8.4 \times 10^{3}\) & 8400 & \(8 \times 10^{3}\) & 8396 \\
\hline 0 & 8396 & \(8 \times 10^{3}\) & 8396 & \(8 \times 10^{3}\) & 8396 \\
\hline 1 & 8396.0 & \(8.4 \times 10^{3}\) & 8396 & \(8 \times 10^{3}\) & 8396 \\
\hline 2 & 8396.00 & \(8.40 \times 10^{3}\) & 8396 & \(8.4 \times 10^{3}\) & 8396 \\
\hline 3 & 8396.000 & \(8.396 \times 10^{3}\) & 8396 & \(8.40 \times 10^{3}\) & 8396 \\
\hline 4 & 8396.0000 & \(8.3960 \times 10^{3}\) & 8396 & \(8.396 \times 10^{3}\) & 8396 \\
\hline
\end{tabular}

\section*{See also}

Define result formats (page 345)

\subsection*{8.6 Units}

Tedds performs your calculations using its base units, but you can define values and obtain calculation results in any previously defined units. The following paragraphs list all previously defined units that are supplied with Tedds.

Please note the following features of Tedds units:
- Units are case sensitive and must be defined exactly as shown below.
- All intermediate results are given in Tedds base units.
- All units must be preceded and followed by a space, an operator, or a delimiter.
- If you define units within the body of an expression, place them in parentheses with their associated value to avoid ambiguity. For example, \(x\) \(+(4 \mathrm{~mm})\).
- You must define \(1 /\) unit as unit \(^{-1}\). \(\mathrm{m} / \mathrm{s}\) is acceptable, but \(1 / \mathrm{s}\) should be defined as \(s^{-1}\).
- The system does not recognize the multiplication of two units. Therefore, units like Nms are not recognized unless you have manually entered them in the unit database.
- You may alter the contents of the units database using the available unit functions. For more information, see Unit functions.

\section*{Base units of Tedds}

NOTE The values shown in the following table are rounded for esthetic reasons.
In Tedds, all values are held to an accuracy of 15 decimal places. If you want to see the full value, place a calculation in your document and set a precision of 15 decimal places.

\section*{Tedds base}
units
\begin{tabular}{|l|l|l|l|}
\hline \multicolumn{3}{|c|}{ Base units of Tedds } \\
\hline \multicolumn{1}{|c|}{ Unit } & \multicolumn{1}{|c|}{ US imperial } & \multicolumn{1}{|c|}{ SI metric } & \multicolumn{1}{c|}{ Dimension } \\
\hline \begin{tabular}{l} 
Lengt \\
h
\end{tabular} & 1 ft & 1 m & 1 L \\
\hline Mass & 1 slugs & 1 kg & 1 M \\
\hline Time & 1 s & 1 s & 1 T \\
\hline \begin{tabular}{l} 
Temp \\
eratur \\
e
\end{tabular} & \(1^{\circ} \mathrm{C}\) & \(1^{\circ} \mathrm{C}\) & 1 D \\
\hline Angle & \begin{tabular}{l}
\(1^{\circ}, 1\) deg, 1 \\
degs
\end{tabular} & \(1^{\circ}, 1\) deg, 1 degs & Dimensionless \\
\hline
\end{tabular}

NOTE Degrees are used as the angular base unit in Tedds because structural engineering calculations typically use degrees and not radians. In the majority of cases this simplifies calculations. It does however mean than when working with circular sectors and calculating length * rad that additional conversion factors must be incorporated into the calculations.

\section*{Derived units: SI metric}

In addition to the base units, Tedds contains a series of derived units. The complete list of units provided with Tedds are given in the following tables.

NOTE For Tedds for Word users:
All units listed in the following tables that require special characters are available in Library Access System. Go to Writing your own custom calculations --> Calculation writing documentation --> SI units.
In addition, the units are listed in the TeddsUnits.doc file, which is located in the directory where you installed Tedds for Word.
\begin{tabular}{|l|l|l|}
\hline \multicolumn{3}{c|}{ Angle units } \\
\hline \multicolumn{1}{|c|}{ Unit } & \multicolumn{1}{c|}{ Tedds base unit } & \multicolumn{1}{c|}{ Dimension } \\
\hline rad & \(180 / \pi\) degs & Dimensionless \\
\hline rads & \(180 / \pi\) degs & Dimensionless \\
\hline
\end{tabular}
\begin{tabular}{|l|l|l|}
\hline \multicolumn{3}{|c|}{ Length units } \\
\hline \multicolumn{1}{|c|}{ Unit } & \multicolumn{2}{c|}{ Tedds base unit } \\
\hline mm & 0.0001 m & L \\
\hline cm & 0.01 m & L \\
\hline dm & 0.1 m & L \\
\hline km & 1000 m & L \\
\hline in & 0.0254 m & L \\
\hline ft & 0.3048 m & L \\
\hline yd & 0.9144 m & L \\
\hline mi & 1609.344 m & L \\
\hline
\end{tabular}
\begin{tabular}{|l|l|ll|}
\hline \multicolumn{4}{|c|}{ Mass units } \\
\hline \multicolumn{1}{|c|}{ Unit } & \multicolumn{1}{|c|}{ Tedds base unit } & \multicolumn{1}{c|}{ Dimension } \\
\hline gm & 0.001 kg & M & \\
\hline t & 1000 kg & M \\
\hline tonne & 1000 kg & M \\
\hline
\end{tabular}
\begin{tabular}{|l|l|ll|}
\hline \multicolumn{4}{|c|}{ Mass units } \\
\hline \multicolumn{1}{|c|}{ Unit } & \multicolumn{1}{|c|}{ Tedds base unit } & \multicolumn{1}{c|}{ Dimension } \\
\hline oz & 0.0283495 kg & M & \\
\hline lb & 0.45359247 kg & M \\
\hline ton & 1016.047 kg & M \\
\hline US_ton & 907.185 kg & M \\
\hline
\end{tabular}
\begin{tabular}{|l|l|ll|}
\hline \multicolumn{4}{|c|}{ Time units } \\
\hline \multicolumn{1}{|c|}{ Unit } & \multicolumn{1}{|c|}{ Tedds base unit } & & Dimension \\
\hline min & 60 s & T & \\
\hline hr & 3600 s & T \\
\hline day & 86400 s & T \\
\hline yr & 31556926 s & T \\
\hline
\end{tabular}
\begin{tabular}{|l|l|ll|}
\hline \multicolumn{4}{|c|}{ Frequency units } \\
\hline \multicolumn{1}{|c|}{ Unit } & \multicolumn{1}{|c|}{ Tedds base unit } & & Dimension \\
\hline Hz & \(1 \mathrm{~s}^{-1}\) & \(\mathrm{~T}^{-1}\) & \\
\hline kHz & \(1000 \mathrm{~s}^{-1}\) & \(\mathrm{~T}^{-1}\) & \\
\hline MHz & \(10^{6} \mathrm{~s}^{-1}\) & \(\mathrm{~T}^{-1}\) & \\
\hline GHz & \(10^{9} \mathrm{~s}^{-1}\) & \(\mathrm{~T}^{-1}\) & \\
\hline
\end{tabular}
\begin{tabular}{|l|l|ll|}
\hline \multicolumn{4}{c|}{ Velocity units } \\
\hline \multicolumn{1}{|c|}{ Units } & \multicolumn{1}{|c|}{ Tedds base unit } & \multicolumn{1}{c|}{ Dimension } \\
\hline kph & \(0.277777778 \mathrm{~m} / \mathrm{s}\) & \(\mathrm{LT}^{-1}\) & \\
\hline mph & \(0.4470398 \mathrm{~m} / \mathrm{s}\) & \(\mathrm{LT}^{-1}\) & \\
\hline
\end{tabular}
\begin{tabular}{|l|l|ll|}
\hline \multicolumn{4}{c|}{ Area units } \\
\hline \multicolumn{1}{|c|}{ Units } & \multicolumn{1}{|c|}{ Tedds base unit } & & Dimension \\
\hline hectare & \(10^{4} \mathrm{~m}^{2}\) & \(\mathrm{~L}^{2}\) & \\
\hline acre & \(4046.8564 \mathrm{~m}^{2}\) & \(\mathrm{~L}^{2}\) & \\
\hline
\end{tabular}
\begin{tabular}{|l|l|l|}
\hline \multicolumn{4}{c|}{ Volume units } \\
\hline \multicolumn{1}{|c|}{ Unit } & \multicolumn{1}{|c|}{ Tedds base unit } & \multicolumn{1}{c|}{ Dimension } \\
\hline ml & \(10^{-6} \mathrm{~m}^{3}\) & \(\mathrm{~L}^{3}\) \\
\hline I & \(10^{-3} \mathrm{~m}^{3}\) & \(\mathrm{~L}^{3}\) \\
\hline floz & \(0.00002841306 \mathrm{~m}^{3}\) & \(\mathrm{~L}^{3}\) \\
\hline gal & \(0.00454609 \mathrm{~m}^{3}\) & \(\mathrm{~L}^{3}\) \\
\hline gallon & \(0.00454609 \mathrm{~m}^{3}\) & \(\mathrm{~L}^{3}\) \\
\hline
\end{tabular}
\begin{tabular}{|l|l|ll|}
\hline \multicolumn{4}{|c|}{ Volume units } \\
\hline \multicolumn{1}{|c|}{ Unit } & \multicolumn{1}{|c|}{ Tedds base unit } & & Dimension \\
\hline US_gal & \(0.00363686 \mathrm{~m}^{3}\) & \(\mathrm{~L}^{3}\) & \\
\hline US_gallon & \(0.00363686 \mathrm{~m}^{3}\) & \(\mathrm{~L}^{3}\) & \\
\hline
\end{tabular}
\begin{tabular}{|l|l|l|}
\hline \multicolumn{3}{c|}{ Force units } \\
\hline \multicolumn{1}{|c|}{ Unit } & \multicolumn{1}{|c|}{ Tedds base unit } & \multicolumn{1}{c|}{ Dimension } \\
\hline N & \(1 \mathrm{kgm} / \mathrm{s}^{2}\) & \(\mathrm{MLT}^{-2}\) \\
\hline kN & \(1000 \mathrm{kgm} / \mathrm{s}^{2}\) & \(\mathrm{MLT}^{-2}\) \\
\hline MN & \(106 \mathrm{kgm} / \mathrm{s}^{2}\) & \(\mathrm{MLT}^{-2}\) \\
\hline kgf & \(9.81 \mathrm{kgm} / \mathrm{s}^{2}\) & \(\mathrm{MLT}^{-2}\) \\
\hline tf & \(9810 \mathrm{kgm} / \mathrm{s}^{2}\) & \(\mathrm{MLT}^{-2}\) \\
\hline dyne & \(10-5 \mathrm{kgm} / \mathrm{s}^{2}\) & \(\mathrm{MLT}^{-2}\) \\
\hline lbf & \(4.4497414 \mathrm{kgm} / \mathrm{s}^{2}\) & \(\mathrm{MLT}^{-2}\) \\
\hline tonf & \(9967.4207 \mathrm{kgm} / \mathrm{s}^{2}\) & \(\mathrm{MLT}^{-2}\) \\
\hline kip & \(4449.7414 \mathrm{kgm} / \mathrm{s}^{2}\) & \(\mathrm{MLT}^{-2}\) \\
\hline kips & \(4449.7414 \mathrm{kgm} / \mathrm{s}^{2}\) & \(\mathrm{MLT}^{-2}\) \\
\hline
\end{tabular}
\begin{tabular}{|l|l|ll|}
\hline \multicolumn{4}{|c|}{ Moment units } \\
\hline \multicolumn{1}{|c|}{ Unit } & \multicolumn{1}{|c|}{ Tedds base unit } & \multicolumn{1}{c|}{ Dimension } \\
\hline Nmm & \(10^{-3} \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-2}\) & \\
\hline kNm & \(1000 \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-2}\) & \\
\hline MNm & \(10^{6} \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-2}\) \\
\hline kip ft & \(1356.2812 \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2} T^{-2}\) \\
\hline kip_in & \(113.023430 \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-2}\) \\
\hline
\end{tabular}
\begin{tabular}{|l|l|ll|}
\hline \multicolumn{4}{|c|}{ Energy units } \\
\hline \multicolumn{1}{|c|}{ Unit } & \multicolumn{1}{|c|}{ Tedds base unit } & \multicolumn{1}{c|}{ Dimension } \\
\hline J & \(1 \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-2}\) & \\
\hline kJ & \(1000 \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-2}\) \\
\hline erg & \(10^{-7} \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2} T^{-2}\) \\
\hline MJ & \(10^{6} \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-2}\) \\
\hline GJ & \(10^{9} \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-2}\) \\
\hline
\end{tabular}
\begin{tabular}{|l|l|ll|}
\hline \multicolumn{4}{|c|}{ Power units } \\
\hline Unit & Tedds base unit & & Dimension \\
\hline W & \(1 \mathrm{kgm}^{2} / \mathrm{s}^{3}\) & \(\mathrm{ML}^{2} T^{-3}\) & \\
\hline
\end{tabular}
\begin{tabular}{|l|l|ll|}
\hline \multicolumn{4}{|c|}{ Power units } \\
\hline \multicolumn{1}{|c|}{ Unit } & \multicolumn{1}{|c|}{ Tedds base unit } & \multicolumn{1}{c|}{ Dimension } \\
\hline kW & \(1000 \mathrm{kgm}^{2} / \mathrm{s}^{3}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-3}\) & \\
\hline MW & \(10^{6} \mathrm{kgm}^{2} / \mathrm{s}^{3}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-3}\) & \\
\hline
\end{tabular}
\begin{tabular}{|l|l|l|}
\hline \multicolumn{3}{c|}{ Stress and pressure units } \\
\hline \multicolumn{1}{|c|}{ Unit } & \multicolumn{1}{c|}{ Tedds base unit } & \multicolumn{1}{c|}{\(\quad\) Dimension } \\
\hline Pa & \(1 \mathrm{~kg} / \mathrm{s}^{2} / \mathrm{m}\) & \(\mathrm{ML}^{-1} \mathrm{~T}^{-2}\) \\
\hline kPa & \(1000 \mathrm{~kg} / \mathrm{s}^{2} / \mathrm{m}\) & \(\mathrm{ML}^{-1} \mathrm{~T}^{-2}\) \\
\hline MPa & \(10^{6} \mathrm{~kg} / \mathrm{s}^{2} / \mathrm{m}\) & \(\mathrm{ML}^{-1} \mathrm{~T}^{-2}\) \\
\hline GPa & \(10^{9} \mathrm{~kg} / \mathrm{s}^{2} / \mathrm{m}\) & \(\mathrm{ML}^{-1} \mathrm{~T}^{-2}\) \\
\hline bar & \(10^{5} \mathrm{~kg} / \mathrm{s}^{2} / \mathrm{m}\) & \(\mathrm{ML}^{-1 \mathrm{~T}^{-2}}\) \\
\hline bars & \(10^{5} \mathrm{~kg} / \mathrm{s}^{2} / \mathrm{m}\) & \(\mathrm{ML}^{-1 \mathrm{~T}^{-2}}\) \\
\hline \(\mathrm{~m}_{\text {water }}\) & \(\mathrm{kg} / \mathrm{s}^{2} / \mathrm{m}\) & \(\mathrm{ML}^{-1 \mathrm{~T}^{-2}}\) \\
\hline \(\mathrm{~mm}_{\text {water }}\) & \(\mathrm{kg} / \mathrm{s}^{2} / \mathrm{m}\) & \(\mathrm{ML}^{-1 \mathrm{~T}^{-2}}\) \\
\hline \(\mathrm{mH}_{2} \mathrm{O}\) & \(\mathrm{kg} / \mathrm{s}^{2} / \mathrm{m}\) & \(\mathrm{ML}^{-1 \mathrm{~T}^{-2}}\) \\
\hline \(\mathrm{mmH} \mathrm{H}_{2} \mathrm{O}\) & \(\mathrm{kg} / \mathrm{s}^{2} / \mathrm{m}\) & \(\mathrm{ML}^{-1 \mathrm{~T}^{-2}}\) \\
\hline ksi & \(\mathrm{kg} / \mathrm{s}^{2} / \mathrm{m}\) & \(\mathrm{ML}^{-1 \mathrm{~T}^{-2}}\) \\
\hline psi & \(\mathrm{kg} / \mathrm{s}^{2} / \mathrm{m}\) & \(\mathrm{ML}^{-1 \mathrm{~T}^{-2}}\) \\
\hline psf & \(\mathrm{kg} / \mathrm{s}^{2} / \mathrm{m}\) & \(\mathrm{ML}^{-1 \mathrm{~T}^{-2}}\) \\
\hline
\end{tabular}
\begin{tabular}{|l|l|ll|}
\hline \multicolumn{4}{|c|}{ Temperature units } \\
\hline \multicolumn{1}{|c|}{ Unit } & \multicolumn{1}{|c|}{ Tedds base unit } & & Dimension \\
\hline Cday & \(86400 \mathrm{~s}^{\circ} \mathrm{C}\) & \(\mathrm{T}^{\circ} \mathrm{C}\) & \\
\hline\({ }^{\circ} \mathrm{C}\) day & \(86400 \mathrm{~s}^{\circ} \mathrm{C}\) & \(\mathrm{T}^{\circ} \mathrm{C}\) & \\
\hline
\end{tabular}

NOTE The units in the Electrical units table are based around a definition of a coulomb as a dimensionless unit.
For all practical purposes, the following definitions are sufficient to ensure that calculations and dimensional checking work correctly in Tedds.

However, in rare cases, combining the following units with other dimensionless units can mean that the dimensional analysis fails to detect errors.
\begin{tabular}{|l|l|l|}
\hline \multicolumn{3}{|c|}{ Electrical units } \\
\hline \multicolumn{1}{|c|}{ Unit } & \multicolumn{1}{|c|}{ Tedds base unit } & \multicolumn{1}{c|}{ Dimension } \\
\hline coul & Not applicable & Dimensionless \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|r|}{Electrical units} \\
\hline Unit & Tedds base unit & Dimension \\
\hline amp & \(\mathrm{s}^{-1}\) & \(\mathrm{T}^{-1}\) \\
\hline A & \(\mathrm{s}^{-1}\) & \(\mathrm{T}^{-1}\) \\
\hline kA & \(10^{3} \mathrm{~s}^{-1}\) & \(\mathrm{T}^{-1}\) \\
\hline mA & \(10^{-3} \mathrm{~s}^{-1}\) & \(\mathrm{T}^{-1}\) \\
\hline \(\mu \mathrm{A}\) & \(10^{-6} \mathrm{~s}^{-1}\) & \(\mathrm{T}^{-1}\) \\
\hline V & \(\mathrm{kg} \mathrm{m}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2} \mathrm{~T}-2\) \\
\hline volt & \(\mathrm{kg} \mathrm{m}^{2} / \mathrm{s}^{2}\) & ML \({ }^{2} \mathrm{~T}-2\) \\
\hline mV & \(10^{-3} \mathrm{~kg} \mathrm{~m}^{2} / \mathrm{s}^{2}\) & ML \({ }^{\text {T }}\) - -2 \\
\hline kV & \(10^{3} \mathrm{~kg} \mathrm{~m}^{2} / \mathrm{s}^{2}\) & ML \({ }^{2} \mathrm{~T}-2\) \\
\hline ohm & \(\mathrm{kg} \mathrm{m}^{2} / \mathrm{s}\) & ML \({ }^{2} \mathrm{~T}-1\) \\
\hline W & \(\mathrm{kg} \mathrm{m}^{2} / \mathrm{s}\) & ML \({ }^{2} \mathrm{~T}-1\) \\
\hline k \(\Omega\) & \(10^{3} \mathrm{~kg} \mathrm{~m}^{2} / \mathrm{s}\) & \(\mathrm{ML}^{2} \mathrm{~T}-1\) \\
\hline \(\mathrm{M} \Omega\) & \(10^{6} \mathrm{~kg} \mathrm{~m}^{2} / \mathrm{s}\) & \(\mathrm{ML}^{2} \mathrm{~T}-1\) \\
\hline mho & \(\mathrm{kg}-1 \mathrm{~m}^{-2} \mathrm{~s}\) & \(\mathrm{M}^{-1} \mathrm{~L}^{-2} \mathrm{~T}\) \\
\hline siemens & \(\mathrm{kg}-1 \mathrm{~m}^{-2} \mathrm{~s}\) & \(\mathrm{M}^{-1} \mathrm{~L}^{-2 \mathrm{~T}}\) \\
\hline weber & \(\mathrm{kg} \mathrm{m}^{2} / \mathrm{s}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-1}\) \\
\hline henry & kg m \({ }^{2}\) & ML \({ }^{2}\) \\
\hline H & \(\mathrm{kg} \mathrm{m}^{2}\) & ML \({ }^{2}\) \\
\hline mH & \(10^{-3} \mathrm{~kg} \mathrm{~m}^{2}\) & ML \({ }^{2}\) \\
\hline \(\mu \mathrm{H}\) & \(10^{-6} \mathrm{~kg} \mathrm{~m}^{2}\) & ML \({ }^{2}\) \\
\hline tesla & kg/s & \(\mathrm{MT}^{-1}\) \\
\hline gauss & \(10^{-4} \mathrm{~kg} / \mathrm{s}\) & \(\mathrm{MT}^{-1}\) \\
\hline oersted & 79.577472 1/ms & \(\mathrm{M}^{-1} \mathrm{~T}^{-1}\) \\
\hline farad & \(\mathrm{kg}^{-1} \mathrm{~m}^{-2} \mathrm{~s}^{2}\) & \(\mathrm{M}^{-1} \mathrm{~L}^{-2} \mathrm{~T}^{2}\) \\
\hline F & \(\mathrm{kg}^{-1} \mathrm{~m}^{-2} \mathrm{~s}^{2}\) & \(\mathrm{M}^{-1} L^{-2} \mathrm{~T}^{2}\) \\
\hline pF & \(10^{-12} \mathrm{~kg}^{-1} \mathrm{~m}^{-2} \mathrm{~s}^{2}\) & \(\mathrm{M}^{-1} \mathrm{~L}^{-2 \mathrm{~T}^{2}}\) \\
\hline nF & \(10^{-9} \mathrm{~kg}^{-1} \mathrm{~m}^{-2} \mathrm{~s}^{2}\) & \(M^{-1} L^{-2} T^{2}\) \\
\hline \(\mu \mathrm{F}\) & \(10^{-6} \mathrm{~kg}^{-1} \mathrm{~m}^{-2} \mathrm{~s}^{2}\) & \(\mathrm{M}^{-1} \mathrm{~L}^{-2} \mathrm{~T}^{2}\) \\
\hline
\end{tabular}
\begin{tabular}{|l|l|r|}
\hline \multicolumn{3}{|c|}{ Currency units } \\
\hline \multicolumn{1}{|c|}{ Unit } & Tedds base unit & Dimension \\
\hline\(£\) & Not applicable & Dimensionless \\
\hline
\end{tabular}

NOTE Like all other units, currency units must be placed after the numbers to which they apply.
Currency units have been added to facilitate calculations which require compound units, such as \(£ /\) year.

