



Integration between Tekla Structural Designer and Tekla Structures

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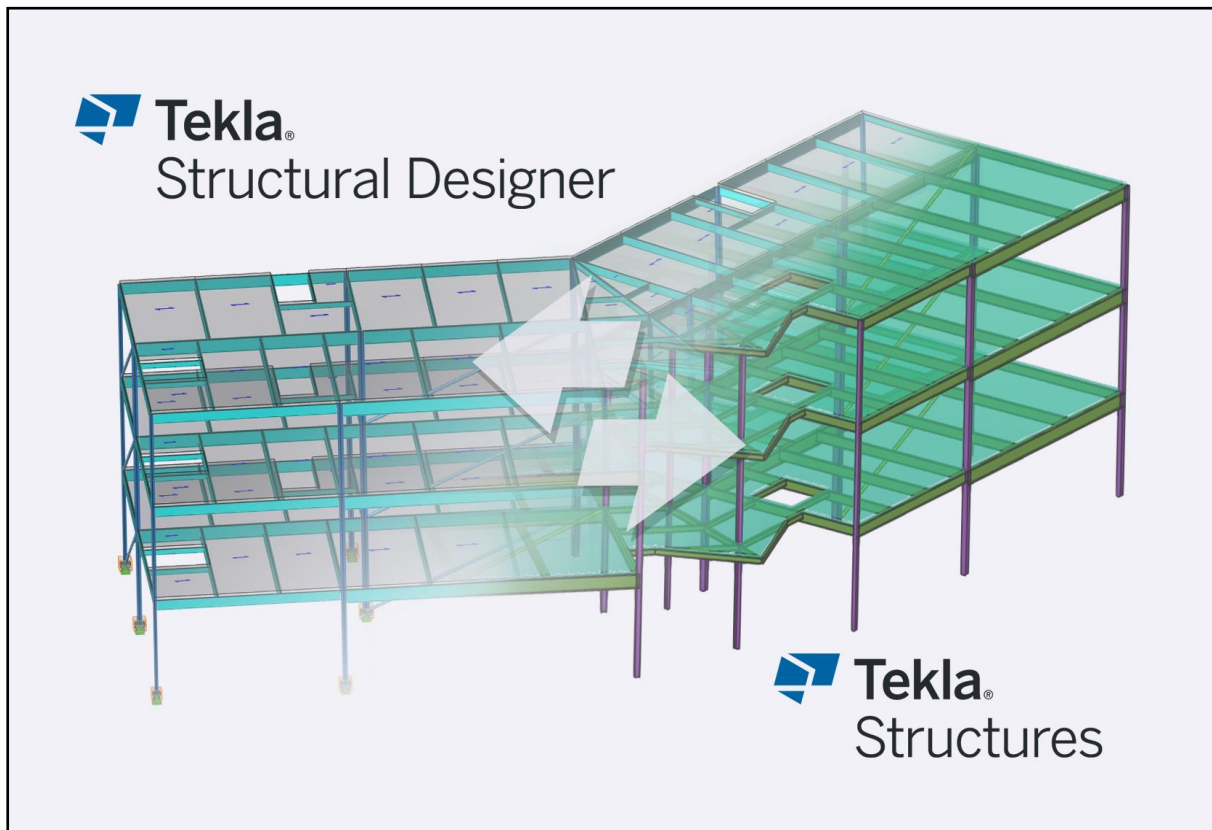
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1.0 Overview of Integration



When considering the integration of Tekla Structural Designer and Tekla Structures it is important to understand that the information transferred is essentially the physical information associated with the structure - e.g., geometry, section sizes and grade, number of studs and slab thicknesses etc.

Tekla Structures allows engineers to quickly and easily create accurate structural models complete with information that offer value from design to construction completion. Design data can be imported and enhanced with Tekla Structures to produce complete, coordinated and constructible drawings and material lists.

The integration process allows users to pass models to and from Tekla Structural Designer and Tekla Structures, updating changes to the physical model whilst also allowing both parties to concurrently update their own versions of the model. As the model is integrated between software applications, the user will find that changes are updated whilst additional items created since the last export operation are maintained within the model.

2.0 Project Workflows

Integration between Tekla Structural Designer and Tekla Structures has been developed to ensure the initial model can be started in either tool without any detriment to the design process. This added flexibility enables companies to align their software solutions closely to their own workflows. (i.e., The initial model can be created in Tekla Structural Designer by the Engineer, or in Tekla Structures by the Technician.)

We would recommend that the Tekla Structures model be used as the **master model** for all geometrical changes. Alterations made to the model geometry are best handled by altering the Tekla Structures model and transferring the changes through to Tekla Structural Designer for redesign.