\section*{Derived units: US imperial and SI metric}

In addition to the base units, Tedds base unit contains a series of derived units. The complete list of units provided with Tedds are given in the following tables.

NOTE For Tedds for Word users:
All units listed in the following tables that require special characters are available in Library Access System. Go to Writing your own custom calculations --> Calculation writing documentation --> US units.

In addition, the units are listed in the TeddsUnits.doc file, which is located in the directory where you installed Tedds for Word.
\begin{tabular}{|l|l|l|l|}
\hline \multicolumn{4}{|c|}{ Angle units } \\
\hline \multicolumn{1}{|c|}{ Unit } & \begin{tabular}{c} 
US imperial \\
factor
\end{tabular} & Tedds base unit & Dimension \\
\hline rad & \(180 / \pi\) degs & \(180 / \pi\) degs & Dimensionless \\
\hline rads & \(180 / \pi\) degs & \(180 / \pi\) degs & Dimensionless \\
\hline
\end{tabular}
\begin{tabular}{|l|l|l|l|}
\hline \multicolumn{4}{|c|}{ Length units } \\
\hline Unit & \multicolumn{1}{|c|}{\begin{tabular}{c} 
US imperial \\
factor
\end{tabular}} & Tedds base unit & Dimension \\
\hline in & 0.0833333 ft & 0.0254 m & L \\
\hline ft & 1 ft & 0.3048 m & L \\
\hline yd & 3 ft & 0.9144 m & L \\
\hline mi & 5280 ft & 1609.344 m & L \\
\hline mm & 0.00328084 ft & 0.001 m & L \\
\hline cm & 0.0328084 ft & 0.01 m & L \\
\hline dm & 0.328084 ft & 0.1 m & L \\
\hline m & 3.28084 ft & 1 m & \\
\hline km & 3280.84 ft & 1000 m & L \\
\hline
\end{tabular}
\begin{tabular}{|l|l|l|l|}
\hline \multicolumn{4}{|c|}{ Unit } \\
\hline \multicolumn{1}{|c|}{\begin{tabular}{c} 
US imperial \\
factor
\end{tabular}} & Tedds base unit & Dimension \\
\hline z_av & 0.00194256 slugs & 0.0283495 kg & M \\
\hline lbm & 0.0310810 slugs & 0.45359237 kg & M \\
\hline lb_av & 0.0310810 slugs & 0.45359237 kg & M \\
\hline lbs_av & 0.0310810 slugs & 0.45359237 kg & M \\
\hline slug & 1 slug & 14.5939 kg & M \\
\hline slugs & 1 slug & 14.5939 kg & M \\
\hline US_ton & 62.1620 slugs & 907.185 kg & M \\
\hline tonne & 68.5219 slugs & 1000 kg & M \\
\hline UK_ton & 69.6214 slugs & 1016.047 kg & M \\
\hline ton_av & 69.6214 slugs & 1016.047 kg & M \\
\hline gm & \begin{tabular}{l}
0.0000685219 \\
slugs
\end{tabular} & 0.001 kg & M \\
\hline kg & 0.0685219 slugs & 1 kg & M \\
\hline
\end{tabular}
\begin{tabular}{|l|l|l|l|}
\hline \multicolumn{3}{|c|}{ Time units } & \\
\hline \multicolumn{1}{|c|}{ Unit } & \begin{tabular}{c} 
US imperial \\
factor
\end{tabular} & Tedds base unit & Dimension \\
\hline \(\min\) & 60 s & 60 s & T \\
\hline hr & 3600 s & 3600 s & T \\
\hline day & 86400 s & 86400 s & T \\
\hline yr & 31556926 s & 31556926 s & T \\
\hline
\end{tabular}
\begin{tabular}{|l|l|l|l|}
\hline \multicolumn{5}{|c|}{ Frequency units } \\
\hline Unit & \multicolumn{1}{|c|}{\begin{tabular}{c} 
US imperial \\
factor
\end{tabular}} & Tedds base unit & \multicolumn{1}{c|}{ Dimension } \\
\hline Hz & \(1 \mathrm{~s}^{-1}\) & \(1 \mathrm{~s}^{-1}\) & \(\mathrm{~T}^{-1}\) \\
\hline kHz & \(1000 \mathrm{~s}^{-1}\) & \(1000 \mathrm{~s}^{-1}\) & \(\mathrm{~T}^{-1}\) \\
\hline MHz & \(10^{6} \mathrm{~s}^{-1}\) & \(10^{6} \mathrm{~s}^{-1}\) & \(\mathrm{~T}^{-1}\) \\
\hline GHz & \(10^{9} \mathrm{~s}^{-1}\) & \(10^{9} \mathrm{~s}^{-1}\) & \(\mathrm{~T}^{-1}\) \\
\hline
\end{tabular}
\begin{tabular}{|l|l|l|ll|}
\hline \multicolumn{5}{|c|}{ Velocity units } \\
\hline Units & \begin{tabular}{c} 
US imperial \\
factor
\end{tabular} & Tedds base unit & Dimension \\
\hline mph & \(1.46667 \mathrm{ft} / \mathrm{s}\) & \(0.277777778 \mathrm{~m} / \mathrm{s}\) & \(\mathrm{LT}^{-1}\) & \\
\hline kph & \(0.911344 \mathrm{ft} / \mathrm{s}\) & \(0.4470398 \mathrm{~m} / \mathrm{s}\) & \(\mathrm{LT}^{-1}\) & \\
\hline
\end{tabular}
\begin{tabular}{|l|l|l|l|}
\hline \multicolumn{5}{|c|}{ Area units } \\
\hline \multicolumn{1}{|c|}{ Units } & \multicolumn{1}{|c|}{\begin{tabular}{c} 
US imperial \\
factor
\end{tabular}} & Tedds base unit & Dimension \\
\hline acre & \(43560.0 \mathrm{ft}^{2}\) & \(4046.86 \mathrm{~m}^{2}\) & \(\mathrm{~L}^{2}\) \\
\hline hetacre & \(107639 \mathrm{ft}^{2}\) & \(10000 \mathrm{~m}^{2}\) & \(\mathrm{~L}^{2}\) \\
\hline
\end{tabular}
\begin{tabular}{|l|l|l|l|}
\hline \multicolumn{5}{|c|}{ Volume units } \\
\hline \multicolumn{1}{|c|}{ Units } & \multicolumn{1}{c|}{\begin{tabular}{c} 
US imperial \\
factor
\end{tabular}} & Tedds base unit & Dimension \\
\hline floz & \(0.00104438 \mathrm{ft}^{3}\) & \(0.0000295735 \mathrm{~m}^{3}\) & \(\mathrm{~L}^{3}\) \\
\hline US_floz & \(0.00104438 \mathrm{ft}^{3}\) & \(0.0000295735 \mathrm{~m}^{3}\) & \(\mathrm{~L}^{3}\) \\
\hline gal & \(0.133681 \mathrm{ft}^{3}\) & \(0.00378541 \mathrm{~m}^{3}\) & \(\mathrm{~L}^{3}\) \\
\hline gallon & \(0.133681 \mathrm{ft}^{3}\) & \(0.00378541 \mathrm{~m}^{3}\) & \(\mathrm{~L}^{3}\) \\
\hline US_gal & \(0.133681 \mathrm{ft}^{3}\) & \(0.00378541 \mathrm{~m}^{3}\) & \(\mathrm{~L}^{3}\) \\
\hline US_gallon & \(0.133681 \mathrm{ft}^{3}\) & \(0.00378541 \mathrm{~m}^{3}\) & \(\mathrm{~L}^{3}\) \\
\hline UK_floz & \(0.00100340 \mathrm{ft}^{3}\) & \(0.0000284131 \mathrm{~m}^{3}\) & \(\mathrm{~L}^{3}\) \\
\hline UK_gal & \(0.160544 \mathrm{ft}^{3}\) & \(0.004546094 \mathrm{~m}^{3}\) & \(\mathrm{~L}^{3}\) \\
\hline UK_gallon & \(0.160544 \mathrm{ft}^{3}\) & \(0.004546094 \mathrm{~m}^{3}\) & \(\mathrm{~L}^{3}\) \\
\hline ml & \(0.0000353147 \mathrm{ft}^{3}\) & \(0.000001 \mathrm{~m}^{3}\) & \(\mathrm{~L}^{3}\) \\
\hline l & \(0.0353147 \mathrm{ft}^{3}\) & \(0.0017 \mathrm{~m}^{3}\) & \(\mathrm{~L}^{3}\) \\
\hline
\end{tabular}
\begin{tabular}{|l|l|l|l|}
\hline \multicolumn{5}{|c|}{ Force units } \\
\hline \multicolumn{1}{|c|}{ Units } & \begin{tabular}{c} 
US imperial \\
factor
\end{tabular} & Tedds base unit & Dimension \\
\hline oz & 0.0625 slugsft/s & \(0.278013 \mathrm{kgm} / \mathrm{s}^{2}\) & \(\mathrm{MLT}^{-2}\) \\
\hline ozf & \(0.0625 \mathrm{slugsft} / \mathrm{s}^{2}\) & \(0.278013 \mathrm{kgm} / \mathrm{s}^{2}\) & \(\mathrm{MLT}^{-2}\) \\
\hline lb & \(1 \mathrm{slugsft} / \mathrm{s}^{2}\) & \(4.448216 \mathrm{kgm} / \mathrm{s}^{2}\) & \(\mathrm{MLT}^{-2}\) \\
\hline lbs & \(1 \mathrm{slugst} / \mathrm{s}^{2}\) & \(4.448216 \mathrm{kgm} / \mathrm{s}^{2}\) & \(\mathrm{MLT}^{-2}\) \\
\hline lbf & \(1 \mathrm{slugsft} / \mathrm{s}^{2}\) & \(4.448216 \mathrm{kgm} / \mathrm{s}^{2}\) & \(\mathrm{MLT}^{-2}\) \\
\hline kip & \(1000 \mathrm{slugsft} / \mathrm{s}^{2}\) & \(4448.22 \mathrm{kgm} / \mathrm{s}^{2}\) & \(\mathrm{MLT}^{-2}\) \\
\hline kips & \(1000 \mathrm{slugsft} / \mathrm{s}^{2}\) & \(4448.22 \mathrm{kgm} / \mathrm{s}^{2}\) & \(\mathrm{MLT}^{-2}\) \\
\hline ton & \(2000 \mathrm{slugsft} / \mathrm{s}^{2}\) & \(8896.43 \mathrm{kgm} / \mathrm{s}^{2}\) & \(\mathrm{MLT}^{-2}\) \\
\hline tonf & \(2000 \mathrm{slugsft} / \mathrm{s}^{2}\) & \(8896.43 \mathrm{kgm} / \mathrm{s}^{2}\) & \(\mathrm{MLT}^{-2}\) \\
\hline t & \(2000 \mathrm{slugsft} / \mathrm{s}^{2}\) & \(8896.43 \mathrm{kgm} / \mathrm{s}^{2}\) & \(\mathrm{MLT}^{-2}\) \\
\hline tf & \(2000 \mathrm{slugsft} / \mathrm{s}^{2}\) & \(8896.43 \mathrm{kgm} / \mathrm{s}^{2}\) & \(\mathrm{MLT}^{-2}\) \\
\hline dyne & \begin{tabular}{l}
0.00000224809 \\
\(\mathrm{slugsft} / \mathrm{s}^{2}\)
\end{tabular} & \(0.00001 \mathrm{kgm} / \mathrm{s}^{2}\) & \(\mathrm{MLT}^{-2}\) \\
\hline
\end{tabular}
\begin{tabular}{|l|l|l|l|}
\hline \multicolumn{5}{|c|}{ Force units } \\
\hline \multicolumn{1}{|c|}{ Units } & \begin{tabular}{c} 
US imperial \\
factor
\end{tabular} & Tedds base unit & Dimension \\
\hline N & \begin{tabular}{l}
0.224809 \\
slugsft \(/ \mathrm{s}^{2}\)
\end{tabular} & \(1 \mathrm{kgm} / \mathrm{s}^{2}\) & \(\mathrm{MLT}^{-2}\) \\
\hline kgf & \(2.20463 \mathrm{slugsft} / \mathrm{s}^{2}\) & \(9.80665 \mathrm{kgm} / \mathrm{s}^{2}\) & \(\mathrm{MLT}^{-2}\) \\
\hline kN & 224.809 slugsft/s \({ }^{2}\) & \(1000 \mathrm{kgm} / \mathrm{s}^{2}\) & \(\mathrm{MLT}^{-2}\) \\
\hline MN & 224809 slugsft/s \({ }^{2}\) & \(1000000 \mathrm{kgm} / \mathrm{s}^{2}\) & \(\mathrm{MLT}^{-2}\) \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|c|}
\hline \multicolumn{3}{|c|}{Moment units} & \\
\hline Units & US imperial factor & Tedds base unit & Dimension \\
\hline lbf_in & \[
\begin{aligned}
& 0.0833333 \\
& \text { slugsft²/s }
\end{aligned}
\] & \(0.112985 \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2 \mathrm{~T}^{-2}}\) \\
\hline in_lbf & \[
\begin{aligned}
& 0.0833333 \\
& \text { slugsft²/s² }
\end{aligned}
\] & \(0.112985 \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-2}\) \\
\hline lb_in & \[
\begin{aligned}
& 0.0833333 \\
& \text { slugsft²/s }
\end{aligned}
\] & \(0.112985 \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2 \mathrm{~T}^{-2}}\) \\
\hline in_lb & \[
\begin{aligned}
& 0.0833333 \\
& \text { slugsft²/s }
\end{aligned}
\] & \(0.112985 \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-2}\) \\
\hline lbs_in & \[
\begin{aligned}
& 0.0833333 \\
& \text { slugsft²/s² }
\end{aligned}
\] & \(0.112985 \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-2}\) \\
\hline in_lbs & \[
\begin{aligned}
& 0.0833333 \\
& \text { slugsft²/s }
\end{aligned}
\] & \(0.112985 \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-2}\) \\
\hline lbf_ft & 1 slugsft \({ }^{2} / \mathrm{s}^{2}\) & \(0.112985 \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-2}\) \\
\hline ft_lbf & 1 slugsft \({ }^{\text {/ }} \mathrm{s}^{2}\) & \(1.35582 \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-2}\) \\
\hline lb_ft & 1 slugsft \(2 / \mathrm{s}^{2}\) & \(1.35582 \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-2}\) \\
\hline ft_lb & 1 slugsft \(^{2} / \mathrm{s}^{2}\) & \(1.35582 \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-2}\) \\
\hline lbs_ft & 1 slugsft \({ }^{2} / \mathrm{s}^{2}\) & \(1.35582 \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(M^{2} \mathrm{~T}^{-2}\) \\
\hline ft_lbs & 1 slugsft \(^{2} / \mathrm{s}^{2}\) & \(1.35582 \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-2}\) \\
\hline kip_in & 83.3333 slugsft \({ }^{2} / \mathrm{s}^{2}\) & \(112.985 \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-2}\) \\
\hline in_kip & 83.3333 slugsft²/s² & \(112.985 \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-2}\) \\
\hline kip_ft & 1000 slugsft \({ }^{2} / \mathrm{s}^{2}\) & \(1355.82 \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-2}\) \\
\hline ft_kip & 1000 slugsft \({ }^{2} / \mathrm{s}^{2}\) & \(1355.82 \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-2}\) \\
\hline ton_ft & 2000 slugsft \({ }^{2} / \mathrm{s}^{2}\) & \(2711.63 \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-2}\) \\
\hline ft_ton & 2000 slugsft \({ }^{2} / \mathrm{s}^{2}\) & \(2711.63 \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-2}\) \\
\hline tons_ft & 2000 slugsft \({ }^{2} / \mathrm{s}^{2}\) & \(2711.63 \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-2}\) \\
\hline ft_tons & 2000 slugsft \({ }^{\text {/ }} \mathrm{s}^{2}\) & \(2711.63 \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-2}\) \\
\hline
\end{tabular}
\begin{tabular}{|l|l|l|l|}
\hline \multicolumn{4}{|c|}{ Moment units } \\
\hline \multicolumn{1}{|c|}{ Units } & \begin{tabular}{c} 
US imperial \\
factor
\end{tabular} & Tedds base unit & Dimension \\
\hline tm & 6561.68 slugsft\({ }^{2} / \mathrm{s}^{2}\) & \(8896.43 \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-2}\) \\
\hline Nmm & \begin{tabular}{l}
0.000737563 \\
slugsft\(/ \mathrm{s}^{2}\)
\end{tabular} & \(0.001 \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-2}\) \\
\hline Nm & \begin{tabular}{l}
0.737563 \\
\(\mathrm{slugsft} / \mathrm{s}^{2}\)
\end{tabular} & \(1 \mathrm{kgm} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-2}\) \\
\hline kNm & \(737.563 \mathrm{slugsft}^{2} / \mathrm{s}^{2}\) & \(1000 \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-2}\) \\
\hline Mnm & \(737563 \mathrm{slugsft} / \mathrm{s}^{2}\) & \(1000000 \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-2}\) \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|c|}
\hline \multicolumn{4}{|c|}{Energy units} \\
\hline Units & US imperial factor & Tedds base unit & Dimension \\
\hline cal & 3.08803 slugsft \({ }^{2} / \mathrm{s}^{2}\) & \(4.1868 \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-2}\) \\
\hline kcal & 3088.03 slugsft \(2 / \mathrm{s}^{2}\) & \(4186.8 \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-2}\) \\
\hline BTU & 778.173 slugsft \(/\) /s \({ }^{2}\) & \(1055.06 \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-2}\) \\
\hline J & \[
\begin{aligned}
& 0.737563 \\
& \text { slugsft} / \mathrm{s}^{2}
\end{aligned}
\] & \(1 \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2 \mathrm{~T}^{-2}}\) \\
\hline kJ & 737.563 slugsft \(/\) / \(\mathrm{s}^{2}\) & \(1000 \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-2}\) \\
\hline MJ & 737563 slugsft²/s \({ }^{2}\) & \(1000000 \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-2}\) \\
\hline GJ & \[
\begin{aligned}
& 737563100 \\
& \text { slugsft²/s }
\end{aligned}
\] & \[
\begin{aligned}
& 1000000000 \\
& \mathrm{kgm}^{2} / \mathrm{s}^{2}
\end{aligned}
\] & \(\mathrm{ML}^{2} \mathrm{~T}^{-2}\) \\
\hline erg & \[
\begin{aligned}
& 0.00000007376 \\
& \text { slugsft} 2 / \mathrm{s}^{2}
\end{aligned}
\] & \[
\begin{aligned}
& 0.0000001 \\
& \mathrm{kgm}^{2} / \mathrm{s}^{2}
\end{aligned}
\] & \(\mathrm{ML}^{2} \mathrm{~T}^{-2}\) \\
\hline
\end{tabular}
\begin{tabular}{|l|l|l|l|}
\hline \multicolumn{5}{|c|}{ Power units } \\
\hline \multicolumn{1}{|c|}{ Units } & \multicolumn{1}{|c|}{\begin{tabular}{c} 
US imperial \\
factor
\end{tabular}} & Tedds base unit & Dimension \\
\hline W & \begin{tabular}{l}
0.737563 \\
\(\mathrm{slugsft} / \mathrm{s}^{3}\)
\end{tabular} & \(1 \mathrm{kgm}^{2} / \mathrm{s}^{3}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-3}\) \\
\hline kw & \(737.563 \mathrm{slugsft}^{2} / \mathrm{s}^{3}\) & \(1000 \mathrm{kgm}^{2} / \mathrm{s}^{3}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-3}\) \\
\hline MW & \(737563 \mathrm{slugsft} / \mathrm{s}^{3}\) & \(1000000 \mathrm{kgm}^{2} / \mathrm{s}^{3}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-3}\) \\
\hline
\end{tabular}
\begin{tabular}{|l|l|l|l|}
\hline \multicolumn{5}{|c|}{ Stress and pressure units } \\
\hline \multicolumn{1}{|c|}{ Units } & \multicolumn{1}{c|}{\begin{tabular}{c} 
US imperial \\
factor
\end{tabular}} & Tedds base unit & Dimension \\
\hline \(\mathrm{m}_{\text {water }}\) & \(204.816 \mathrm{slugs} / \mathrm{s}^{2} / \mathrm{ft}\) & \(9806.65 \mathrm{~kg} / \mathrm{s}^{2} / \mathrm{m}\) & \(\mathrm{ML}^{-1} \mathrm{~T}^{-2}\) \\
\hline \(\mathrm{~mm}_{\text {water }}\) & \begin{tabular}{l}
0.204816 \\
\(\mathrm{slugs} / \mathrm{s}^{2} / \mathrm{ft}\)
\end{tabular} & \(9.80665 \mathrm{~kg} / \mathrm{s}^{2} / \mathrm{m}\) & \(\mathrm{ML}^{-1} \mathrm{~T}^{-2}\) \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|c|}
\hline \multicolumn{4}{|c|}{Stress and pressure units} \\
\hline Units & US imperial factor & Tedds base unit & Dimension \\
\hline \(\mathrm{mH}_{2} \mathrm{O}\) & 204.816 slugs/s²/ft & \(9806.65 \mathrm{~kg} / \mathrm{s}^{2} / \mathrm{m}\) & \(\mathrm{ML}^{-1} \mathrm{~T}^{-2}\) \\
\hline \(\mathrm{mmH}_{2} \mathrm{O}\) & \[
\begin{array}{|l|}
\hline 0.204816 \\
\text { slugs } / \mathrm{s}^{2} / \mathrm{ft}
\end{array}
\] & \(9.80665 \mathrm{~kg} / \mathrm{s}^{2} / \mathrm{m}\) & \(\mathrm{ML}^{-1} \mathrm{~T}^{-2}\) \\
\hline in_HG & 70.7261 slugs/s²/ft & \(3386.38 \mathrm{~kg} / \mathrm{s}^{2} / \mathrm{m}\) & \(\mathrm{ML}^{-1} \mathrm{~T}^{-2}\) \\
\hline atm & 2116.22 slugs/s²/ft & \(101325 \mathrm{~kg} / \mathrm{s}^{2} / \mathrm{m}\) & \(\mathrm{ML}^{-1} \mathrm{~T}^{-2}\) \\
\hline ksi & 144000 slugs/s²/ft & \(6894748 \mathrm{~kg} / \mathrm{s}^{2} / \mathrm{m}\) & \(\mathrm{ML}^{-1} \mathrm{~T}^{-2}\) \\
\hline ksf & 1000 slugs/s²/ft & \(47880.2 \mathrm{~kg} / \mathrm{s}^{2} / \mathrm{m}\) & \(\mathrm{ML}^{-1} \mathrm{~T}^{-2}\) \\
\hline psi & 144 slugs/s²/ft & \(6894.75 \mathrm{~kg} / \mathrm{s}^{2} / \mathrm{m}\) & \(\mathrm{ML}^{-1} \mathrm{~T}^{-2}\) \\
\hline psf & 1 slugs/s²/ft & \(47.8802 \mathrm{~kg} / \mathrm{s}^{2} / \mathrm{m}\) & \(\mathrm{ML}^{-1} \mathrm{~T}^{-2}\) \\
\hline Pa & \[
\begin{aligned}
& 0.0208855 \\
& \text { slugs } / \mathrm{s}^{2} / \mathrm{ft}
\end{aligned}
\] & \(1 \mathrm{~kg} / \mathrm{s}^{2} / \mathrm{m}\) & \(\mathrm{ML}^{-1} \mathrm{~T}^{-2}\) \\
\hline kPa & 20.8855 slugs/s \(\mathrm{s}^{2} / \mathrm{ft}\) & \(1000 \mathrm{~kg} / \mathrm{s}^{2} / \mathrm{m}\) & \(\mathrm{ML}^{-1} \mathrm{~T}^{-2}\) \\
\hline MPa & 20885.5 slugs/s²/ft & \(1000000 \mathrm{~kg} / \mathrm{s}^{2} / \mathrm{m}\) & \(\mathrm{ML}^{-1} \mathrm{~T}^{-2}\) \\
\hline GPa & \[
\begin{aligned}
& 20885500 \\
& \text { slugs } / \mathrm{s}^{2} / \mathrm{ft}
\end{aligned}
\] & \(10^{9} \mathrm{~kg} / \mathrm{s}^{2} / \mathrm{m}\) & \(\mathrm{ML}^{-1} \mathrm{~T}^{-2}\) \\
\hline bar & 2088.55 slugs/s \({ }^{2} / \mathrm{ft}\) & \(100000 \mathrm{~kg} / \mathrm{s}^{2} / \mathrm{m}\) & \(\mathrm{ML}^{-1} \mathrm{~T}^{-2}\) \\
\hline bars & 2088.55 slugs/s²/ft & \(100000 \mathrm{~kg} / \mathrm{s}^{2} / \mathrm{m}\) & \(\mathrm{ML}^{-1} \mathrm{~T}^{-2}\) \\
\hline
\end{tabular}
\begin{tabular}{|l|c|c|c|}
\hline \multicolumn{5}{|c|}{ Force density units } \\
\hline Units & \begin{tabular}{c} 
US imperial \\
factor
\end{tabular} & Tedds base unit & Dimension \\
\hline pcf & \(1 \mathrm{slugs} / \mathrm{s}^{2} / \mathrm{ft}^{2}\) & \(157.087 \mathrm{~kg} / \mathrm{s}^{2} / \mathrm{m}^{2}\) & \(\mathrm{ML}^{-2} \mathrm{~T}^{-2}\) \\
\hline
\end{tabular}
\begin{tabular}{|l|l|l|l|}
\hline \multicolumn{5}{|c|}{ Load force units } \\
\hline \multicolumn{1}{|c|}{ Units } & \begin{tabular}{c} 
US imperial \\
factor
\end{tabular} & Tedds base unit & Dimension \\
\hline klf & 1000 slugs \(/ \mathrm{s}^{2}\) & \(14593.9 \mathrm{~kg} / \mathrm{s}^{2}\) & \(\mathrm{MT}^{-2}\) \\
\hline plf & 1 slugs \(/ \mathrm{s}^{2}\) & \(14.5939 \mathrm{~kg} / \mathrm{s}^{2}\) & \(\mathrm{MT}^{-2}\) \\
\hline
\end{tabular}
\begin{tabular}{|l|l|l|l|}
\hline \multicolumn{5}{|c|}{ Temperature units } \\
\hline \multicolumn{1}{|c|}{ Units } & \multicolumn{1}{|c|}{\begin{tabular}{c} 
US imperial \\
factor
\end{tabular}} & Tedds base unit & \multicolumn{1}{c|}{ Dimension } \\
\hline Cday & \(86400 \mathrm{~s}^{\circ} \mathrm{C}\) & \(86400 \mathrm{~s}^{\circ} \mathrm{C}\) & \(\mathrm{T}^{\circ} \mathrm{C}\) \\
\hline\({ }^{\circ} \mathrm{Cday}\) & \(86400 \mathrm{~s}^{\circ} \mathrm{C}\) & \(86400 \mathrm{~s}^{\circ} \mathrm{C}\) & \(\mathrm{T}^{\circ} \mathrm{C}\) \\
\hline
\end{tabular}

NOTE The units in the Electrical units table are based around a definition of a coulomb as a dimensionless unit.

For all practical purposes, the following definitions are sufficient to ensure that calculations and dimensional checking work correctly in Tedds.

However, in rare cases, combining the following units with other dimensionless units can mean that the dimensional analysis fails to detect errors.
\begin{tabular}{|c|c|c|c|}
\hline Units & US imperial factor & Tedds base unit & Dimension \\
\hline coul & Not applicable & Not applicable & Dimensionless \\
\hline amp & \(\mathrm{s}^{-1}\) & \(\mathrm{s}^{-1}\) & T-1 \\
\hline A & \(\mathrm{s}^{-1}\) & \(\mathrm{s}^{-1}\) & T-1 \\
\hline kA & \(10^{3} \mathrm{~s}^{-1}\) & \(10^{3} \mathrm{~s}^{-1}\) & \(\mathrm{T}^{-1}\) \\
\hline mA & \(10^{-3} \mathrm{~s}^{-1}\) & \(10^{-3} \mathrm{~s}^{-1}\) & T-1 \\
\hline \(\mu \mathrm{A}\) & \(10^{-6} \mathrm{~s}^{-1}\) & \(10^{-6} \mathrm{~s}^{-1}\) & T-1 \\
\hline V & \[
\begin{aligned}
& 0.737563 \\
& \text { slugsft²/s }
\end{aligned}
\] & \(1 \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2}{ }^{-2}\) \\
\hline volt & \[
\begin{aligned}
& 0.737563 \\
& \text { slugsft} / \mathrm{s}^{2}
\end{aligned}
\] & \(1 \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2}{ }^{-2}\) \\
\hline mV & \[
\begin{aligned}
& 0.0007376 \\
& \text { slugsft²/s }
\end{aligned}
\] & \(0.001 \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2} \mathrm{~T}^{-2}\) \\
\hline kV & 737.563 slugsft \({ }^{2} \mathrm{~s}^{2}\) & \(1000 \mathrm{kgm}^{2} / \mathrm{s}^{2}\) & \(\mathrm{ML}^{2}{ }^{-2}\) \\
\hline ohm & \[
\begin{array}{|l}
0.737563 \\
\text { slugsft} 2 / \mathrm{s}
\end{array}
\] & \(1 \mathrm{kgm}^{2} / \mathrm{s}\) & \(\mathrm{ML}^{2}{ }^{-1}\) \\
\hline W & 737.563 slugsft²/s & \(1 \mathrm{kgm}^{2} / \mathrm{s}\) & \(\mathrm{ML}^{2}{ }^{-1}\) \\
\hline k \(\Omega\) & \[
\begin{aligned}
& 0.737563 \\
& \text { slugstt} / \mathrm{s}
\end{aligned}
\] & \(1000 \mathrm{kgm}^{2} / \mathrm{s}\) & \(\mathrm{ML}^{2}{ }^{-1}\) \\
\hline \(\mathrm{M} \Omega\) & 737563 slugsft²/s & \(1000000 \mathrm{kgm}^{2} / \mathrm{s}\) & \(\mathrm{ML}^{2}{ }^{-1}\) \\
\hline mho & \[
\begin{aligned}
& 1.35582 \\
& \text { slugs }{ }^{-1} \mathrm{ft}^{-2} \mathrm{~s}
\end{aligned}
\] & \(1 \mathrm{~kg}^{-1} \mathrm{~m}^{-2} \mathrm{~s}\) & \(M^{-1} L^{-2} \mathrm{~T}\) \\
\hline siemens & \[
\begin{aligned}
& 1.35582 \\
& \text { slugs }{ }^{-1} \mathrm{ft}^{-2} \mathrm{~s}
\end{aligned}
\] & \(1 \mathrm{~kg}^{-1} \mathrm{~m}^{-2} \mathrm{~s}\) & \(M^{-1} L^{-2} \mathrm{~T}\) \\
\hline weber & \[
\begin{aligned}
& 0.737563 \\
& \text { slugstt/s }
\end{aligned}
\] & \(1 \mathrm{kgm}^{2} \mathrm{~s}\) & \(\mathrm{ML}^{2}{ }^{-1}\) \\
\hline henry & 0.737563 slugsft \({ }^{2}\) & \(1 \mathrm{~kg} \mathrm{~m}^{2}\) & ML \({ }^{2}\) \\
\hline H & 0.737563 slugsft \({ }^{2}\) & \(1 \mathrm{~kg} \mathrm{~m}^{2}\) & ML \({ }^{2}\) \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|c|}
\hline Units & US imperial factor & Tedds base unit & Dimension \\
\hline mH & \[
\begin{aligned}
& 0.0000007376 \\
& \text { slugsft² }
\end{aligned}
\] & 0.001 kg m² & ML \({ }^{2}\) \\
\hline \(\mu \mathrm{H}\) & \[
\begin{aligned}
& 0.0000007376 \\
& \text { slugsft² }
\end{aligned}
\] & \(0.000001 \mathrm{~kg} \mathrm{~m}^{2}\) & ML \({ }^{2}\) \\
\hline tesla & 0.0685219 slugs/s & \(1 \mathrm{~kg} / \mathrm{s}\) & MT-1 \\
\hline gauss & \[
\begin{aligned}
& 0.0000068522 \\
& \text { slugs/s }
\end{aligned}
\] & 0.0001 kg/s & \(\mathrm{MT}^{-1}\) \\
\hline oersted & \(24.2552 / \mathrm{ft} / \mathrm{s}\) & \(79.5775 / \mathrm{m} / \mathrm{s}\) & \(\mathrm{M}^{-1} \mathrm{~T}^{-1}\) \\
\hline farad & \[
\begin{aligned}
& 1.35582 \\
& \text { slugs }^{-1} \mathrm{~m}^{-2} \mathrm{~s}^{2}
\end{aligned}
\] & \(1 \mathrm{~kg}^{-1} \mathrm{~m}^{-2} \mathrm{~s}^{2}\) & \(\mathrm{M}^{-1} \mathrm{~L}^{-2} \mathrm{~T}^{2}\) \\
\hline F & \[
\begin{aligned}
& 1.35582 \\
& \text { slugs }{ }^{-1} \mathrm{~m}^{-2} \mathrm{~s}^{2}
\end{aligned}
\] & \(1 \mathrm{~kg}^{-1} \mathrm{~m}^{-2} \mathrm{~s}^{2}\) & \(\mathrm{M}^{-1} \mathrm{~L}^{-2} \mathrm{~T}^{2}\) \\
\hline pF & \[
\begin{aligned}
& 0.0000000000013 \\
& 56 \text { slugs }^{-1} \mathrm{~m}^{-2} \mathrm{~s}^{2}
\end{aligned}
\] & \[
\begin{aligned}
& 0.000000000001 \\
& \mathrm{~kg}^{-1} \mathrm{~m}^{-2} \mathrm{~s}^{2}
\end{aligned}
\] & \(\mathrm{M}^{-1} \mathrm{~L}^{-2} \mathrm{~T}^{2}\) \\
\hline nF & \[
\begin{aligned}
& 0.0000000013558 \\
& 2 \text { slugs }^{-1} \mathrm{~m}^{-2} \mathrm{~s}^{2}
\end{aligned}
\] & \[
\begin{aligned}
& 0.000000001 \\
& \mathrm{~kg}^{-1} \mathrm{~m}^{-2} \mathrm{~s}^{2}
\end{aligned}
\] & \(\mathrm{M}^{-1} \mathrm{~L}^{-2} \mathrm{~T}^{2}\) \\
\hline \(\mu \mathrm{F}\) & \[
\begin{aligned}
& 0.00000135582 \\
& \text { slugs }^{-1} \mathrm{~m}^{-2} \mathrm{~s}^{2}
\end{aligned}
\] & \[
\begin{aligned}
& 0.000001 \\
& \mathrm{~kg}^{-1} \mathrm{~m}^{-2} \mathrm{~s}^{2}
\end{aligned}
\] & \(M^{-1} L^{-2} \mathrm{~T}^{2}\) \\
\hline
\end{tabular}
\begin{tabular}{|l|l|l|l|}
\hline \multicolumn{5}{c|}{ Currency units } \\
\hline \multicolumn{1}{|c|}{ Units } & \multicolumn{1}{|c|}{\begin{tabular}{c} 
US imperial \\
factor
\end{tabular}} & Tedds base unit & \multicolumn{1}{|c|}{ Dimension } \\
\hline\(£\) & Not applicable & Not applicable & Dimensionless \\
\hline\(\$\) & Not applicable & Not applicable & Dimensionless \\
\hline
\end{tabular}

NOTE Like all other Tedds units, currency units must be placed after the numbers to which they apply.

Currency units have been added to facilitate calculations which require compound units, such as \(£ /\) year.

\section*{See also}

Use units in calculations (page 350)

\subsection*{8.7 Pre-defined system variables}

Tedds contains a number of pre-defined variables, which you can use in all your calculations. The following table presents all pre-defined system variables in Tedds.
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|r|}{Predefined system variables} \\
\hline \multirow[t]{4}{*}{Base system variables} & \multirow[t]{4}{*}{Gener al} & \(\pi=3.1415926536\) \\
\hline & & pi \(=3.1415926536\) \\
\hline & & \(\mathrm{gacc}=9.80665 \mathrm{~m} / \mathrm{s}^{2}\) \\
\hline & & \(\mathrm{e}_{\mathrm{e}}=2.7182818285\) \\
\hline \multirow[t]{2}{*}{Water} & Kinem atic viscosi ty at \(10^{\circ} \mathrm{C}\) & \(\mathrm{v}_{\text {water@10 }}=0.00000131 \mathrm{~m}^{2} / \mathrm{s}\) \\
\hline & \[
\begin{aligned}
& \text { Densit } \\
& \text { y at } \\
& 4^{\circ} \mathrm{C}
\end{aligned}
\] & \(\rho_{\text {water@4 }}=1000 \mathrm{~kg} / \mathrm{m}^{3}\) \\
\hline \multirow[t]{13}{*}{Concrete} & \multirow[t]{8}{*}{\[
\begin{array}{l|}
\hline \text { BS } \\
8110
\end{array}
\]} & \(\mathrm{E}_{58110}=200 \mathrm{kN} / \mathrm{mm}^{2}\) \\
\hline & & \(\mathrm{a}_{\mathrm{C}}=10 \times 10^{-60} \mathrm{C}^{-1}\) \\
\hline & & \(\mathrm{v}_{\mathrm{C}}=0.2\) \\
\hline & & \(\mathrm{m}_{\mathrm{c}}=16\) \\
\hline & & \(\rho_{\text {c.norm }}=2400 \mathrm{~kg} / \mathrm{m}^{3}\) \\
\hline & & \(\rho_{\text {c.norm_w }}=2500 \mathrm{~kg} / \mathrm{m}^{3}\) \\
\hline & & \(\rho_{\text {c.light }}=1800 \mathrm{~kg} / \mathrm{m}^{3}\) \\
\hline & & \(\rho_{\text {C.light_w }}=1900 \mathrm{~kg} / \mathrm{m}^{3}\) \\
\hline & \multirow[t]{2}{*}{AC} & \(\rho_{\text {c.norm }}=2400 \mathrm{~kg} / \mathrm{m}^{3}\) \\
\hline & & \(\rho_{\text {c.light }}=1800 \mathrm{~kg} / \mathrm{m}^{3}\) \\
\hline & \multirow[t]{3}{*}{\[
\begin{aligned}
& \text { BS540 } \\
& 0
\end{aligned}
\]} & \(\rho_{\text {C5400 }}=2500 \mathrm{~kg} / \mathrm{m}^{3}\) \\
\hline & & \(\mathrm{a}_{\text {c5400 }}=12 \times 10^{-60} \mathrm{C}^{-1}\) \\
\hline & & \(\mathrm{E}_{\mathrm{y} \text { _ } 5400}=200 \mathrm{kN} / \mathrm{mm}^{2}\) \\
\hline \multirow[t]{10}{*}{Steel} & \multirow[t]{2}{*}{\begin{tabular}{l}
Gener \\
al
\end{tabular}} & \(v_{S}=0.3\) \\
\hline & & \(\mathrm{a}_{\mathrm{S}}=12 \times 10^{-60} \mathrm{C}^{-1}\) \\
\hline & \multirow[t]{4}{*}{\[
\begin{array}{|l}
\mathrm{BS} 595 \\
0
\end{array}
\]} & \(\rho_{\text {S5950 }}=7860 \mathrm{~kg} / \mathrm{m}^{3}\) \\
\hline & & \(\mathrm{E}_{\text {S5950 }}=205 \mathrm{kN} / \mathrm{mm}^{2}\) \\
\hline & & \(\mathrm{G}_{55950}=78.8 \mathrm{kN} / \mathrm{mm}^{2}\) \\
\hline & & \(\mathrm{K}_{55950}=170.8 \mathrm{kN} / \mathrm{mm}^{2}\) \\
\hline & \multirow[t]{4}{*}{EC3} & \(\rho_{\text {SEC3 }}=7850 \mathrm{~kg} / \mathrm{m}^{3}\) \\
\hline & & \(\mathrm{E}_{\text {SEC3 }}=210 \mathrm{kN} / \mathrm{mm}^{2}\) \\
\hline & & \(\mathrm{G}_{\text {SEC3 }}=80.8 \mathrm{kN} / \mathrm{mm}^{2}\) \\
\hline & & \(\mathrm{K}_{\text {SEC }}=175 \mathrm{kN} / \mathrm{mm}^{2}\) \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|r|}{Predefined system variables} \\
\hline & \multirow[t]{3}{*}{\[
\begin{array}{|l}
\hline \text { BS540 } \\
0
\end{array}
\]} & \(\rho_{\text {S5400 }}=7860 \mathrm{~kg} / \mathrm{m}^{3}\) \\
\hline & & \(\mathrm{E}_{55400}=205 \mathrm{kN} / \mathrm{mm}^{2}\) \\
\hline & & \(\mathrm{G}_{55400}=80 \mathrm{kN} / \mathrm{mm}^{2}\) \\
\hline \multirow[t]{7}{*}{Steel} & \multirow[t]{3}{*}{\[
\begin{aligned}
& \text { AISC / } \\
& \text { LRFD }
\end{aligned}
\]} & \(\rho_{\text {SLRFD }}=490 \mathrm{lb} / \mathrm{ft}^{3}\) \\
\hline & & \(\mathrm{ESLRFD}=29000 \mathrm{ksi}\) \\
\hline & & \(\mathrm{G}_{\text {SLRFD }}=11200 \mathrm{ksi}\) \\
\hline & \multirow[t]{3}{*}{\[
\begin{aligned}
& \hline \text { AISC / } \\
& \text { ASD }
\end{aligned}
\]} & \(\mathrm{r}_{\text {SASD }}=490 \mathrm{lb} / \mathrm{ft}^{3}\) \\
\hline & & \(\mathrm{E}_{\text {SASD }}=29000 \mathrm{ksi}\) \\
\hline & & \(\mathrm{G}_{\text {SASD }}=11200 \mathrm{ksi}\) \\
\hline & ACl & \(\mathrm{E}_{\text {ACI }}=29000 \mathrm{ksi}\) \\
\hline \multirow[t]{6}{*}{Aluminum} & \multirow[t]{6}{*}{\begin{tabular}{l}
Gener \\
al
\end{tabular}} & \(\rho_{\text {Al }}=2720 \mathrm{~kg} / \mathrm{m}^{3}\) \\
\hline & & \(\mathrm{E}_{\mathrm{Al}}=70 \mathrm{kN} / \mathrm{mm}^{2}\) \\
\hline & & \(\mathrm{G}_{\text {Al }}=26 \mathrm{kN} / \mathrm{mm}^{2}\) \\
\hline & & \(\mathrm{K}_{\text {Al }}=69 \mathrm{kN} / \mathrm{mm}^{2}\) \\
\hline & & \(\mathrm{v}_{\mathrm{Al}}=0.33\) \\
\hline & & \(\mathrm{a}_{\text {Al }}=22 \times 10^{-60} \mathrm{C}^{-1}\) \\
\hline
\end{tabular}

\section*{See also}

Use system variables (page 364)

\subsection*{8.8 System and user libraries}

The Library Access System recognizes two types of libraries: system and user libraries. You can recall the contents of both types into any document. You can also modify the contents of a user library according to your needs. However, you cannot make changes to a system library, unless you are authorized to do so.