A typical workflow and the decision making process through the different stages of a project could be as follows:-

2.1 Initial Scheme Stage

- The initial model may be started in Tekla Structural Designer or Tekla Structures without any detriment to the process.
- A number of factors may determine which software is used in the initial modeling process, such as availability of staff, or deliverable requirements.
- Unless there are external drivers, Tekla Structures may prove to be the best starting point for the model as it can provide most of the deliverable items at the initial stage.
- The model does not need to cover the complete building, it might be a typical bay or floor for example.
- The generated structure can be designed in Tekla Structural Designer for initial section sizing at the initial stage and synchronized back to Tekla Structures for initial drawings or material list creation.
- Simple drawings can be created at this stage; this can be done in Tekla Structural Designer or Tekla Structures.
- Initial material lists for cost estimates can be generated at this stage.

2.2 Detailed Design

- It is not always appropriate to carry models forward from the Initial Scheme Stage to the Detailed Design Stage. It is sometimes better to begin the model again.
- Models can be started in Tekla Structures or Tekla Structural Designer to suit the user. The models can then be transferred to the other modeling system.
- Importantly, the two models can be worked on at the same time, with synchronization of the two models taking place to suit the workflow.
- Within Tekla Structural Designer, the model can be used for a full design of the structure, sway check, lateral (wind) design and a design of connections (if required).
- Within Tekla Structures, drawings can be generated to a Tender stage level and general arrangements submitted to Building Control for approval.

2.3 Construction Stage

- Using the model from the Detailed Design stage, much of the Construction Stage process will take place in Tekla Structures so that the integration with other trades can be accounted for.
- The design is not revisited unless the client drives the requirement for change.
- If a re-design of the structure is required, the same synchronization of Tekla Structural Designer and Tekla Structures models can be carried out to suit the user.
- The model will be completed within Tekla Structures and fully detailed drawings for parts can be created along with construction level drawings of the structure.
- Detail integration checks with other trades (e.g. Mechanical and Electrical Engineers) can be carried out at this stage.

2.4 Workflows for integration

There are two specific integration workflows stipulated within this manual. These workflows differ depending whether the workflow is started within Tekla Structural Designer or Tekla Structures.

- **Starting in Tekla Structural Designer**
 - Allows full bi-directional model updates
 - Requires additional parts to be generated from common intersection points
- **Starting in Tekla Structures**
 - Requires analysis and design model to be created prior to transfer
 - Limited bi-directional model updates

2.5 Where to start?

As mentioned above, there are specific workflows to consider depending on whether the initial model is created within Tekla Structural Designer or within Tekla Structures.

- When starting in Tekla Structural Designer, the initial import into Tekla Structures sets all parts from common intersection points. This may mean that some parts such as slabs and bracing are not in the correct positions to begin the detailed design or construction phases.
 - We would recommend that when starting the integration process from Tekla Structural Designer, the entire design and integration process is completed before advancing the model into either the detailed design or construction phases.
- When starting in Tekla Structures, the model may be generated from positions more suitable for the detailed design or construction phases. The analysis and design model created within Tekla Structures can use these physical positions whilst generating an analytical model which is still analytically connected and won't introduce eccentric analytical connections.
 - The workflow however is limited when considering updates to existing parts and positional changes or offsets will not be considered when returning results from Tekla Structural Designer.
 - In this case, the Tekla Structures model must act as the master model. Changes to positions are made in this model only and exported to Tekla Structural Designer for a full design of the structure. New parts, profile changes and material changes are then returned back to the Tekla Structures model.

2.5.1 File format

In addition to the information listed above, there are two separate file formats to be considered.

- **Model file format (.tsmd file)**
 - Requires both Tekla Structural Designer and Tekla Structures to be installed on the same machine.
 - Allows the transfer of design intent rebar objects from Tekla Structural Designer
 - Does not support the transfer of member end forces, web openings, cellular beam infills or opening stiffeners.
- **Neutral file format (.cxl file)**
 - Allows the transfer of member end forces
 - Allows the transfer of web openings and stiffeners from Tekla Structural Designer into Tekla Structures.
 - Allows the transfer of infill data and ring stiffeners for Westok cellular beams from Tekla Structural Designer into Tekla Structures.
 - Does not support the transfer of design intent rebar objects from Tekla Structural Designer

3.0 Minimum versions for integration

Please note that depending on the file format and the workflow to be used, there are some minimum version requirements to consider.

3.1 Minimum version for neutral file transfer

In order to use the neutral integration file format, you must be using at least Tekla Structures v21.0 or later. Integration will not be possible using any method if using a version of Tekla Structures earlier than v21.0.

- If using v21.0 only, please note that an Integrator macro is required for installation. This can be found within the Tekla warehouse (<http://warehouse.tekla.com>).
- From v21.1 onwards the integration commands were hardcoded into the software.