The information in this section is aimed at two types of users:
- Personal user:

A user that has created calculations for their own use, and thinks that they might be useful to other Tedds users.
- Organizational user:

A user that is creating a standard set of calculations that are used in an organization. The calculations are carefully revised and tested before they
are released organization－wide．In addition，only the individual or group who created the calculations can modify them．

\section*{See also}

Create libraries for organizational use（page 544）
Share libraries created for personal use（page 543）

\section*{Naming libraries}

Whether you are creating sets and libraries for personal use or for organizational use，pay attention to the names that you use for your libraries and the entries in them．
－If you plan on sharing libraries with others，ensure that the name of your library is not the same as the name of someone else＇s library．Having two libraries with the same name creates a risk of overwriting one library by the other．In consequence，you may lose valuable data．
－Ensure that the names of libraries convey the content of the calculations to other users．

\section*{Library Access System icons}

The Library Access System indicates different types of items with different icons．For more information on item types，see the following table．
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|r|}{Library Access System icons} \\
\hline Icon & Name & Description \\
\hline 回 & Note item & The item returns notes to assist you in using the calculations． \\
\hline 県 & Solution item & The item returns a complete solution． \\
\hline （ & Component item & The item returns a component calculation．It must be used with other items to produce a complete solution． \\
\hline 包 & Example item & The item returns an example calculation． \\
\hline 回 & External file item & The item returns an external file． \\
\hline
\end{tabular}

\section*{Share libraries created for personal use}

After you have created libraries for your personal use, you can share the calculations to other users, if necessary. See the following instructions.

NOTE The following only applies to Tedds for Word.
- Copy the user library and the calculation set from your computer to the same directories on the other users' computers.

\section*{Create libraries for organizational use}

The following paragraphs present shortcuts and tips that may help you in creating libraries for organizational use.

NOTE The following only applies to Tedds for Word.

WARNING The following shortcuts speed up creating libraries, but may increase the risk of losing data. Therefore, you should:
- Make sure that you are completely familiar with using the Library Access System, and know some Library Access System terminology. For more information, see Start the Library Access System (page 81).
- Ensure that you fully understand the instructions as you proceed.

\section*{Finding items in libraries and sets}

Each item in a set is a pointer that tells the Library Access System whether the item is in a library, what the name of the library is, and finally, what the name of the entry in that library is.
The item does not hold any information other than this. Therefore, if the Library Access System cannot find the entry, it displays the text <item not found>.
The Library Access System may be unable to find the entry for several reasons:
1. The item points to a user library, but the library file has been moved to the system libraries directory.
2. The item points to a system library, but the library file has been moved to the user libraries directory.
3. The item points to a user library, but the library file has been moved elsewhere.
4. The item points to a system library, but the library file has been moved elsewhere.
5. The library that the item points to has been deleted.
6. The entry that the item points to has been deleted from the library.

The options that are open to you depend on the event (1 to 6) that has occurred.
\begin{tabular}{|l|l|l|}
\hline \multicolumn{1}{|c|}{ Option } & \multicolumn{1}{c|}{ Event } & \multicolumn{1}{c|}{ Solution } \\
\hline A & 1 or 2 & \begin{tabular}{l} 
Modify the set so that \\
the item points to the \\
correct library type. \\
For more information, \\
see Change the library \\
type of a set (page 547)
\end{tabular} \\
\hline B & \(1,2,3\), or 4 & \begin{tabular}{l} 
Move the library back to \\
the location where \\
Library Access System \\
tries to find it.
\end{tabular} \\
\hline C & \(1,2,3\), or 4 & \begin{tabular}{l} 
Change your Library \\
Access System sections \\
to give the new location \\
of the system libraries \\
directory or user \\
libraries directory.
\end{tabular} \\
\hline & \begin{tabular}{l} 
For more information, \\
see Library access \\
system settings \\
(page 154).
\end{tabular} \\
\hline D & 5 and 6 & \begin{tabular}{l} 
Restore the library file \\
from a previous backup \\
or a version of the \\
library file containing the \\
deleted item.
\end{tabular} \\
\hline
\end{tabular}

NOTE Creating new libraries and sets requires using the options A and C repeatedly.

\section*{Tips for creating libraries}
- Ensure that none of the other users use the same directories that you use for the system libraries, user libraries and sets that you generate.
- To speed up creating system libraries, set your user libraries directory and your system libraries directory to point to the same development location. We recommend placing your sets in the development location as well.
- Ensure that the names that you use for your libraries, items, and groups reflect their contents and are not the same as the names of other users' libraries, items, and groups.
- Keep your sets and libraries to a manageable size. A number of smaller libraries and sets is far easier to handle than an enormous one.
- To easily modify your sets and libraries, keep master copies of each set and library that you create in your development location. You can make changes to the master copies, and redistribute the modified sets and libraries.
- To simplify updating your libraries and sets, try to organize sets and libraries so that the items and entries are linked by a particular theme (such as material).
- To prevent anyone from modifying or deleting your sets and libraries, ensure that the read-only attribute is set for each set and library which you release.
- If you want to create compound sets that contain entries from several libraries:
- It is easiest to create a separate set for each library you generate. Ensure that the items in the set access all the entries in the library, and that the set only includes items that refer to that library.
- It is fastest to copy the sets for the libraries to your development location.
- You can create a new set, and begin dragging and dropping items and groups according to your needs.

NOTE A single set can refer to several libraries and a library can be referred to by many sets. Therefore, deleting entries from libraries may have far reaching implications.

\section*{Frequently used procedures in creating system libraries}

The following paragraphs cover procedures that you need to use repeatedly when creating system libraries. The procedures include changing items to point to a different library type, changing the location of the user libraries directory, changing the location of the system libraries directory, and importing a library.

NOTE The following only applies to Tedds for Word.

\section*{See also}

Create system libraries (page 549)
Modify system libraries (page 551)

\section*{Change items to point to a different library type}
1. In Library Access System, open the set whose items are saved in the library to be changed.
2. Ensure that you have the Advanced mode of the Library Access System open.
3. Click Tools --> Manage Libraries....

The Manage Libraries dialog box opens.
\begin{tabular}{|c|c|c|c|c|c|c|}
\hline \multicolumn{7}{|l|}{Manage Libraries \(\times\)} \\
\hline Show Libraries in & \multicolumn{2}{|l|}{Current Set} & , & \multirow[b]{2}{*}{Modified} & \multirow[b]{2}{*}{Attributes} & \multirow[b]{2}{*}{\(\mathrm{Nu} \uparrow\)} \\
\hline Name & & Type & Size & & & \\
\hline \multicolumn{2}{|l|}{2 D frame analysis templates-x-x-enxx.lbr} & System & 224 KB & 02/14/17 12:31 & R & \\
\hline \multicolumn{2}{|l|}{2D frame analysis templates-x-x-x.lbr} & System & 1.69 MB & 02/14/17 12:26 & R & \\
\hline \multicolumn{2}{|l|}{2D frame analysis-x-x-enxx.lbr} & System & 1.42 MB & 06/08/17 19:20 & R & \\
\hline \multicolumn{2}{|l|}{Anchor bolt design-ACI318-x-enus.lbr} & System & 535 KB & 02/13/17 14:49 & R & \\
\hline \multicolumn{2}{|l|}{ASDSI.lbr} & System & 192 KB & 01/25/17 16:25 & R & \\
\hline \multicolumn{2}{|l|}{AustDatatables.lbr} & System & 160 KB & 01/25/17 16:26 & R & \\
\hline \multicolumn{2}{|l|}{Batch design-x-x-x.lbr} & System & 138 KB & 06/13/17 15:44 & R & \\
\hline \multicolumn{2}{|l|}{Bearing pressure.lbr} & System & 288 KB & 02/13/17 16:38 & R & \\
\hline \multicolumn{2}{|l|}{Bolt group analysis-si.lbr} & System & 389 KB & 02/13/17 16:38 & R & \\
\hline \multicolumn{2}{|l|}{Bolt group analysis-us.lbr} & System & 307 KB & 01/25/17 16:26 & R & \\
\hline \multicolumn{2}{|l|}{bulletins-x-x-x.lbr} & System & 1.88 MB & 06/06/17 18:29 & R & \\
\hline \multicolumn{2}{|l|}{CANotes.lbr} & System & 160 KB & 02/13/17 16:04 & R & \\
\hline \multicolumn{2}{|l|}{Cold-formed steel joist design-AISI-x-enus...} & System & 473 KB & 02/13/17 14:49 & R & \\
\hline \multicolumn{2}{|l|}{Cold-formed steel wall design-AISI-x-enus...} & System & 216 KB & 02/13/17 14:49 & R & \\
\hline \multicolumn{2}{|l|}{Column base plate-AISC360-us-enus.lbr} & System & 925 KB & 02/21/17 15:50 & R & \\
\hline \multicolumn{2}{|l|}{Column base plate-AISC360-x-enus.lbr} & System & 405 KB & 02/21/17 15:06 & R & \\
\hline \multicolumn{2}{|l|}{Compound section properties-AISC-x-enus...} & System & 117 KB & 02/13/17 14:49 & R & \\
\hline \multicolumn{2}{|l|}{Concrete design toolkit-ACI318-si-enus.lbr} & System & 160 KB & 02/13/17 15:58 & R & \\
\hline \multicolumn{2}{|l|}{Cut and fill-x-si-engb.lbr} & System & 915 KB & 02/13/17 16:38 & R & \\
\hline \multicolumn{2}{|l|}{Cut and fill-x-us-enus.lbr} & System & 808 KB & 02/13/17 14:49 & R & \\
\hline \multicolumn{2}{|l|}{Dead load calculation.lbr} & System & 192 KB & 02/13/17 16:38 & R & \(\checkmark\) \\
\hline \multicolumn{2}{|l|}{\(<\)} & & & & \multicolumn{2}{|r|}{>} \\
\hline & & & & & & se \\
\hline
\end{tabular}
4. In the Current Set list, right-click the libraries whose position you have changed.
5. Click Edit --> Type, and select the type that you want for the library.
6. When you are finished, click Close.

The library type to which the items point has now been changed.
7. Save the set to disk, so that the changed library types are used when you next open the set.

\section*{Change the location of the user libraries directory}
1. In the Tools ribbon group, click More --> Tedds options.

The Options - Default dialog box appears.
2. In the side pane of the dialog box, click Setup --> Calc libraries.

The following view opens.

3. Do one of the following:
- In the User field, type the new location for the system libraries directory.
- Click the Browse... button on the right side of the field to navigate to and locate the directory.
4. To start using the new directory, click OK.
5. To ensure that Library Access System can still find the items in your sets, open Library Access System and click View --> Refresh.

\section*{Change the location of the system libraries directory}
1. In the Tools ribbon group, click More --> Tedds options.

The Options - Default dialog box appears.
2. In the side pane of the dialog box, click Setup --> Calc libraries.

The following view opens.

3. Hold down the Ctrl key and right-click the dialog box twice. You can now modify the System field and change the location of the system libraries directory.
4. Do one of the following:
- In the System field, type the new location for the system libraries directory.
- Click the Browse... button on the right side of the field to navigate to and locate the directory.
5. To start using the new directory, click OK.
6. To ensure that Library Access System can still find the items in your sets, open Library Access System and click View --> Refresh.

\section*{Import a library}

See Basic Library Access System procedures: Advanced mode (page 86).

\section*{Create system libraries}

Creating system libraries is a multi-step process, and therefore, it is divided into several sub-tasks. To create system libraries, see the following instructions.

NOTE The following only applies to Tedds for Word.

\section*{See also}

Modify system libraries (page 551)

\section*{Before creating system libraries}
1. Write the calculations which you want to include in your Tedds for Word documents in a normal manner.
2. Change the user libraries directory and system libraries directory so that they point to the same location, or your development location.

\section*{Create system libraries}
1. To create a new set where the new items will be located, click File --> New.
2. If you have already an idea of the structure that you want the set to have, you can create new groups within the set.
3. Select the calculations which you want to add in the set.
4. Click Edit --> New Item to create new items in the set.
a. If you have selected the Select format and category of item contents setting, select the format in which the item is saved.

The New item properties dialog box appears.

5. Name the item and select the library to which you want to add entries.

At this point, the new library is a user library, and the items in the set point to it as a user library.
6. According to your needs, determine other details for the new item.
7. Click OK.
8. Click File --> Save as and save the set to your development location.
9. Repeat steps 3 to 6 for each item and entry that you want to add to the set and library.

NOTE Remember to save the set regularly.

\section*{Save system libraries}
1. Change the set so that it points to the library as a system library.

For more information, see Frequently used procedures in creating system libraries (page 546).
2. To ensure that all items are correctly displayed, do the following:
a. To expand a group, select the group and press the * key on the numeric keypad.
b. To collapse a group, select the group and press the - key on the numeric keypad.
3. Save the set into your sets directory.
4. Copy the set and the library to a disk or to a central area on your network.

NOTE Keep the original copies of the set and library in the original location, and remember to back them up.

\section*{After creating system libraries}
1. To protect the files from any accidental damage, set the read-only attribute on the copied set and library file using File Explorer.
2. Inform other users about location of the set. Tell them to place the sets in their own sets directory. If necessary, ask them to copy the system library to their own system libraries directory.

NOTE If your organization uses a central system libraries area, copy the system library to the central system libraries area, and only distribute the set.

Other users are now able to access your calculations.
3. Change your user libraries directory and system libraries directory, so that they point back to their previous locations.

\section*{Modify system libraries}

From time to time, you may need to make changes to your system libraries due to an update or a similar event. To modify system libraries, see the following instructions.

NOTE The following only applies to Tedds for Word.
WARNING We strongly recommend that:
- Only a specific group of advanced Tedds users have the authority to modify system libraries.
- You back up the existing libraries and sets before any changes are made.
- You do not make changes to the files in the locations that other Tedds users use. Instead, you should copy the files to a development location and work on these development copies.

\section*{See also}

Create system libraries (page 549)

\section*{Before modifying system libraries}
1. Ensure that the set and library that you modify are in your development location, and that they are the up-to-date copies.
2. Ensure that read-only attributes of the set and library are not set.
3. Change the user libraries directory and system libraries directory so that they point to your development location.

\section*{Modify system libraries}
1. Open the set.
2. Change the set so that it points to the library as a user library.

For more information, see Change items to point to a different library type (page 547).
3. To ensure that all items are correctly displayed, do the following:
a. To expand a group, select the group and press the * key on the numeric keypad.
b. To collapse a group, select the group and press the - key on the numeric keypad.
4. Open a new Tedds for Word document.
5. According to your needs, do one of the following:
- Write the calculations that you want to add.
- Recall the calculations you want to modify and make the necessary changes.
6. Select the calculations that you want to add or modify, and proceed according to the separate instructions.
7. Change the set so that it points to the library as a system library.
8. Repeat step 3.
9. Save the set into your sets directory. and copy it with the system library to a disk or to a central area on your network. In addition, keep the original copies in the original location. Make sure that you backup the original copies of the set and the library.
10. Copy the set and library to a disk or to a central area on your network.

NOTE Keep the original copies of the set and library in the original location, and remember to back them up.

\section*{Add items}
1. Click Edit --> New Item.
a. If you have selected the Select format and category of item contents setting, select the format in which the item is saved.

The New item properties dialog box appears.
2. Name the item and select the library to which you want to add entries.

At this point, the new library is a user library, and the items in the set point to it as a user library.
3. According to your needs, determine other details for the new item.
4. Click OK.

\section*{Modify items}
1. To change the details for an entry in the library, click Edit --> Edit Item Contents....
2. Give the new properties for the item.
3. Click OK.

\section*{After modifying system libraries}
1. To protect the files from any accidental damage, set the read-only attribute on the copied set and library file using File Explorer.
2. Inform other users about location of the set. Tell them to place the sets in their own sets directory. If necessary, ask them to copy the system library to their own system libraries directory.

NOTE If your organization uses a central system libraries area, copy the system library to the central system libraries area, and only distribute the set.

Other users are now able to access your calculations.
3. Change your user libraries directory and system libraries directory, so that they point back to their previous locations.

\subsection*{8.9 Error messages}

In general, all error and warning messages that Tedds displays should be clear in themselves. However, if you do have difficulties understanding an error message, you can see the likely causes and solutions of all Tedds error messages in the following tables.
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{General error and warning messages} \\
\hline Message & Description & Action \\
\hline A problem has occurred in the Expression Evaluation filter & The Expression Evaluation filter has failed to initialize correctly, but has not returned an error. The error may occur when you are running low on memory. & \begin{tabular}{l}
1. Close some applications. \\
2. Try again.
\end{tabular} \\
\hline A problem has occurred while initializing the Expression Evaluator expression evaluation has been aborted & The error usually occurs when your computer is running low on memory. & \begin{tabular}{l}
1. Close some applications. \\
2. Try again.
\end{tabular} \\
\hline A problem has occurred while initializing the filter to the Expression Evaluator - expression evaluation has been aborted & The error usually occurs when your computer is running low on memory. & \begin{tabular}{l}
1. Close some applications. \\
2. Try again.
\end{tabular} \\
\hline Memory full condition detected & The error usually occurs when your computer is running low on memory. & \begin{tabular}{l}
1. Close some applications. \\
2. Try again.
\end{tabular} \\
\hline Unable to launch the Library Access System. & The error usually occurs when your computer is running low on memory. & \begin{tabular}{l}
1. Close some applications. \\
2. Try again.
\end{tabular} \\
\hline Unable to launch the Sketch Viewer. & The error usually occurs when your computer is running low on memory. & \begin{tabular}{l}
1. Close some applications. \\
2. Try again.
\end{tabular} \\
\hline Unable to create temporary variable (.VBL) file & The error usually occurs when your computer is running low on memory. & \begin{tabular}{l}
1. Close some applications. \\
2. Try again.
\end{tabular} \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{General error and warning messages} \\
\hline Message & Description & Action \\
\hline Tedds is already running only one instance is allowed & You have attempted to load the Tedds system when it is already loaded. It is not possible to have two copies of the Tedds system open for one copy of Word. & Not applicable \\
\hline The clipboard format is invalid & The error is very unlikely to occur in normal use of Tedds. & - Report the error and the actions that lead to it to the Tekla Support Department. \\
\hline The clipboard is locked by another application & The error is very unlikely to occur in normal use of Tedds. & \begin{tabular}{l}
1. Close all other applications. \\
2. Try again. \\
3. If steps 1 and 2 fail, report the error and the actions that lead to it to the Tekla Support department.
\end{tabular} \\
\hline The data in the temporary library file is invalid & The error usually occurs when your disk has become corrupted in some way. & \begin{tabular}{l}
1. Verify the situation of the disk with a commercially available disk checking package. \\
2. Try again.
\end{tabular} \\
\hline Unable to create a temporary copy of the variable (.VBL) file & The error usually occurs when you are running low on disk space. & \begin{tabular}{l}
1. Delete some old files or documents. \\
2. Try again.
\end{tabular} \\
\hline The Tedds document variable file (.VBL) does not exist; - a complete document recalculation is required & \begin{tabular}{l}
A Tedds for Word document consists of two files: a Word document and a Tedds variable file with a .VBL file extension. \\
For some reason, the variable file cannot be found.
\end{tabular} & - Recalculate the entire document in order to recreate it. \\
\hline Unable to copy temporary variable file to the document variable (.VBL) file & The error usually occurs when you are running low on disk space. & 1. Delete some old files or documents. \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{General error and warning messages} \\
\hline Message & Description & Action \\
\hline & & 2. Try again. \\
\hline The Tedds document and its associated variable file (.VBL) are out of sync. An error occurred while trying to delete the variable file. You must delete this file and then perform a complete document recalculation & \begin{tabular}{l}
A Tedds for Word document consists of two files: a Word document and a Tedds variable file with a VBL file extension. \\
The integrity of the information is ensured through time stamps. \\
For some reason, the two files are no longer synchronized. That is why the stored variable file must be deleted. However, the automatic deletion of the Tedds variable file has failed. This may occur when the variable file is set to be readonly.
\end{tabular} & \begin{tabular}{l}
1. Delete the .VBL file manually. \\
2. Recalculate the entire document in order to recreate it.
\end{tabular} \\
\hline The Tedds document and its associated variable file (.VBL) are out of sync. The variable file has been deleted - a complete document recalculation is required & \begin{tabular}{l}
A Tedds for Word document consists of two files: a Word document and a Tedds variable file with a .VBL file extension. \\
The integrity of the information is ensured through time stamps. \\
For some reason, the two files are no longer synchronized. That is why the stored variable file has been deleted.
\end{tabular} & - Recalculate the entire document in order to recreate it. \\
\hline Unable to tidy the temporary variable file. The variable file has been deleted - a complete document re-calculation is required & \begin{tabular}{l}
The temporary variable files are tidied periodically during your session. A problem has occurred during this process. \\
The error may occur when you are running low on disk space.
\end{tabular} & - Remove any unwanted files from your disk. \\
\hline
\end{tabular}