3.2 Minimum version for model file transfer

In order to use the model file transfer, you must be using Tekla Structures 2020 or later. This functionality is not available in earlier versions.

3.3 Minimum version for Tekla Structures analysis model

In order to use the analysis model commands within Tekla Structures to export a model to Tekla Structural Designer, you need to be using Tekla Structures 2018 or later. This functionality is not available in earlier versions.

3.4 Minimum version for Rebar transfer

To integrate design intent rebar content from Tekla Structural Designer to Tekla Structures, you will need to be using Tekla Structures 2020 or later. This functionality is not available in earlier versions.

3.5 Does software need to be on the same computer?

Please note that if you intend to use the model file integration method (including design intent rebar content), both Tekla Structural Designer and Tekla Structures must be installed and have licenses available for use at the time of integration.

If you intend to use the neutral file method to integrate models it is not necessary to have both Tekla Structural Designer and Tekla Structures on the same computer.

4.0 Starting the workflow with Tekla Structural Designer

4.1 Creation of the Tekla Structural Designer Model

The Engineer has a number of options available to him when creating a Tekla Structural Designer model.

4.1.1 Create model from Scratch

- Tekla Structural Designer includes typical modeling tools to create grids, columns, beams, walls, floors etc. Importantly, each element is modeled as a physical object that can be positioned correctly in space.
- When synchronized with Tekla Structures, the true spatial position is communicated along with items such as sections size, grade, studs, holes etc.

4.1.2 Part Models

- At the early stages of design, it is possible to create part models to investigate a structural scheme.
- For example, the engineer can model just a floor or a bay in Tekla Structural Designer to investigate the best solution to satisfy code compliance and economics.
- Although only a part model, this can still be sent to Tekla Structures. (Note, the physical position of the part model will be communicated to Tekla Structures.)
- For example, if an engineer models a floor but the true level is not yet known, this part model can be sent to Tekla Structures where adjustments can be made. If this model is communicated back to Tekla Structural Designer, its position will be updated.
- At the early design stages, it is reasonable to stop the bi-directional integration as new refined models are often created later in the design process.

4.1.3 Import 2D Drawings

- It is common early in a project to have a number of 2D architectural drawings outlining the scheme. Tekla Structural Designer has the facility to import 2D DXF drawings.
- The engineer can use these drawings as ghost layouts in the background to aid setting out or to import grids.
- If a common grid is used on the project, it is logical to import this grid into Tekla Structural Designer to ensure the structure is set out in the correct position.
- If a number of separate models are to be created and merged together it is strongly advisable to use a common grid system.
- When importing grids it is also advisable to check the geometry of the grid thoroughly.

4.2 Deliverables

Even at these early stages of a project, Tekla Structural Designer provides a significant number of the deliverables required.

For example:-

- Comprehensive code compliant scheme design.
- Material take-off.
- 2D engineering DXF drawings.
- Member end forces and support reactions.

4.3 Do you need to create an export?

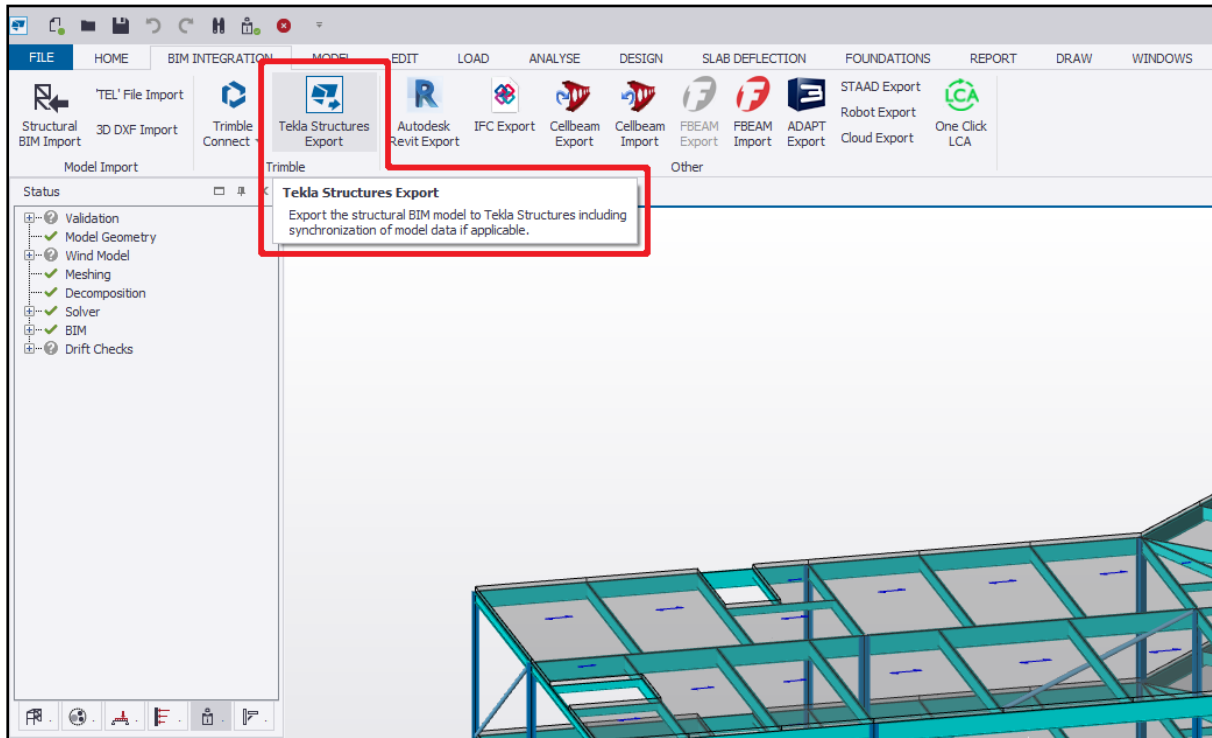
When considering the transfer of information from Tekla Structural Designer to Tekla Structures, you may ask whether you need to export a neutral file from the software or whether to provide the model file to the Tekla Structures user?