\section*{Tedds error messages}

Tedds error messages can be divided into the following three categories:
- Fatal errors
- Non-fatal errors
- Variable errors
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{Fatal errors} \\
\hline Message & Description & Action \\
\hline Unable to open unit database (in read-only mode) & The unit database file cannot be found, does not exist, or is corrupt. & \begin{tabular}{l}
1. Reinstate the unit database. \\
2. Try again.
\end{tabular} \\
\hline Memory error - out of memory & \multirow[t]{10}{*}{The errors occur for a number of reasons. However, they are very unlikely to occur during normal use of Tedds.} & \multirow[t]{10}{*}{- Contact your dealer or the Tekla Support Department for assistance.} \\
\hline Reassigning floating point error handler & & \\
\hline Unable to add to an internal list & & \\
\hline Unable to create an internal function object & & \\
\hline Unable to create an internal list & & \\
\hline Unable to create an internal module object & & \\
\hline Unable to create an internal object & & \\
\hline Unable to delete an internal list & & \\
\hline Unable to initialize the Expression Evaluator & & \\
\hline Wrong output type & & \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{Non-fatal errors} \\
\hline Message & Description & Action \\
\hline Argument has incorrect dimensions & The units of an argument are incompatible with the expected units. & \begin{tabular}{l}
1. Check the expression for any unit errors. \\
2. Correct the errors. \\
3. Try again.
\end{tabular} \\
\hline Dimensional analysis is switched off & In Tedds options, the option to perform dimensional checks is switched off. & \begin{tabular}{l}
1. In Tedds options, switch on dimensional checking. \\
2. Try again.
\end{tabular} \\
\hline Dimensional equality expected in expression & The dimensions within the expression are not correct. & 1. Check the expression for any errors in the units of \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{Non-fatal errors} \\
\hline Message & Description & Action \\
\hline & & \begin{tabular}{l}
any variables or constants. \\
2. Correct the errors. \\
3. Try again. \\
or \\
- Switch off dimensional checking.
\end{tabular} \\
\hline & & \begin{tabular}{l}
NOTE If you switch off dimensional checking, be careful to ensure that the results are still valid. \\
You can confirm the dimensional analysis of the expression by looking up its functions. For more information, see Mathematics (page 502).
\end{tabular} \\
\hline Dimensional equality required for addition/ subtraction & The dimensions within the expression are not correct. & \begin{tabular}{l}
1. Check the expression for errors, such as \(1 m+\) \(1 \mathrm{~kg}=\) ? \\
2. Correct the errors. \\
3. Try again.
\end{tabular} \\
\hline Dimensional equality required for numeric comparison & The dimensions within the expression are not correct. & \begin{tabular}{l}
1. Check the expression for errors, such as if(1 \(m<1 \mathrm{~kg}, 1,0\) ). \\
2. Correct the errors. \\
3. Try again.
\end{tabular} \\
\hline Dimensionless value expected in expression & You have specified a value with dimensions & 1. Confirm the dimensional \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{Non-fatal errors} \\
\hline Message & Description & Action \\
\hline & that the function cannot accept, for example \(\sin (45 \mathrm{~m})\). & \begin{tabular}{l}
analysis of the expression by looking up its functions. \\
For more information, see Mathematics (page 502). \\
2. Alter the expression. \\
3. Try again.
\end{tabular} \\
\hline Divide by zero & Tedds has found an expression containing a division by zero. & \begin{tabular}{l}
1. Check your document for errors. \\
2. Correct the errors. \\
3. Try again.
\end{tabular} \\
\hline Equal sign expected in expression & An equal sign is missing from the expression. & \begin{tabular}{l}
1. Check the expression for a missing equal sign. \\
2. Correct the errors. \\
3. Try again.
\end{tabular} \\
\hline Expression contains a variable which references itself & The calculated expressions contain a circular calculation. & \begin{tabular}{l}
1. Check the expression for errors. \\
2. Correct the errors. \\
3. Try again.
\end{tabular} \\
\hline Expression contains an unexpected delimiter & The expression is incomplete. & \begin{tabular}{l}
1. Correct the expression. \\
2. Try again.
\end{tabular} \\
\hline Expression is too complex to evaluate & The most likely reason for the error to occur is that the expression is recursive, for example \(a\) \(=a+1\). & \begin{tabular}{l}
1. Correct the expression. \\
2. Try again.
\end{tabular} \\
\hline Function argument must be dimensionless & The dimensions within the expression are not correct. & \begin{tabular}{l}
1. Check the expression for errors, such as \(\log (1\) \(m\) ) \(=\) ? \\
2. Correct the errors. \\
3. Try again.
\end{tabular} \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{Non-fatal errors} \\
\hline Message & Description & Action \\
\hline Function argument number - - - is not within its permissible range & An argument of a function is outside the allowable range. & \begin{tabular}{l}
1. Check the allowable argument values by looking up the function. \\
For more information, see Mathematics (page 502). \\
2. Correct the errors. \\
3. Try again.
\end{tabular} \\
\hline Function arguments have mismatched dimensions & The dimensions within the expression are not correct. & \begin{tabular}{l}
1. Check the expression for errors, such as \(\min (3 m, 5 \mathrm{~kg})=\) ? \\
2. Correct the errors. \\
3. Try again.
\end{tabular} \\
\hline Illegal mathematical relationship & The values that you have entered in an equation are of different types. & \begin{tabular}{l}
1. Check your document for errors, such as \(a==\) 1. \\
2. Correct the errors. \\
3. Try again.
\end{tabular} \\
\hline Incorrect argument in function & The function contains an incorrect type of argument. & \begin{tabular}{l}
1. Check the types of argument which the function requires by looking up the function. \\
For more information, see Mathematics (page 502). \\
2. Correct the errors. \\
3. Try again.
\end{tabular} \\
\hline Incorrect number of arguments in function & The function contains an incorrect number of arguments. & \begin{tabular}{l}
1. Check the number of arguments that the function requires by looking up the function. \\
For more information, see
\end{tabular} \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{Non-fatal errors} \\
\hline Message & Description & Action \\
\hline & & \begin{tabular}{l}
Mathematics
(page 502). \\
2. Correct the errors. \\
3. Try again.
\end{tabular} \\
\hline Interrupted by user & You have chosen to interrupt a calculation. & Not applicable \\
\hline Invalid expression & Tedds is unable to find a valid expression. & \begin{tabular}{l}
1. Correct the expression. \\
2. Try again.
\end{tabular} \\
\hline Invalid expression to call a module & The expression contains a call to an invalid module, possibly because the module has been overwritten. & \begin{tabular}{l}
1. Do one of the following: \\
- Alter the call. \\
- Reinstate the call from the library. \\
2. Try again.
\end{tabular} \\
\hline Invalid result format defined & Usually The error occurs when you have specified an incorrect format character in a results format string. & \begin{tabular}{l}
1. Check the allowable result formats. \\
For more information, see Result formats and precision (page 523). \\
2. Try again.
\end{tabular} \\
\hline Missing or misplaced parenthesis & Tedds has found unmatched left and right parentheses. & \begin{tabular}{l}
1. Correct the expression. \\
2. Try again.
\end{tabular} \\
\hline Missing semicolon (;) & Tedds cannot find a set of complete expressions. & \begin{tabular}{l}
1. Check the document for errors. \\
2. Correct the expression. \\
3. Try again.
\end{tabular} \\
\hline Multiple final results defined on one line & You have defined several final results fields within a single equation, for example \(a+b=\) ? = ? . & \begin{tabular}{l}
1. Correct the expression. \\
2. Try again.
\end{tabular} \\
\hline Multiple intermediate results defined on one line & You have defined several intermediate results fields within a single & 1. Correct the expression. \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{Non-fatal errors} \\
\hline Message & Description & Action \\
\hline & equation, for example \(a\) \(+b=\#\) = \# . & 2. Try again. \\
\hline Multiple variable assignments defined on one line & You have defined several variables within a single equation, \(a=b=\) ?. & \begin{tabular}{l}
1. Correct the expression. \\
2. Try again.
\end{tabular} \\
\hline No expression to evaluate! & The area of the document which you have chosen to evaluate does not contain any complete expressions. & \begin{tabular}{l}
1. Modify the chosen area. \\
2. Try again.
\end{tabular} \\
\hline Numeric domain error & The value of the function is not appropriate, for example \(\alpha \sin (5)\). & \begin{tabular}{l}
1. Correct the expression. \\
2. Try again.
\end{tabular} \\
\hline Numeric power must be dimensionless & The dimensions within the expression are not correct. & \begin{tabular}{l}
1. Check the expression for errors such as \(10^{5}\) kg. \\
2. Try again.
\end{tabular} \\
\hline Numeric range error & Calculating the expression has resulted in a number which is too large (> \(10^{306}\) ), or too small (< 10-306) to handle. & \begin{tabular}{l}
1. Correct the expression. \\
2. Try again.
\end{tabular} \\
\hline Security violation - unable to obtain a licence for this function & You are using a function that is secured. It is not possible to run more copies of this function than your licence allows. & \begin{tabular}{l}
1. Wait until a licence becomes available. \\
2. Try again.
\end{tabular} \\
\hline Specified result units do not match dimensions of expression & The dimensions within the expression are not correct. & \begin{tabular}{l}
1. Check the expression for errors, such as \(1 \mathrm{~m}+\) \(5 \mathrm{~m}=\) ? kg . \\
2. Correct the expression. \\
3. Try again.
\end{tabular} \\
\hline Square root of a negative number & Tedds has found an expression containing the square root of a negative number. & \begin{tabular}{l}
1. Check the document for errors. \\
2. Correct the errors.
\end{tabular} \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{Non-fatal errors} \\
\hline Message & Description & Action \\
\hline & & 3. Try again. \\
\hline Unable to add a unit to the unit database & Either the unit database file does not exist or it is corrupt, or the unit you have specified already exists in the unit database. & \begin{tabular}{l}
- Reinstate the unit database. \\
or \\
1. Remove the old definition of the unit. \\
For more information, see Delete system units (page 353). \\
2. Add a new definition for the unit. \\
For more information, see Add system units (page 352).
\end{tabular} \\
\hline Unable to decompose units & Tedds cannot split the units of your calculations into components that it recognizes. & \begin{tabular}{l}
1. Check the document for errors. \\
2. Correct the errors. \\
3. If necessary, add a new unit to the unit database. \\
For more information, see Add system units (page 352). \\
4. Try again.
\end{tabular} \\
\hline Unable to delete a unit from the unit database & Either the unit database file does not exist or it is corrupt, or it does not contain the unit you are trying to delete. & \begin{tabular}{l}
1. Check the document for errors. \\
2. Correct the errors. \\
3. If necessary, add a new unit to the unit database. \\
For more information, see Add system units (page 352).
\end{tabular} \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{Non-fatal errors} \\
\hline Message & Description & Action \\
\hline & & 4. Try again. \\
\hline Unable to get a unit from the unit database & Either the unit database file does not exist or it is corrupt, or it does not contain the unit you are trying to display or delete. & \begin{tabular}{l}
1. Reinstate the unit database file. \\
2. Try again. \\
For further information, see Units (page 526).
\end{tabular} \\
\hline Unable to open variables file & \begin{tabular}{l}
A Tedds for Word document consists of two files: a Word document and a Tedds variable file with a .VBL file extension. \\
The variable file that you are using has been deleted or has become corrupt.
\end{tabular} & \begin{tabular}{l}
1. Save and close the document. \\
2. Delete the .VBL file. \\
3. Open the document. \\
4. Recalculate the document.
\end{tabular} \\
\hline Unable to re-apply units to value & There is an error in your units. & \begin{tabular}{l}
1. Check the units for errors. \\
2. Correct the errors. \\
3. Try again.
\end{tabular} \\
\hline Unknown keyword & The expression uses an unknown keyboard. & \begin{tabular}{l}
1. Modify the expression to remove the unknown keyboard. \\
2. Try again.
\end{tabular} \\
\hline Unknown module called & The expression calls an unknown module. & \begin{tabular}{l}
1. Modify the expression to remove the unknown module. \\
2. Try again.
\end{tabular} \\
\hline Unknown variable in expression & A variable in an expression has not been defined, and you have not given it a value. & \begin{tabular}{l}
1. Define the variable. \\
2. Try again.
\end{tabular} \\
\hline Unrecognized unit & The unit does not exist in the unit database. & \begin{tabular}{l}
1. Add the unit in the unit database. \\
For more information, see Add system units (page 352).
\end{tabular} \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{Non-fatal errors} \\
\hline Message & Description & Action \\
\hline & & 2. Try again. \\
\hline Unable to add a section to the variables file & \multirow[t]{11}{*}{\begin{tabular}{l}
A Tedds for Word document consists of two files: a Word document and a Tedds variable file with a .VBL file extension. \\
When one of these errors occurs, the variable file either does not exist, or it is corrupt.
\end{tabular}} & \multirow[t]{3}{*}{\begin{tabular}{l}
1. Save and close the document. \\
2. Delete the .VBL file. \\
3. Open the document.
\end{tabular}} \\
\hline Unable to add a variable to the variables file (.VBL) & & \\
\hline Unable to close the variables file (.VBL) & & \\
\hline Unable to delete a section from the variables file (.VBL) & & document. \\
\hline Unable to delete a variable from the variables file (.VBL) & & \\
\hline Unable to get a section from the variables file (.VBL) & & \\
\hline Unable to get a variable from the variables file (.VBL) & & \\
\hline Unable to get sync code for the variables file (.VBL) & & \\
\hline Unable to initiali ze the variables file (.VBL) & & \\
\hline Unable to set sync code in the variables file (.VBL) & & \\
\hline Unable to tidy the variables file (.VBL) & & \\
\hline Unable to close the unit database & The unit database file does not exist, or is & 1. Reinstate the unit database file. \\
\hline Unable to enumerate units in the unit database (unit) & corrupt. & 2. Try again. \\
\hline Unable to initialize the unit database (unit) & & \\
\hline No system variables file found & The errors occur for a number of reasons. They & - Contact your dealer or the Tekla Support \\
\hline No unit database specified & are very unlikely to arise during normal use of Tedds. & Department for assistance. \\
\hline Unable to create a DLL instance & & \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{Non-fatal errors} \\
\hline Message & Description & Action \\
\hline Unable to enumerate variables & & \\
\hline Unable to execute program & & \\
\hline Unable to open the system variables file (read-only mode) & & \\
\hline Unable to open the unit database (read-write mode) & & \\
\hline End of buffer reached while reading RTF & \multirow[t]{8}{*}{The errors occur for a number of reasons. They are very unlikely to arise during normal use of Tedds.} & \multirow[t]{8}{*}{- Contact your dealer or the Tekla Support Department for assistance.} \\
\hline Internal ris assertion failure & & \\
\hline Invalid font name & & \\
\hline Invalid hex character found & & \\
\hline RTF Stack overflow & & \\
\hline RTF Stack underflow & & \\
\hline RTF table (sym or prop) invalid & & \\
\hline Unmatched brace & & \\
\hline Bad field & \multirow[t]{8}{*}{The errors occur for a number of reasons. They are very unlikely to arise during normal use of Tedds.} & \multirow[t]{8}{*}{- Contact your dealer or the Tekla Support Department for assistance.} \\
\hline Building output from results ... ... & & \\
\hline Cannot add to list & & \\
\hline Cannot create list structure & & \\
\hline Cannot create object & & \\
\hline Error can't enlarge buffer & & \\
\hline Invalid CSC bookmark (nested!) & & \\
\hline Mismatched bookmarks & & \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{ Non-fatal errors } \\
\hline Message & Description & Action \\
\hline Out of memory & & \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{Rare fatal errors} \\
\hline Message & Description & Action \\
\hline floating point error invalid & \multirow[t]{10}{*}{The floating point errors occur for a number of reasons. They are not specifically located within Tedds because they are very unlikely to arise.} & \multirow[t]{10}{*}{- Contact the Tekla Support Department for assistance.} \\
\hline floating point error denormal & & \\
\hline floating point error divide by zero & & \\
\hline floating point error overflow & & \\
\hline floating point error underflow & & \\
\hline floating point error inexact & & \\
\hline floating point error unemulated & & \\
\hline floating point error - sqrt. neg number & & \\
\hline floating point error - stack overflow & & \\
\hline floating point error - stack underflow & & \\
\hline
\end{tabular}

\section*{Library Access System error messages}
\begin{tabular}{|l|l|ll|}
\hline \multicolumn{4}{|c|}{ Library Access System error messages } \\
\hline \multicolumn{1}{|c|}{ Message } & \multicolumn{1}{c|}{ Description } & \multicolumn{1}{c|}{ Action } \\
\hline \begin{tabular}{l} 
Failed to get Clipboard \\
data!
\end{tabular} & \begin{tabular}{l} 
The error usually occurs \\
when your computer is \\
running low on memory.
\end{tabular} & \begin{tabular}{l} 
1.
\end{tabular} \begin{tabular}{l} 
Close calculation \\
sets or other \\
running \\
applications.
\end{tabular} \\
\hline Failed to open Clipboard! & \begin{tabular}{l} 
The error usually occurs \\
when your computer is \\
Try again.
\end{tabular} \\
running low on memory. & 1. \begin{tabular}{l} 
Close calculation \\
sets or other \\
running \\
applications.
\end{tabular} \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{Library Access System error messages} \\
\hline Message & Description & Action \\
\hline & & 2. Try again. \\
\hline File does not exist: & You have entered a set name which does not exist. & \begin{tabular}{l}
1. Do one of the following: \\
- Enter the correct set name. \\
- Select the set in the list of available sets. \\
2. Try again.
\end{tabular} \\
\hline Incorrect set format & The format of the set which you have selected is incorrect. & \begin{tabular}{l}
1. You may need to reinstall Tedds. \\
For further assistance, contact the Tekla Support Department.
\end{tabular} \\
\hline Invalid Library File name & The name of the library file that you have given contains invalid characters. & - Type a name that only contains valid characters. \\
\hline Problem adding new item into calculation set & \begin{tabular}{l}
When a calculation set is modified, a temporary file is created to contain the changed information. \\
Either the file cannot be created, or cannot be extended to hold the required information. \\
The error is most likely to occur because the disk is full.
\end{tabular} & \begin{tabular}{l}
1. Delete some old files or documents. \\
2. Try again.
\end{tabular} \\
\hline Problem retrieving valid library item data from clipboard & You have attempted to add data into the library, but the data on the clipboard is invalid. & 1. Try to paste data that is appropriate for a library item. \\
\hline Problem updating selected library item in calculation set & \begin{tabular}{l}
When a calculation set is modified, a temporary file is created to contain the changed information. \\
Either the file cannot be created, or cannot be
\end{tabular} & \begin{tabular}{l}
1. Delete some old files or documents. \\
2. Try again.
\end{tabular} \\
\hline
\end{tabular}
\begin{tabular}{|l|l|l|}
\hline \multicolumn{3}{|c|}{ Library Access System error messages } \\
\hline Message & \multicolumn{1}{|c|}{ Description } & \multicolumn{1}{c|}{ Action } \\
\hline & \begin{tabular}{l} 
extended to hold the \\
required information. \\
The error is most likely \\
to occur because the \\
disk is full.
\end{tabular} & \\
\hline
\end{tabular}

\section*{Sketch viewer error messages}
\begin{tabular}{|l|l|l|}
\hline \multicolumn{3}{|c|}{ Sketch Viewer error messages } \\
\hline \multicolumn{1}{|c|}{ Message } & \multicolumn{1}{|c|}{ Description } & \multicolumn{1}{c|}{ Action } \\
\hline \begin{tabular}{l} 
An unknown file format \\
has been selected
\end{tabular} & \begin{tabular}{l} 
The data in the file \\
cannot be imported. \\
The file may have the \\
wrong file extension or \\
be in an old format.
\end{tabular} & \begin{tabular}{l} 
Select a file \\
containing correct \\
information.
\end{tabular} \\
\hline \begin{tabular}{l} 
This Sketch cannot be \\
enlarged any further
\end{tabular} & \begin{tabular}{l} 
The error occurs when \\
you have repeatedly \\
zoomed into the picture. \\
The result of the zoom \\
that you have tried to \\
perform would be a \\
picture which is too large \\
to be displayed.
\end{tabular} & \begin{tabular}{l} 
Try another zoom \\
setting.
\end{tabular} \\
\hline \begin{tabular}{l} 
This Sketch cannot be \\
reduced any further
\end{tabular} & \begin{tabular}{l} 
The error occurs when \\
you have repeatedly \\
zoomed out of the \\
picture.
\end{tabular} & • Try another zoom \\
setting.
\end{tabular}

\section*{Data Tables error messages}
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{Data Tables error messages} \\
\hline Message & Description & Action \\
\hline File does not exist & The Data Tables tool has tried to open a table that cannot be located. & \begin{tabular}{l}
1. You may need to reinstall Tedds. \\
For further assistance, contact the Tekla Support Department.
\end{tabular} \\
\hline Invalid Data Table file format & The Data Tables tool has tried to open a data table that is corrupt. & \begin{tabular}{l}
1. You may need to reinstall Tedds. \\
For further assistance, contact the Tekla Support Department.
\end{tabular} \\
\hline Range values for "item name" cannot be extrapolated in table "table name" & \begin{tabular}{l}
Extrapolation of data tables is not permitted. \\
The values that you specify for interpolation must be greater than the smallest value and less than the largest value of the range item which is being interpolated.
\end{tabular} & \begin{tabular}{l}
1. Check the table for errors. \\
2. Correct the errors. \\
3. Try again.
\end{tabular} \\
\hline The zoom factor must be between 50 and 200\% & You have specified a zoom factor that is outside the allowable range of \(50-200 \%\). & - Enter a zoom value that is within the allowable range. \\
\hline This table has no value ranges and therefore cannot be interpolated & \begin{tabular}{l}
The opened data table does not contain any items that can be interpolated. \\
You can only interpolate tables that have ranges of information in them, for example various spans.
\end{tabular} & - Open a table that has items that can be interpolated. \\
\hline
\end{tabular}

\section*{Data Graph error messages}
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{Data Graph error messages} \\
\hline Message & Description & Action \\
\hline Failed to connect to your user registry key. Your user defined options have not been loaded and any changes made to the user options will not be saved. & The Data Graph tool has tried to save your settings to the Windows registry, but for some reason, the connection has failed. & \begin{tabular}{l}
1. You may need to reinstall Tedds. \\
For further assistance, contact the Tekla Support Department.
\end{tabular} \\
\hline Failed to create Data Graph registry key. & The Data Graph tool has tried to create a basic set of settings in the Windows registry, but for some reason, the process has failed. & \begin{tabular}{l}
1. You may need to reinstall Tedds. \\
For further assistance, contact the Tekla Support Department.
\end{tabular} \\
\hline Failed to connect to Tedds. Changes to variables will not be updated in your document. & The Data Graph tool has tried to connect to Tedds, so that the details of your selections could be returned to your document. For some reason, the connection has failed. & \begin{tabular}{l}
1. Close and restart Tedds. \\
2. If the problem continues, you may need to re-install Tedds. \\
For further assistance, contact the Tekla Support Department.
\end{tabular} \\
\hline Failed to open the 'Users' registry key. & The Data Graph tool has tried to save your settings to the Windows registry. For some reason, the connection has failed. & \begin{tabular}{l}
1. You may need to reinstall Tedds. \\
For further assistance, contact the Tekla Support Department.
\end{tabular} \\
\hline Value already exists (Interpolation dialog). & You have tried to interpolate a graph, but the value you have specified is the same as for a curve that already exists. & - Specify a value that does not correspond to an existing curve. \\
\hline
\end{tabular}

\section*{Section Designer error messages}
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{Section Designer error messages} \\
\hline Message & Description & Action \\
\hline The detail specified for the shape, places it off the canvas. The shape has been deleted. & \begin{tabular}{l}
In the Section Designer, all shapes must lie completely within the canvas. \\
The details that you defined for the last shape did not meet this requirement. The shape has been deleted.
\end{tabular} & \begin{tabular}{l}
1. Save the shape to Tedds. \\
2. Select a larger canvas size. \\
3. Define the shapes for your section.
\end{tabular} \\
\hline The length of the hole is greater than the length of the parent shape. & \begin{tabular}{l}
In the Section Designer, all holes must lie completely within their parent shape. \\
The hole that you have just defined does not meet these requirements. The hole has not been created.
\end{tabular} & \begin{tabular}{l}
- Do one of the following: \\
- Increase the size of the parent object. \\
- Reduce the size of the hole.
\end{tabular} \\
\hline The width of the hole is greater than the width of the parent shape. & \begin{tabular}{l}
In the Section Designer, all holes must lie completely within their parent shape. \\
The hole that you have just defined does not meet these requirements. The hole has not been created.
\end{tabular} & \begin{tabular}{l}
- Do one of the following: \\
- Increase the size of the parent object. \\
- Reduce the size of the hole.
\end{tabular} \\
\hline The diameter of the hole is greater than the width/ length of the parent shape. & \begin{tabular}{l}
In the Section Designer, all holes must lie completely within their parent shape. \\
The hole that you have just defined does not meet these requirements. The hole has not been created.
\end{tabular} & \begin{tabular}{l}
- Do one of the following: \\
- Increase the size of the parent object. \\
- Reduce the size of the hole.
\end{tabular} \\
\hline The diameter of the hole is greater than the diameter of the parent shape. & In the Section Designer, all holes must lie & \begin{tabular}{l}
- Do one of the following: \\
- Increase the size of the parent object.
\end{tabular} \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{Section Designer error messages} \\
\hline Message & Description & Action \\
\hline & \begin{tabular}{l}
completely within their parent shape. \\
The hole that you have just defined does not meet these requirements. The hole has not been created.
\end{tabular} & - Reduce the size of the hole. \\
\hline The detail for the hole places it outside its parent shape. & \begin{tabular}{l}
In the Section Designer, all holes must lie completely within their parent shape. \\
The hole that you have just defined does not meet these requirements. The hole has not been created.
\end{tabular} & \begin{tabular}{l}
- Do one of the following: \\
- Increase the size of the parent object. \\
- Reduce the size of the hole.
\end{tabular} \\
\hline The hole has been moved outside of its parent shape. The move has been cancelled. & \begin{tabular}{l}
In the Section Designer, all holes must lie completely within their parent shape. \\
The move that you tried to make would cause the hole to lie outside its parent shape. The move has been cancelled.
\end{tabular} & \begin{tabular}{l}
- Do one of the following: \\
- Move the parent shape and the hole together. \\
- Increase the size of the parent shape, so that it can contain the hole in its new location.
\end{tabular} \\
\hline The hole has been resized to make it too big to fit in its parent shape. The resize has been cancelled. & \begin{tabular}{l}
In the Section Designer, all holes must lie completely within their parent shape. \\
The resize that you applied would cause the hole to lie outside its parent shape. The resize has been cancelled.
\end{tabular} & \begin{tabular}{l}
1. Increase the size of the parent shape so that it can contain the larger hole. \\
2. Increase the size of the hole again.
\end{tabular} \\
\hline This shape has been resized making it too small to contain its existing hole(s). The resize has been cancelled. & \begin{tabular}{l}
In the Section Designer, all holes must lie completely within their parent shape. \\
The resize that you applied would cause the
\end{tabular} & 1. Decrease the size of the hole so that it will fit within the new size of the parent shape. \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{Section Designer error messages} \\
\hline Message & Description & Action \\
\hline & hole to lie outside its parent shape. The resize has been cancelled. & 2. If necessary, decrease the size of the parent shape. \\
\hline This shape has been modified preventing it containing all its existing hole(s). The editing has been cancelled. & \begin{tabular}{l}
In the Section Designer, all holes must lie completely within their parent shape. \\
The modification that you applied to the parent shape would cause the hole to lie outside its parent shape. The modification has been cancelled.
\end{tabular} & \begin{tabular}{l}
1. Modify the holes so that they fit within the new size of the parent shape. \\
2. If needed, decrease the size of the parent shape.
\end{tabular} \\
\hline The size of canvas you have chosen has changed. This could result in loss of shapes or shapes which are too small to be seen. & \begin{tabular}{l}
You have chosen a canvas size that is different to the one that you used when you last calculated the section properties for this section. \\
If there are any shapes that do not lie completely within the canvas, they are deleted. Conversely, if there are any small shapes on your canvas, you might not be able to see these even at the largest possible zoom factor.
\end{tabular} & \begin{tabular}{l}
If this is acceptable: \\
- Click Next. \\
Otherwise: \\
- Select another canvas size.
\end{tabular} \\
\hline This will lose all the work that you have done on this canvas. Are you sure that you want to proceed? & You have made changes to the canvas, and have chosen to create a new canvas. The changes that you have made will be lost. & \begin{tabular}{l}
If this is acceptable: \\
- Click OK. \\
Otherwise: \\
- Save the changes before attempting to open a new canvas.
\end{tabular} \\
\hline The snap details specified for the shape, places it off the canvas. The snap shapes has been cancelled. & In the Section Designer, all shapes must lie & 1. Move the shapes so that both shaped will lie on canvas when snapped together. \\
\hline
\end{tabular}
\begin{tabular}{|l|l|l|}
\hline \multicolumn{3}{|c|}{ Section Designer error messages } \\
\hline \multicolumn{1}{|c|}{ Message } & \multicolumn{1}{|c|}{ Description } & \multicolumn{1}{c|}{ Action } \\
\hline & \begin{tabular}{l} 
Completely within the \\
canvas. \\
The modification that \\
you applied by snapping \\
the shapes to one \\
another would cause \\
one of the shapes to lie \\
off the canvas. The \\
modification has been \\
cancelled.
\end{tabular} & \begin{tabular}{l} 
Try snapping the \\
options to one \\
another again
\end{tabular} \\
\hline \begin{tabular}{l} 
Your input ini file does not \\
exist. Please contact Tekla \\
support.
\end{tabular} & \begin{tabular}{l} 
One of the files required \\
by the Section Designer \\
does not exist.
\end{tabular} & - \begin{tabular}{l} 
Contact the Tekla \\
Support Department.
\end{tabular} \\
\hline \begin{tabular}{l} 
Your output ini file does \\
not exist. Please contact \\
Tekla support.
\end{tabular} & \begin{tabular}{l} 
One of the files required \\
by the Section Designer \\
does not exist.
\end{tabular} & - Contact the Tekla \\
Support Department.
\end{tabular}

\subsection*{8.10 Toolbars and buttons}

This section covers the toolbars and buttons that allow you access many functions with a single click.

\section*{See also}

Tedds ribbon commands (the Tedds Application only) (page 575)
Tedds ribbon groups (Tedds for Word only) (page 585)
Library Access System toolbars (page 594)
Sketch Viewer toolbar (page 597)
Data Tables toolbar (page 598)
Data Graph interpolate bar (page 599)
Section Designer toolbars (page 600)

\section*{Tedds ribbon commands (the Tedds Application only)}

The following tables cover the different commands and their functions on the Tedds ribbon.

NOTE The following only applies to the Tedds Application.

\section*{file menu}
\begin{tabular}{|c|c|c|}
\hline Button & Action & Further information \\
\hline \[
\square_{0}
\]
New & \begin{tabular}{l}
New \\
- create a new empty calculation document \\
- create a new project
\end{tabular} & After performing a calculation (page 59) \\
\hline  & \begin{tabular}{l}
Open... \\
- browse to open an existing calculation document \\
- open a recent calculation document
\end{tabular} & \\
\hline  & \begin{tabular}{l}
Open Project... \\
- browse to open an existing project \\
- open a recent project
\end{tabular} & \\
\hline  & \begin{tabular}{l}
Save \\
- save the active calculation document \\
- save the active project
\end{tabular} & \\
\hline Save All & \begin{tabular}{l}
Save All \\
saves all active documents.
\end{tabular} & \\
\hline Save As... & \begin{tabular}{l}
Save As... \\
- save the active document as PDF \\
- save all documents in the active project as PDF \\
- save the active document \\
- save the active project
\end{tabular} & \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline Button & Action & Further information \\
\hline & \begin{tabular}{l}
- save the the active document to a Trimble Connect location \\
- save the the active project to a Trimble Connect location
\end{tabular} & \\
\hline  & \begin{tabular}{l}
Send To \\
allows you to send the current calculations to another application, such as Tedds for Word or Microsoft Word, or to another Tedds user via email.
\end{tabular} & \\
\hline Print & \begin{tabular}{l}
Print \\
- print the active document \\
- quick print \\
- print preview \\
- print setup \\
- page setup
\end{tabular} & \\
\hline Properties.. & \begin{tabular}{l}
Properties... \\
display properties for the active document
\end{tabular} & \\
\hline Close & \begin{tabular}{l}
Close \\
close the active document
\end{tabular} & \\
\hline Close All & \begin{tabular}{l}
Close All \\
close all documents
\end{tabular} & \\
\hline Close Project & \begin{tabular}{l}
Close Project \\
close the active project
\end{tabular} & \\
\hline
\end{tabular}

Home tab
\begin{tabular}{|c|c|c|}
\hline Button & Action & Further information \\
\hline \begin{tabular}{l}
■ \\
New
\end{tabular} & \begin{tabular}{l}
New \\
creates a new empty calculation document.
\end{tabular} & \multirow[t]{5}{*}{After performing a calculation (page 59)} \\
\hline Open & \begin{tabular}{l}
Open \\
allows you to open and modify an existing calculation document.
\end{tabular} & \\
\hline  & \begin{tabular}{l}
Save \\
saves the current calculation document.
\end{tabular} & \\
\hline Duplicate & \begin{tabular}{l}
Duplicate \\
creates an identical copy of the current calculation document. You can modify the versions separately without any changes affecting the other version.
\end{tabular} & \\
\hline \[
\begin{gathered}
\square \\
\text { Send } \\
\text { To }
\end{gathered}
\] & \begin{tabular}{l}
Send To \\
allows you to send the current calculations to another application, such as Tedds for Word or Microsoft Word, or to another Tedds user via email.
\end{tabular} & \\
\hline  & \begin{tabular}{l}
Header \\
allows you to modify the information on the header of the current calculation document
\end{tabular} & Adjust calculation sheet details (page 64) \\
\hline \begin{tabular}{l}
! \\
Calculate
\end{tabular} & \begin{tabular}{l}
Calculate \\
re-calculates the current calculation document and allows you to modify the calculation details.
\end{tabular} & After performing a calculation (page 59) \\
\hline \[
\digamma_{|x|}
\] & \begin{tabular}{l}
Variables \\
allows you to view and manage the variables of the calculation document.
\end{tabular} & Use the Variables dialog box (page 365) \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline Button & Action & Further information \\
\hline Find & \begin{tabular}{l}
Find \\
allows you to search the calculation document with a specific search text.
\end{tabular} & Not applicable \\
\hline \begin{tabular}{l}
\[
0
\] \\
Next
\end{tabular} & \begin{tabular}{l}
Next \\
moves to the next point in the calculation that matches the current search text.
\end{tabular} & \\
\hline \begin{tabular}{l}
XX \\
Locale
\end{tabular} & \begin{tabular}{l}
Locale \\
allows you to select which regional calculations and data you want to use in your calculation document. \\
NOTE • Depending on your licence and location, you may have one or several locales installed by default. \\
Calculations and data for other locales is available at additional cost. If you only have one locale installed, the Locale list is not active. \\
- The appearance of the locale list varies slightly depending on the locale that you are using.
\end{tabular} & Change the locale (page 61) \\
\hline Options & \begin{tabular}{l}
Options \\
allows you to adjust different Tedds options.
\end{tabular} & Configuring settings (page 135) \\
\hline
\end{tabular}

\section*{Project tab}
\begin{tabular}{|c|c|c|}
\hline Button & Action & Further information \\
\hline \[
\begin{gathered}
\text { El } \\
=0 \\
\text { New } \\
\text { Project }
\end{gathered}
\] & New Project creates an empty project. & Create a new project (page 67) \\
\hline  & \begin{tabular}{l}
Open Project \\
allows you to select and open an existing project.
\end{tabular} & Open or close existing projects (page 69) \\
\hline \[
\begin{aligned}
& \text { II } \\
& \text { Save } \\
& \text { Project }
\end{aligned}
\] & \begin{tabular}{l}
Save Project \\
saves the current project.
\end{tabular} & Not applicable \\
\hline  & \begin{tabular}{l}
Send To Tedds For Word \\
send all or some of the documents in the current project to Tedds for Word
\end{tabular} & After performing a calculation (page 59) \\
\hline Project Header & \begin{tabular}{l}
Project Header \\
allows you to create and adjust a project header that is common to all the documents within the current project.
\end{tabular} & Modify document headers or project headers (page 68) \\
\hline Calculate Project & \begin{tabular}{l}
Calculate Project \\
allows you to recalculate the entire project and modify the calculation details.
\end{tabular} & Not applicable \\
\hline  & \begin{tabular}{l}
New Document \\
adds an empty calculation document to the current project.
\end{tabular} & Add documents into a project (page 67) \\
\hline \(\mathbb{Q}_{+}\)Active Document & \begin{tabular}{l}
Active Document \\
adds the currently active document to the current project.
\end{tabular} & \\
\hline \(\mathrm{E}_{+}{ }_{+}\)Existing Document & Existing Document allows you to select an existing document that & \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline Button & Action & Further information \\
\hline & you want to add in the current project. & \\
\hline Folder & \begin{tabular}{l}
Folder \\
adds a folder within the currently open project.
\end{tabular} & Reorganize documents within a project (page 67) \\
\hline Rename & Rename allows you to rename the document or folder that is currently selected in the Project Manager window. & Not applicable \\
\hline 国 Move Up & \begin{tabular}{l}
Move Up \\
moves the document or folder that is currently selected in the Project Manager window up by one step.
\end{tabular} & Reorganize documents within a project (page 67) \\
\hline 國 Move Down & \begin{tabular}{l}
Move Down \\
moves the document or folder that is currently selected in the Project Manager window down by one step.
\end{tabular} & \\
\hline \(\times\) Remove & \begin{tabular}{l}
Remove \\
removes the document or folder that is currently selected in the Project Manager window from the current project.
\end{tabular} & Not applicable \\
\hline
\end{tabular}

View tab
\begin{tabular}{|l|l|l|}
\hline \multicolumn{1}{|c|}{ Button } & \multicolumn{1}{c|}{ Action } & Further information \\
\hline \hline \begin{tabular}{l} 
Start \\
Page
\end{tabular} & \begin{tabular}{l} 
Start Page \\
opens the Tedds Start \\
Page.
\end{tabular} & \begin{tabular}{l} 
Start Tekla Tedds \\
(page 50)
\end{tabular} \\
\hline\(\square\) Project Manager & \begin{tabular}{l} 
Project Manager \\
allows you to select \\
whether you want Tedds \\
to display the Project \\
Manager window or \\
not.
\end{tabular} & \begin{tabular}{l} 
Organize projects with \\
the Project Manager \\
(page 67)
\end{tabular} \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline Button & Action & Further information \\
\hline \(\checkmark\) Status Bar & \begin{tabular}{l}
Status Bar \\
allows you to select whether you want Tedds to display the status bar at the bottom of the Tedds window.
\end{tabular} & Not applicable \\
\hline \(\checkmark\) Document Tabs & \begin{tabular}{l}
Document Tabs \\
allows you to select whether you want Tedds to display tabs for each currently open calculation document or not.
\end{tabular} & \\
\hline \(\checkmark\) Hidden Text & \begin{tabular}{l}
Hidden Text \\
allows you to select whether you want Tedds to display the hidden text in your calculation.
\end{tabular} & View hidden text, semicolons, or variables (page 62) \\
\hline \(\checkmark\) Semicolons & \begin{tabular}{l}
Semicolons \\
allows you to select whether you want Tedds to display the hidden semicolons that separate your calculation.
\end{tabular} & \\
\hline \(\checkmark\) Progress Log & \begin{tabular}{l}
Progress Log \\
allows you to select whether you want Tedds to display the Progress Log or not.
\end{tabular} & The Progress Log (page 377) \\
\hline \[
\bigcirc
\] & \begin{tabular}{l}
Zoom \\
allows you to define the zoom percentage that you want to use.
\end{tabular} & Adjust the zoom level (page 63) \\
\hline 100 \(100 \%\) & \begin{tabular}{l}
100 \% \\
displays the calculation document at \(100 \%\) zoom percentage.
\end{tabular} & Not applicable \\
\hline 园 Page Width & \begin{tabular}{l}
Page Width \\
displays the calculation document at the maximum page width in
\end{tabular} & \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline Button & Action & Further information \\
\hline & which it fits in the window． & \\
\hline ［⿴囗］Whole Page & \begin{tabular}{l}
Whole Page \\
displays the entire calculation document in the window，so that you can view it without scrolling．
\end{tabular} & \\
\hline  & \begin{tabular}{l}
Windows \\
allows you to activate， save，close，organize and minimize currently open documents．
\end{tabular} & Not applicable \\
\hline 居Cascade & \begin{tabular}{l}
Cascade \\
cascades the currently open documents in the Tedds window．
\end{tabular} & \\
\hline \(\square\) Tile Horizontally & \begin{tabular}{l}
Tile Horizontally \\
places the currently open documents side by side in the Tedds．
\end{tabular} & \\
\hline \(\square\) Tile Vertically & \begin{tabular}{l}
Tile Vertically \\
stacks the currently open documents in the Tedds window．
\end{tabular} & \\
\hline
\end{tabular}

\section*{Help tab}
\begin{tabular}{|l|l|c|}
\hline \multicolumn{1}{|c|}{ Button } & \multicolumn{1}{c|}{ Action } & Further information \\
\hline ？ & \begin{tabular}{l} 
Help \\
opens the Tekla User \\
Assistance website \\
where you can access \\
user instructions， \\
support articles，and \\
other useful material \\
related to Tedds．
\end{tabular} & Not applicable \\
\hline \begin{tabular}{l} 
Relen \\
Release \\
Notes
\end{tabular} & \begin{tabular}{l} 
Release Notes \\
opens the Tekla Tedds \\
release notes in a new \\
dialog box．
\end{tabular} & \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline Button & Action & Further information \\
\hline 國Quick Start Guide & Quick Start Guide opens the Tedds quick start guide that helps you & \\
\hline 圆Engineering Library & Engineering Library opens a PDF file describing some of the different calculations in the Tedds engineering library． & \\
\hline 圊 User Guide & User Guide opens the Tedds user guide as a PDF file． & \\
\hline  & \begin{tabular}{l}
Contact Support \\
opens a web form that allows use to contact the Tedds support．
\end{tabular} & Feedback options （page 153） \\
\hline  & \begin{tabular}{l}
Send Feedback \\
allows you to send feedback to the TeddsTedds development team via email．
\end{tabular} & \\
\hline Check For Updates & \begin{tabular}{l}
Check For Updates \\
checks whether there are any new Tedds updates available either for the software itself or for the engineering library．
\end{tabular} & Update service options （page 152） \\
\hline \begin{tabular}{l}
License \\
Manager
\end{tabular} & License Manager opens the Software License Manager dialog box that allows you to activate your product， view the status of your licenses，request product activation keys or send a support question，and modify license settings． & Not applicable \\
\hline
\end{tabular}

\section*{Tedds ribbon groups (Tedds for Word only)}

Tedds for Word uses ribbon groups and associated command buttons to provide a single-click access to many functions. The following table presents the different Tedds ribbon groups and the buttons that they include.

NOTE The following only applies to Tedds for Word.

\section*{Library group}

The Library group contains a button that allows you to launch Library Access System.
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{Library group} \\
\hline Button & Action & Further information \\
\hline 田 & \begin{tabular}{l}
Launch the Tedds Library Access System \\
launches the Library Access System, so that you can browse the Tedds library of calculations and engineering data.
\end{tabular} & \begin{tabular}{l}
- Library Access System (page 81) \\
- Data lists (page 414) \\
- Data tables (page 419) \\
- Data graphs (page 428)
\end{tabular} \\
\hline
\end{tabular}

\section*{Calculate group}

The Calculate group contains buttons that allow you to perform calculations within the document. See the buttons included of the Calculate group in the following table:
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{Calculate group} \\
\hline Button & Action & Further information \\
\hline \begin{tabular}{l}
! ? \\
All
\end{tabular} & \begin{tabular}{l}
All \\
calculates all calculations in the current document.
\end{tabular} & Calculate results (page 370) \\
\hline \({ }^{\text {fxing Expression }}\) & \begin{tabular}{l}
Expression \\
calculates all calculations within the current paragraph or expression.
\end{tabular} & \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{Calculate group} \\
\hline Button & Action & Further information \\
\hline 「 \({ }^{\text {a }}\) Calc Section & \begin{tabular}{l}
Calc Section \\
calculates all calculations within the current calc section.
\end{tabular} & \\
\hline , \({ }^{\text {S }}\) Start to Here & \begin{tabular}{l}
Start to Here \\
calculates all calculations from the beginning of the document to the current insertion point position.
\end{tabular} & \\
\hline 國 Here to End & \begin{tabular}{l}
Here to End \\
calculates all calculations from the current insertion point position to the end of the document.
\end{tabular} & \\
\hline Talection & \begin{tabular}{l}
Selection \\
calculates all calculations in the highlighted part of the document.
\end{tabular} & \\
\hline Recalc Selection & \begin{tabular}{l}
Recalc Selection \\
recalculates the calculations in the part of the document that was highlighted last time that you calculated a selection. \\
NOTE You do not need to highlight the previously selected area again. Tedds for Word always remembers the scope of the last calculation.
\end{tabular} & \\
\hline
\end{tabular}

\section*{Header group}

The Header group contains a button that allows you to modify the information and layout of the page header.
\begin{tabular}{|l|l|l|}
\hline \multicolumn{3}{|c|}{ Header group } \\
\hline \multicolumn{1}{|c|}{ Button } & \multicolumn{1}{c|}{ Action } & \multicolumn{1}{c|}{\begin{tabular}{c} 
Further \\
information
\end{tabular}} \\
\hline\(\square\) & \begin{tabular}{l} 
Edit \\
opens a dialog box that allows you to \\
modify the text in the document \\
header.
\end{tabular} & \begin{tabular}{l} 
Modify the header \\
or footer of a \\
calculation \\
template \\
(page 75)
\end{tabular} \\
\hline
\end{tabular}

\section*{Calc Section group}

The Calc Section group contains buttons that allow you to manage calc sections within the document．
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{Calc Section group} \\
\hline Button & Action & Further information \\
\hline \begin{tabular}{l}
E？ \\
Insert
\end{tabular} & \begin{tabular}{l}
Insert \\
adds a new calc section into your calculations．
\end{tabular} & \multirow[t]{7}{*}{Calc sections（page 368）} \\
\hline 囫 Edit & \begin{tabular}{l}
Edit \\
allows you to modify the title of the current calc section．
\end{tabular} & \\
\hline \(\mathrm{T}_{8} \mathrm{Cut}\) & \begin{tabular}{l}
Cut \\
allows you to cut a calc section and paste it elsewhere．
\end{tabular} & \\
\hline \({ }^{\text {a }}\) Delete & \begin{tabular}{l}
Delete \\
deletes the current calc section， including its variables．
\end{tabular} & \\
\hline 可Copy & \begin{tabular}{l}
Copy \\
allows you to copy a calc section and its variables to the clipboard and paste it elsewhere．
\end{tabular} & \\
\hline \(\xrightarrow{\text { 包 }}\) Go To－ & \begin{tabular}{l}
Go To \\
moves the insertion point to the start of the next or previous calc section within your document． \\
TIP To change the direction， click the arrow next to the Go To button．
\end{tabular} & \\
\hline 涌Paste & \begin{tabular}{l}
Paste \\
pastes a calc section，including its variables，from the clipboard into your calculations．
\end{tabular} & \\
\hline
\end{tabular}

\section*{Show/Hide group}

The Show/Hide group contains check boxes that allow you to modify the display of the document.
\begin{tabular}{|l|l|l|}
\hline \multicolumn{3}{|c|}{ Show/Hide group } \\
\hline Check box & \multicolumn{1}{|c|}{ Action } & \multicolumn{1}{c|}{\begin{tabular}{c} 
Further \\
information
\end{tabular}} \\
\hline\(\square\) Field Codes & \begin{tabular}{l} 
Show field codes \\
displays or hides the results, and the \\
formatting options that have been \\
used to generate the results.
\end{tabular} & None \\
\hline\(\square\) Hidden Calcs & \begin{tabular}{l} 
Show hidden calcs \\
displays or hides any calculations in \\
your document that have been \\
defined using one of the Hidden \\
paragraph styles.
\end{tabular} & \begin{tabular}{l} 
Find errors \\
(page 376)
\end{tabular} \\
\hline\(\square\) Semicolons & \begin{tabular}{l} 
Show expression delimiters \\
displays or hides any semicolons in \\
your document, whether they \\
separate calculations from one \\
another or not.
\end{tabular} & \begin{tabular}{l} 
Show or hide \\
semicolons \\
(page 349)
\end{tabular} \\
\hline
\end{tabular}

\section*{Font group}

The Font group contains buttons that allow you to change the font used in the text.
\begin{tabular}{|l|l|c|}
\hline \multicolumn{3}{|c|}{ Font group } \\
\hline \multicolumn{1}{|c|}{ Button } & \multicolumn{1}{c|}{ Action } & \begin{tabular}{c} 
Further \\
information
\end{tabular} \\
\hline \(\boldsymbol{\alpha}\) & \begin{tabular}{l} 
Greek text \\
If you have highlighted a piece of text, \\
the button changes the highlighted \\
text to Greek characters. \\
If no text is highlighted, the button \\
varies switches between typing in \\
Greek and Roman characters.
\end{tabular} & \begin{tabular}{l} 
Expression text \\
format (page 516)
\end{tabular} \\
\hline \(\mathbf{x}^{2}\) & Superscript & \\
\hline
\end{tabular}
\begin{tabular}{|c|l|c|}
\hline \multicolumn{3}{|c|}{ Font group } \\
\hline Button & \multicolumn{1}{c|}{\begin{tabular}{c} 
Further \\
information
\end{tabular}} \\
\hline & \begin{tabular}{l} 
If you have highlighted a piece of text, \\
the button changes the highlighted \\
text to superscript. \\
If no text is highlighted, the button \\
switches between typing in normal \\
and superscript fonts.
\end{tabular} \\
\hline \(\mathbf{x}_{2}\) & \begin{tabular}{l} 
Subscript \\
If you have highlighted a piece of text, \\
the button changes the highlighted \\
text to superscript. \\
If no text is highlighter, the button \\
switches between typing in normal \\
and subscript fonts.
\end{tabular} & \\
\hline
\end{tabular}

\section*{Insert group}

The Insert group contains buttons that allow you to insert fields, symbols, characters, and unit into the document.
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{Insert group} \\
\hline Button & Action & Further information \\
\hline \[
\left\{\begin{array}{|c|c|}
\substack{\text { Tedds } \\
\text { Field }}
\end{array}\right.
\] & \begin{tabular}{l}
Tedds field \\
adds a desired type of Tedds field at the current position in the document. \\
Creates a link for full data transfer between Tedds for Word and Excel.
\end{tabular} & Enhancing Tedds for Word calculations with Tedds fields (page 380) \\
\hline  & \begin{tabular}{l}
Insert user interface \\
allows you to create your own input interfaces.
\end{tabular} & Interface Designer (page 103) \\
\hline X & \begin{tabular}{l}
Insert multiplication symbol \\
adds a multiplication symbol at the current position in the document.
\end{tabular} & None \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{Insert group} \\
\hline Button & Action & Further information \\
\hline \(\checkmark\) & \begin{tabular}{l}
Insert square root symbol \\
adds a square root symbol at the current position in the document.
\end{tabular} & \\
\hline (=) & Equals not calculated adds an equals symbol that Tedds for Word will ignore while calculating. & \\
\hline Greek Lower & \begin{tabular}{l}
Lowercase Greek letters \\
allows you to add lowercase Greek characters in the document.
\end{tabular} & Expression text format (page 516) \\
\hline Greek Upper * & \begin{tabular}{l}
Uppercase Greek letters \\
Allows you to add uppercase Greek characters in the document.
\end{tabular} & \\
\hline \begin{tabular}{l}
SI Units * \\
US Units *
\end{tabular} & \begin{tabular}{l}
SI/US Units \\
Allows you to quickly access and add all the SI or US units that Tedds for Word contains, depending on your locale. The unit that you select will be inserted at the current position in the document.
\end{tabular} & Units (page 526) \\
\hline
\end{tabular}

\section*{Tools group}

The Tools group contains buttons for accessing various Tedds tools, including the Variables dialog box, Tedds options, and Progress Log
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{Tools group} \\
\hline Button & Action & Further information \\
\hline \(¢_{|x|}\) Variables & \begin{tabular}{l}
Variables \\
displays all variables in the current document. \\
TIP Clicking the arrow next to the button displays a menu that allows you to copy, paste or delete variables.
\end{tabular} & Use variables (page 353) \\
\hline XX Locale - & \begin{tabular}{l}
Locale \\
displays a list of different locales, and allows you to access calculations and data of a particular locale. \\
NOTE - Depending on your licence and location, you may have one or several locales installed by default. Calculations and data for other locales is available at additional cost. If you only have one locale installed, the Locale button is not active. \\
- The appearance of the locale button varies slightly depending on the locale that you are using.
\end{tabular} & None \\
\hline E Progress Log & \begin{tabular}{l}
Show Progress log \\
switches between showing and hiding the Progress Log. The
\end{tabular} & None \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{Tools group} \\
\hline Button & Action & Further information \\
\hline & Progress Log summarizes important calculation steps and output results when a document is calculated. & \\
\hline ? Help & \begin{tabular}{l}
Help \\
displays a menu that allows you to access Tedds help and documentation.
\end{tabular} & None \\
\hline \({ }_{\star}{ }^{\text {Next Error }}\) - & \begin{tabular}{l}
Go to Next/Previous Error \\
finds the next or previous visible error in your document and moves the insertion point to that position.
\end{tabular} & Find errors (page 376) \\
\hline More * & \begin{tabular}{l}
More \\
Displays the following menu providing access to: \\
Launch \\
Sketch Viewer \\
Import \\
Tedds document (.ted) \\
Tools \\
Duplicate document \\
Unlink Document \\
\{a\} \({ }_{a}\) Unlink Fields \\
(x) Remove Tedds Field Results \\
Remove Linked Paragraph Styles \\
Tedds Options \\
Launch the Tedds Sketch viewer \\
launches Sketch Viewer, so that you can import pictures, and place them at appropriate points within your calculations. \\
- Import Tedds document
\end{tabular} & \begin{tabular}{l}
- Sketch Viewer (page 129) \\
- Import Tedds documents into Tedds for Word
\end{tabular} \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{Tools group} \\
\hline Button & Action & Further information \\
\hline & \begin{tabular}{l}
- allows you to import the contents of a Tedds document into a Tedds for Word document. \\
- Duplicate document \\
allows you to copy document output, variables and header properties into another document. \\
- Unlink document \\
changes the AutoText fields in the document header to normal text. \\
This button can be useful if you want to send a document to someone who does not have Tedds for Word installed. \\
- Unlink fields \\
displays the actual calculations of a document, instead of a single field replacing automated calculations. \\
This button can be useful if you want to send a document to someone who does not have Tedds for Word installed. \\
NOTE If you use automated calculations, they may contain other nested automated calculations. In such cases, you will have to click Unlink fields several times in order to unlink the field around each
\end{tabular} & \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{Tools group} \\
\hline Button & Action & Further information \\
\hline & \begin{tabular}{l}
automated calculation. \\
- Remove Tedds field results removes field results from the document. \\
- Remove linked paragraph styles \\
removes linked paragraph styles from the document. \\
- Tedds options allows you to adjust Tedds for Word options.
\end{tabular} & \\
\hline
\end{tabular}

\section*{Library Access System toolbars}

There are two different Library Access System toolbars. The toolbar that you see depends on whether you use the Simple or the Advanced mode of the Library Access System. For more information on the toolbars and the buttons, see the following paragraphs.

NOTE The following only applies to Tedds for Word.

\section*{Simple mode}
\begin{tabular}{|l|l|l|}
\hline \multicolumn{3}{|c|}{ Library Access System toolbar: Simple mode } \\
\hline \multicolumn{1}{|c|}{ Button } & \multicolumn{1}{c|}{ Action } & Further information \\
\hline 自 Index & \begin{tabular}{l} 
Index \\
displays the index of the \\
current sets installed in \\
the Library Access \\
System.
\end{tabular} & \begin{tabular}{l} 
Basic Library Access \\
System procedures: \\
Simple mode (page 83)
\end{tabular} \\
\hline O Find & \begin{tabular}{l} 
Find \\
allows you to find \\
groups or items by \\
typing a part of their \\
names in the Find field.
\end{tabular} & \\
\hline
\end{tabular}
\begin{tabular}{|l|l|l|}
\hline \multicolumn{3}{|c|}{ Library Access System toolbar: Simple mode } \\
\hline \multicolumn{1}{|c|}{ Button } & \multicolumn{1}{|c|}{ Action } & Further information \\
\hline 毋 Execute & \begin{tabular}{l} 
Execute \\
opens the selected set \\
or inserts a selected \\
item into your \\
document.
\end{tabular} \\
\hline Д Preview & \begin{tabular}{l} 
Preview \\
displays a preview of the \\
selected item.
\end{tabular} & \\
\hline
\end{tabular}

\section*{Advanced mode}
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|r|}{Library Access System toolbar: Advanced mode} \\
\hline Button & Action & Further information \\
\hline C. & \begin{tabular}{l}
New Calc Set Wizard \\
allows yo to create a new set into which you can add groups and items. \\
You can either copy groups and items from other sets or create them directly into the new set.
\end{tabular} & Create new sets (page 91) \\
\hline 닥 & \begin{tabular}{l}
Open \\
opens an existing set, so that you can access the items that the set contains.
\end{tabular} & Basic Library Access System procedures: Advanced mode (page 86) \\
\hline - & \begin{tabular}{l}
Save \\
saves the details of a modified set to disk.
\end{tabular} & None \\
\hline O & \begin{tabular}{l}
Find \\
allows you to find groups or items by typing a part of their names in the Find field.
\end{tabular} & Basic Library Access System procedures: Advanced mode (page 86) \\
\hline 家 & Execute inserts a selected item in your document. & \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{Library Access System toolbar：Advanced mode} \\
\hline Button & Action & Further information \\
\hline 9 & \begin{tabular}{l}
New Group \\
allows you to add a new group into the current set． \\
Later，you can add groups or items into the new group to achieve a logical structure．
\end{tabular} & Add new groups into a set（page 93） \\
\hline 回。 & \begin{tabular}{l}
New Item \\
allows you to add a new item into the current set
\end{tabular} & Add new items into a set （page 94） \\
\hline 自 & \begin{tabular}{l}
Index \\
displays the index of the current sets installed in the Library Access System．
\end{tabular} & \\
\hline  & \begin{tabular}{l}
Show calculation examples \\
switches between displaying and hiding calculation examples in the index．
\end{tabular} & None \\
\hline \(\square\) & \begin{tabular}{l}
Show calculation components \\
switches between showing and hiding calculation components in the index．
\end{tabular} & None \\
\hline 5 & Preview displays a preview of the selected item． & Basic Library Access System procedures： Advanced mode （page 86） \\
\hline 0 & \begin{tabular}{l}
Properties \\
displays the properties of the selected group or item．
\end{tabular} & \\
\hline
\end{tabular}

TIP By clicking the right mouse button in the Library Access System view， you have access to context－sensitive menus and their submenus．

Context-sensitive menus give you instant access to commands that are relevant to the position of the mouse pointer.

\section*{Sketch Viewer toolbar}

The Sketch Viewer toolbar contains buttons that represent the various features of the Sketch Viewer. For more information on the buttons in the Sketch Viewer toolbar, see the following table.

NOTE The following only applies to Tedds for Word.
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{Sketch Viewer toolbar} \\
\hline \multicolumn{3}{|c|}{風成|} \\
\hline Button & Action & Further information \\
\hline  & \begin{tabular}{l}
Copy \\
copies the current sketch to the clipboard.
\end{tabular} & Copy a sketch to your calculations (page 134) \\
\hline Paste & \begin{tabular}{l}
Paste \\
pastes the content of the clipboard into the current sketch window.
\end{tabular} & Transfer a sketch to the Sketch Viewer (page 132) \\
\hline  & \begin{tabular}{l}
Paste new \\
pastes the content of the clipboard into a new sketch window.
\end{tabular} & \\
\hline  & \begin{tabular}{l}
Zoom to fit \\
fits the current sketch so that it fills the sketch window.
\end{tabular} & Adjust the view of a sketch (page 133) \\
\hline \({ }_{x}{ }^{2}\), Zoom in & \begin{tabular}{l}
Zoom in \\
allows you to zoom in on a desired point in the current sketch.
\end{tabular} & \\
\hline 1/2. D Zoom out & \begin{tabular}{l}
Zoom out \\
allows you to zoom out of a desired point in the current sketch.
\end{tabular} & \\
\hline \[
\rho_{\text {nravinus }}^{\text {Loom }}
\] & \begin{tabular}{l}
Zoom previous \\
returns to the previous zoom state.
\end{tabular} & \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{Sketch Viewer toolbar} \\
\hline \multicolumn{3}{|c|}{に式|} \\
\hline Button & Action & Further information \\
\hline \[
\begin{aligned}
& \text { Move } \\
& \text { Mor }
\end{aligned}
\] & \begin{tabular}{l}
Move \\
allows you to move the sketch around in the sketch window.
\end{tabular} & \\
\hline \begin{tabular}{l}
6 \\
Settings
\end{tabular} & \begin{tabular}{l}
Settings \\
allows you to adjust the colors of the Sketch Viewer window.
\end{tabular} & \\
\hline
\end{tabular}

NOTE By right-clicking in the Sketch Viewer window, you have access to contextsensitive menus and their submenus. Context-sensitive menus give you instant access to commands that are relevant to the position of the mouse pointer.

\section*{Data Tables toolbar}

The Data Tables toolbar contains buttons that allow you to easily access the features of Data Tables. For more information, see the following table:
\begin{tabular}{|c|l|l|}
\hline \multicolumn{3}{|c|}{ Data Tables toolbar } \\
\hline \multicolumn{1}{|c|}{ Button } & \multicolumn{1}{c|}{ Action } & Further information \\
\hline \begin{tabular}{c} 
Copy to calcs
\end{tabular} & \begin{tabular}{l} 
Copy to calcs \\
returns the variables of \\
the selected item into \\
your document, so that \\
you can use them in \\
your calculations.
\end{tabular} & \begin{tabular}{l} 
Return data table \\
information to your \\
calculations (page 425)
\end{tabular} \\
\hline\(\equiv\) & \begin{tabular}{l} 
Interpolate \\
allows you to insert and \\
calculate values that lie \\
between the values that \\
are displayed in a data \\
table.
\end{tabular} & \begin{tabular}{l} 
Interpolate data within a \\
data table (page 422)
\end{tabular} \\
\hline Interpolate & \begin{tabular}{l} 
Search \\
allows you to search for \\
Qalues that lie within a \\
range that you specify.
\end{tabular} & \begin{tabular}{l} 
Search specific \\
information in a data \\
table (page 424)
\end{tabular} \\
\hline
\end{tabular}
\begin{tabular}{|c|l|l|}
\hline \multicolumn{3}{|c|}{ Data Tables toolbar } \\
\hline \multicolumn{1}{|c|}{ Button } & \multicolumn{1}{c|}{ Action } & Further information \\
\hline \begin{tabular}{l} 
Tile Horizontal
\end{tabular} & \begin{tabular}{l} 
Tile Horizontal \\
allows you to tile open \\
data tables horizontally.
\end{tabular} & None \\
\hline\(\square\) & \begin{tabular}{l} 
Tile Vertical \\
allows you to tile open \\
data tables vertically.
\end{tabular} & None \\
\hline \begin{tabular}{l} 
Tile Vertical
\end{tabular} & \begin{tabular}{l} 
Cascade Windows \\
allows you to cascade \\
open data tables.
\end{tabular} & None \\
\hline Cascade Windows & & \\
\hline
\end{tabular}

\section*{Data Graph interpolate bar}

The Data Graph interpolate bar contains buttons, text boxes, and list boxes that allow you to modify the Data Graph window. For more information, see the following table:
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{Data Graph interpolate bar} \\
\hline Button & Action & Further information \\
\hline \% & \begin{tabular}{l}
Copy to calcs \\
returns the variables for the selected item into your document, ready for future use in your calculations.
\end{tabular} & Return data graph information to your calculations (page 431) \\
\hline E & \begin{tabular}{l}
Interpolate \\
allows you to insert and calculate values that lie between the values that are displayed in the data graph.
\end{tabular} & Interpolate data within a data graph (page 431) \\
\hline curve \(\checkmark\) & \begin{tabular}{l}
Choose curve \\
If a graph contains more than one curve, the Choose curve list allows you to select one curve in the list of existing curves.
\end{tabular} & Select a point in a data graph (page 429) \\
\hline
\end{tabular}
\begin{tabular}{|l|l|l|}
\hline \multicolumn{3}{|c|}{ Data Graph interpolate bar } \\
\hline Button & \multicolumn{1}{c|}{ Action } & \begin{tabular}{c} 
Further \\
information
\end{tabular} \\
\hline Diection \(\square\) & \begin{tabular}{l} 
X-axis position \\
displays the position of the current \\
point along the x-axis of the graph. To \\
move a point, type a value in the field. \\
NOTE The label of the field depends \\
on the data that is displayed \\
in the data graph.
\end{tabular} & None \\
\hline s. 0.732 & \begin{tabular}{l} 
Y-axis position \\
displays the position of the current \\
point along the y-axis of the graph. To \\
move a point, type a value in the field.
\end{tabular} & None \\
\begin{tabular}{ll} 
NOTE The label of the field depends \\
on the data that is displayed \\
in the data graph.
\end{tabular} & \\
\hline
\end{tabular}

NOTE By right-clicking in the Data Graph window, you have access to context-sensitive menus. The context-sensitive menus give you instant access to commands that are relevant to the position of the mouse pointer.

\section*{Section Designer toolbars}

The Section Designer toolbars contain buttons that allow you to insert, modify and move objects, and adjust the view of the canvas.

\section*{Standard toolbar}
\(\left.\)\begin{tabular}{|l|l|l|}
\hline \multicolumn{4}{|c|}{ Standard toolbar } \\
\hline \multicolumn{2}{|c|}{ Button } & \multicolumn{1}{c|}{ Action }
\end{tabular} \begin{tabular}{c} 
Further \\
information
\end{tabular} \right\rvert\, \begin{tabular}{ll} 
None \\
C. & \begin{tabular}{l} 
New \\
deletes any objects that you may have \\
defined, and allows you to create a \\
new section from scratch.
\end{tabular} \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{Standard toolbar} \\
\hline Button & Action & Further information \\
\hline " & \begin{tabular}{l}
Open \\
opens an existing Section Designer canvas with its associated objects. \\
NOTE To open a canvas in Section Designer, you must have previously saved the canvas to disk using Section Designer.
\end{tabular} & \\
\hline - & \begin{tabular}{l}
Save \\
allows you to save the current canvas and the objects it contains to disk. \\
When saving a canvas and objects this way, all details of the objects are saved as well.
\end{tabular} & - Save a section to disk (page 477) \\
\hline \% & \begin{tabular}{l}
Copy to calcs \\
calculates the properties of the section, and returns them back to your document as variables.
\end{tabular} & - Return section properties to your calculations (page 478) \\
\hline (i) & \begin{tabular}{l}
Show Properties \\
calculates and displays the properties of the section. \\
TIP You can define whether the Section Designercalculates the section properties continuously or only when you request.
\end{tabular} & - View section properties (page 476) \\
\hline \(\cdots\) & \begin{tabular}{l}
Undo \\
undoes the most recent modification done the selected shape.
\end{tabular} & None \\
\hline ¢ & \begin{tabular}{l}
Cut \\
removes the selected objects and their properties from the canvas and places them on the clipboard.
\end{tabular} & \\
\hline
\end{tabular}
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{Standard toolbar} \\
\hline Button & Action & Further information \\
\hline ㄷ. & \begin{tabular}{l}
Copy \\
copies the selected objects and their properties from the canvas and places them on the clipboard.
\end{tabular} & \\
\hline 区 & \begin{tabular}{l}
Paste \\
places the objects from the clipboard into your calculation document, creating new objects, if necessary. \\
NOTE If you are copying and pasting within the same document, the pasted objects will be placed in the positions where they were copied from.
\end{tabular} & \\
\hline
\end{tabular}

Drawing toolbar
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{Drawing toolbar} \\
\hline Button & Action & Further information \\
\hline \(\square\) & \begin{tabular}{l}
Rectangle \\
allows you to add a rectangle on the canvas.
\end{tabular} & \multirow[t]{4}{*}{- Create sections in the Section Designer (page 459)} \\
\hline - & \begin{tabular}{l}
Circle \\
allows you to add a circle on the canvas.
\end{tabular} & \\
\hline - & Triangle allows you to add a triangle on the canvas. & \\
\hline I & \begin{tabular}{l}
Predefined \\
allows you to add shapes that represent standard sections on the canvas. \\
You can either select the shape and serial size that you require in a list, or select a custom section shape and modify it manually.
\end{tabular} & \\
\hline
\end{tabular}

\section*{Section Designer tools toolbar}
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{Section Designer tools toolbar} \\
\hline Button & Action & Further information \\
\hline * & \begin{tabular}{l}
Select \\
activates the selection tool that allows you to select and move existing objects.
\end{tabular} & \multirow[t]{6}{*}{None} \\
\hline 会。 & \begin{tabular}{l}
Pan \\
allows you to move the currently zoomed display around.
\end{tabular} & \\
\hline \multirow[t]{2}{*}{○} & \begin{tabular}{l}
Zoom \\
allows you to zoom in or out of a certain pointer in your canvas. To zoom in, click the left mouse button. To zoom out, click the right mouse button.
\end{tabular} & \\
\hline & \begin{tabular}{l}
TIP You can also hold the left mouse button down and drag the pointer to create a rectangle on the screen. \\
When you release the mouse button, the display zooms to show the area inside the rectangle.
\end{tabular} & \\
\hline \({ }^{[0]}\) & \begin{tabular}{l}
Zoom to Fit \\
zooms the display so that you can see the entire section.
\end{tabular} & \\
\hline 0 & \begin{tabular}{l}
Zoom to Selection \\
zooms the display so that you can see all currently selected objects.
\end{tabular} & \\
\hline 2 & \begin{tabular}{l}
Rotate \\
allows you to rotate the selected objects around their midpoints.
\end{tabular} & - Rotate objects (page 469) \\
\hline |IT] & \begin{tabular}{l}
Snap Shapes \\
allows you to attach two objects to one another. Snapping shapes allows you to position the objects with respect to each other.
\end{tabular} & - Snap objects with respect to each other (page 472) \\
\hline
\end{tabular}

\section*{Nudge toolbar}
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{Nudge toolbar} \\
\hline Button & Action & Further information \\
\hline 困 & \begin{tabular}{l}
Nudge Up \\
nudges the selected objects upwards．
\end{tabular} & \multirow[t]{4}{*}{－Move objects on the canvas （page 467）} \\
\hline 國 & \begin{tabular}{l}
Nudge Down \\
nudges the selected objects downwards．
\end{tabular} & \\
\hline 困 & \begin{tabular}{l}
Nudge Left \\
nudges the selected objects to the left．
\end{tabular} & \\
\hline 田 & \begin{tabular}{l}
Nudge Right \\
nudges the selected objects to the right．
\end{tabular} & \\
\hline
\end{tabular}

\section*{Structure toolbar}
\begin{tabular}{|c|c|c|}
\hline \multicolumn{3}{|c|}{Structure toolbar} \\
\hline Button & Action & Further information \\
\hline ． & \begin{tabular}{l}
Group \\
allows you to create a group of two or more objects． \\
Once the objects are grouped，you can move and rotate them as a single entity．
\end{tabular} & －Structure sections （page 465） \\
\hline 咕 & Ungroup allows you to destroy groups． Once objects are ungrouped，each object can be handled separately & \\
\hline 「 & \begin{tabular}{l}
Front \\
moves the selected object in front of all other objects．
\end{tabular} & \\
\hline 或 & Back moves the selected object behind all other objects． & \\
\hline
\end{tabular}
\begin{tabular}{|l|l|c|}
\hline \multicolumn{3}{|c|}{ Structure toolbar } \\
\hline \multicolumn{1}{|c|}{ Button } & \multicolumn{1}{c|}{ Action } & \begin{tabular}{c} 
Further \\
information
\end{tabular} \\
\hline\(\square\) & \begin{tabular}{l} 
Forward \\
moves the selected object in front of \\
the object immediately in front of it.
\end{tabular} & \\
\hline\(\square\) & \begin{tabular}{l} 
Backward \\
moves the selected object behind the \\
object immediately behind it.
\end{tabular} & \\
\hline\(\square\) & \\
\hline
\end{tabular}

\subsection*{8.11 Import Tedds documents into Tedds for Word}

If you have created calculations in the Tedds Application, you may sometimes want to import them into Tedds for Word. For this purpose, Tedds for Word provides an import facility, intended to help in importing Tedds documents into Tedds for Word.

\section*{Import Tedds documents into Tedds for Word}
1. In the Tools ribbon group, click More --> Import --> Tedds document.
2. Find and select the .ted file that you want to import.
3. Click Open.

The Import Tedds document dialog box appears.

4. Select the location where and the method how you want to import the Tedds document. For help, see the table below.
\begin{tabular}{|l|l|}
\hline \multicolumn{1}{|c|}{ Option } & \multicolumn{1}{c|}{ Description } \\
\hline New document & \begin{tabular}{l} 
Inserts the Tedds document in a new Tedds for \\
Word document.
\end{tabular} \\
\hline Append to active document & \begin{tabular}{l} 
Inserts the Tedds document at the end of the \\
current Tedds for Word document.
\end{tabular} \\
\hline Insert in active document & \begin{tabular}{l} 
Inserts the Tedds document in the current Tedds \\
for Word document at the position of the \\
insertion point. <clarify!>
\end{tabular} \\
\hline Add new Calc Section & \begin{tabular}{l} 
Inserts the Tedds document in a new calc section \\
in the current Tedds for Word document.
\end{tabular} \\
\hline Insert page break & \begin{tabular}{l} 
Adds a page break into the Tedds for Word \\
document before the calc section.
\end{tabular} \\
\hline
\end{tabular}
5. Click OK.

\subsection*{8.12 Shortcut keys}

Using some shortcut keys may speed up creating and modifying your calculations in Tedds for Word. For more information on the available shortcut keys, see the following table.

NOTE - A plus sign (+) means that you need to press multiple keys at the same time.
- A comma sign (,) means that you need to press multiple keys in order.
\begin{tabular}{|c|c|}
\hline Attribute & Shortcut keys \\
\hline Subscript text & Ctrl+T, I \\
\hline Superscript text & Ctrl+T, 6 \\
\hline Hidden text & Ctrl+Shift + H \\
\hline Normal text & Ctrl+Shift + Z \\
\hline Calculate expression & Ctrl+T, E \\
\hline Calculate section & Ctrl+T, S \\
\hline Calculate all & Ctrl+T, A \\
\hline Calculate selection & Ctrl+T, H \\
\hline Recalculate selection & Ctrl+T, R \\
\hline Calculate from start to here & Ctrl+T, Home \\
\hline Calculate from here to end & Ctrl+T, End \\
\hline Add calc section & Ctrl+T, Insert \\
\hline Cut calc section & Ctrl+T, X \\
\hline Copy calc section & Ctrl+T, C \\
\hline Paste calc section & Ctrl+T, V \\
\hline Delete calc section & Ctrl+T, Delete \\
\hline Previous calc section & Ctrl+T, Page up \\
\hline Next calc section & Ctrl+T, Page down \\
\hline Go to previous error & Ctrl+T, < \\
\hline Go to next error & Ctrl+T, > \\
\hline Insert a Tedds field & Ctrl+T, I \\
\hline Modify calculation sheet header & Ctrl+T, D \\
\hline Open the Variables dialog box & Ctrl+T, M \\
\hline New default calculation document & Ctrl+T, N \\
\hline Launch the Library Access System & Ctrl+T, L \\
\hline Show/hide field codes & Ctrl+T, F9 \\
\hline Greek text on/off & Ctrl+T, G \\
\hline Insert square root symbol & Ctrl+T, 9 \\
\hline Insert multiplication symbol & Ctrl+T, 8 \\
\hline Show/hide hidden calculations & Ctrl+T, F10 \\
\hline
\end{tabular}

\section*{Index}
2D analysis ..... 434
Add a new group into a set ..... 93
Add documents into a project ..... 67
Add new items into a set ..... 94
Adjust calculation sheet details ..... 64
Adjust data graph settings ..... 432
Adjust data table settings ..... 426
Adjust the view of the Data List dialog ..... 416
Adjust zoom level ..... 63
After performing a calculation ..... 59
Application Data ..... 150
Automated calculations ..... 377
Basic Library access system procedures:
Simple mode ..... 83
Beam analysis options ..... 146
Build new sets based on existing items ..... 95
Calc document options ..... 152
Calc index ..... 150
Calc item options ..... 147
Calc library options ..... 151
Calc Project options ..... 151
Calculating options ..... 140
Change the locale ..... 61
Change the units of results ..... 348
Change units in your calculations ..... 350
Clear an interpolation ..... 423
Close the Data Graph window ..... 433
Close the Data Tables window ..... 427
Components of a calculation interface ..... 58
Components of the 2D Analysis dialog box ..... 435
Components of the Data Graph window ..... 428
Components of the Data tables window 420 ..... 420
Components of the Sketch Viewer window130
Components of the Tedds window ..... 55
Configuring settings ..... 135
Copy a sketch to your calculations ..... 134
Create a 2D Analysis model ..... 437
Create a new set ..... 91
Create an example interface ..... 124
Create and modify expressions ..... 344
Create libraries for organizational use ..... 544
Create new calculation templates ..... 78
Create sections ..... 459
Creating the example 2D Analysis model ..... 
445
Data Graph fields ..... 405
Data graph interpolate bar ..... 599
Data graphs ..... 428
Data list fields ..... 402
Data Table fields ..... 404
Data tables ..... 419
Data Tables toolbar ..... 598
Define units for results ..... 347
Dimensional analysis of variables ..... 519
Document options ..... 137
Enhancing Tedds for Word calculations withTedds fields380
Environment options ..... 136
Error options ..... 146
Example of a 2D Analysis model ..... 442
Excel Link fields ..... 399
Excel workbook options ..... 152
Feedback options ..... 153
Find errors ..... 376
General calculating options ..... 140,147
How can I centrally deploy Tekla software? ..... 46
Install a Tekla Tedds service pack ..... 47
Install and license Tekla Tedds ..... 43
Install Tekla Structural Designer service packs ..... 47
Installation and licensing workflow ..... 37
Interpolate data within a data graph ..... 431
Interpolate data within a data table ..... 422
Introducing Data lists ..... 414,479
Introducing Progress Log ..... 377
Introducing Tedds ..... 55
Library Access System icons ..... 543
Library Access System settings (Tedds for Word only) ..... 154
Linked data tables ..... 421
Mathematics ..... 502
Microsoft Word settings (Tedds for Word only) ..... 158
Modify a 2D Analysis model ..... 441
Modify document headers or project headers ..... 68
Modify header labels ..... 66
Modify sections ..... 463
Modify sets ..... 99
Move objects on the canvas ..... 467
Open a new sketch window ..... 132
Open or close existing projects ..... 69
Organize projects with the Project Manager ..... 67
Predefined system variables ..... 540
Profile options ..... 153
Progress options ..... 144
Reacting to calculation errors ..... 375
References ..... 488
Regional settings ..... 145
Reorganize documents within a project ..... 67
Result formats and precision ..... 523
Result options ..... 143
Return data graph information to your
431
431
calculations
calculations ..... 425Return information to your calculations.
Return section properties to calculations
478
Review a calculation ..... 62
Rotate objects ..... 469
Save a section to disk ..... 477
Save options ..... 140
Search calculations in the Select Calculation dialog ..... 57
Search specific information in a data table ..... 424
Select a calculation ..... 56
Select a point in a data graph ..... 429
Select an item in a Data table ..... 421
Select the item to return ..... 417
Select the items displayed in the Progress
378
log
Send To options (the Tedds Application only)138
Setup options ..... 150
Share calculations to other Tedds users . 101 ..... 101
Sharing libraries created for personal use543
Show or hide semicolons ..... 349
Sketch options ..... 142
Snap objects with respect to each other ..... 472
Start 2D Analysis ..... 434
Start the Section properties calculator ..... 456
Startup options ..... 135
Store variables as expressions ..... 357
Structure sections ..... 465
Syntax conventions ..... 488
Tedds fields and functions ..... 488
Tedds ribbon commands (the Tedds Application only) ..... 575
Time and date formatting options ..... 501
Units ..... 526
Update service options ..... 152
Use constants with units ..... 351
Use the condition function ..... 412
Use the Library Access System in Advanced mode. ..... 85
Use the string function ..... 411
Variables dialog box ..... 365
View options ..... 138
View section properties ..... 476
View the details of a selected item ..... 416
A
Adjust the view of a sketch. ..... 133
Adjusting Section Designer ..... 473
B
Basic Library access system procedures: Advanced mode. ..... 86
C
Calc Item fields ..... 406
Calc sections ..... 368
Calculate results ..... 370
Calculation errors ..... 372
Close sketch windows ..... 135
Components of calculations ..... 335
Components of Interface Designer ..... 105
Components of the Data List dialog box . 414
Components of the Tedds for Word window70
Control the position of objects on the canvas ..... 466
Controls ..... 110
Create a custom page template. ..... 122
Create a new project ..... 67
Create system libraries ..... 549
D
Data views. ..... 120
Define result formats ..... 345
Define results ..... 345
Define variables ..... 355
Delete groups and items ..... 100
Dialog options. ..... 149
Dialogs options ..... 149
Document templates. ..... 71
E
Error messages ..... 554
Expression text format. ..... 516
F
Filter the items displayed in the Progress
Log ..... 379
Frequently used procedures in creating system libraries ..... 546
G
Get familiar with Tekla Tedds ..... 50
Groups ..... 115
Import Tedds documents into Tedds for Word. ..... 605
indexterm. ..... 479
Input fields ..... 381
Interface Designer ..... 103
Introducing Calculations ..... 335
Introducing Tedds for Word ..... 69
L
Launch Tedds ..... 50
Library Access System ..... 81
Library access system toolbars ..... 594
Log fields. ..... 394
M
Major Tedds fields syntax ..... 489
Mathematical symbols ..... 518
Message fields ..... 389
Modify groups and items. ..... 97
Modify Tedds fields. ..... 408
Modify the header or footer of a calculation template. ..... 75
Modify variables ..... 356
Modifying system libraries. ..... 551
0
Other Tedds features. ..... 414
Other Tedds fields ..... 496
P
Page items ..... 117
Pages ..... 107
Q
Quick Start Guide - Eurocode design examples. ..... 218
R
Roll up the Progress Log ..... 380
S
Section designer ..... 457
Section designer toolbars ..... 600
Section properties calculator ..... 456
Select a calculation template ..... 72
Shortcut keys ..... 606
Show fields ..... 383
Sketch viewer ..... 129
Sketch viewer toolbar ..... 597
System and user libraries ..... 542
T
Tedds and Tedds for Word - what's the difference? ..... 53
Tedds ribbon groups ..... 585
Tekla Tedds 2023 release notes... 14,22,28,30
Tekla Tedds 2023 release notes ..... 14
Tekla Tedds Quick Start Guides ..... 160
Toolbars and buttons ..... 575
Transfer a sketch ..... 132
U
Upgrade Tekla Tedds to a new version. ..... 48
Use calc section variables ..... 358
Use document variables. ..... 361
Use Library Access System: Simple mode.. ..... 82
Use system units. ..... 351
Use system variables. ..... 364
Use units in calculations. ..... 350
Use variables ..... 353
V

View the different details of a data table. 425```