There are a number of factors which may mandate the use of either a neutral file or the use of the model file.

- Do both Tekla Structural Designer and Tekla Structures reside on the same computer?
 - *If they don't, then a **.cxl** format neutral file must be used for integration purposes.*
- Do you wish to transfer design intent rebar objects?
 - *If you do, then you must use a **.tsmd** model file for integration.*
- Do you wish to transfer member end forces from Tekla Structural Designer to Tekla Structures?
 - *If you do, then a **.cxl** format neutral file must be used for integration purposes.*
- Do you wish to transfer web openings and stiffeners from Tekla Structural Designer into Tekla Structures?
 - *If you do, then a **.cxl** format neutral file must be used for integration purposes.*
- Do you wish to transfer infill data and ring stiffeners for Westok cellular beams?
 - *If you do, then a **.cxl** format neutral file must be used for integration purposes.*

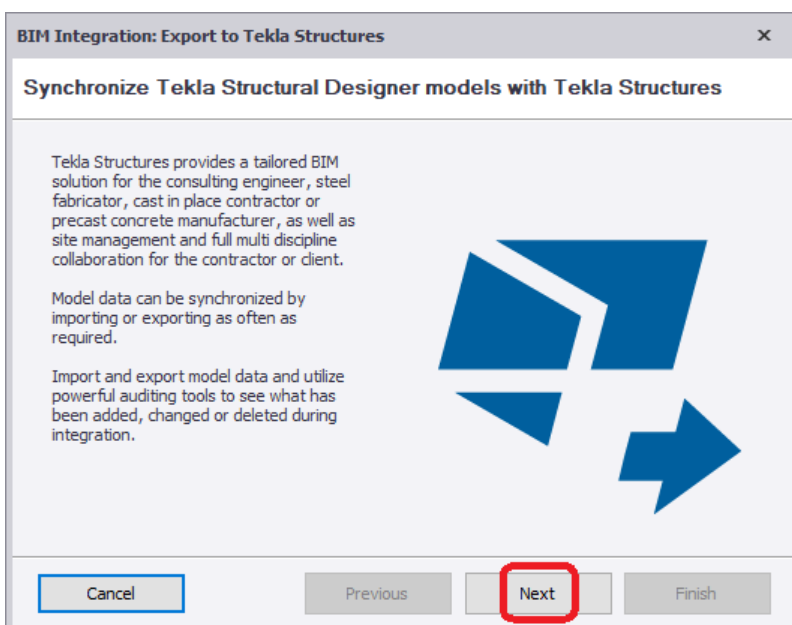
4.3.1 Exporting a .cxl format neutral file from Tekla Structural Designer

Once a model has been created in Tekla Structural Designer, you need to save the model with a recognizable name and then run the command **Tekla Structures Export** (BIM Integration tab).



Running the command will start the export application with various dialogs displayed through a wizard process.

The first screen encountered provides some information about the two base design products used with the Integrator. Click **Next** to move onto the next page.



The following screen will allow you to move the model to real world coordinates by entering suitable figures within the dialog. In our case, we will keep the values at the default and just choose **Next**.

BIM Integration: Export to Tekla Structures

Relocate Export Model

Move export model by

X m

Y m

Z m

Rotation °

Cancel Previous **Next** Finish

After the model location, you will be prompted to choose the element types to choose to export along with options for openings where applicable. The default settings are that all items should be exported. In this example, we will follow the same settings and export all object types – clicking **Next** to continue.

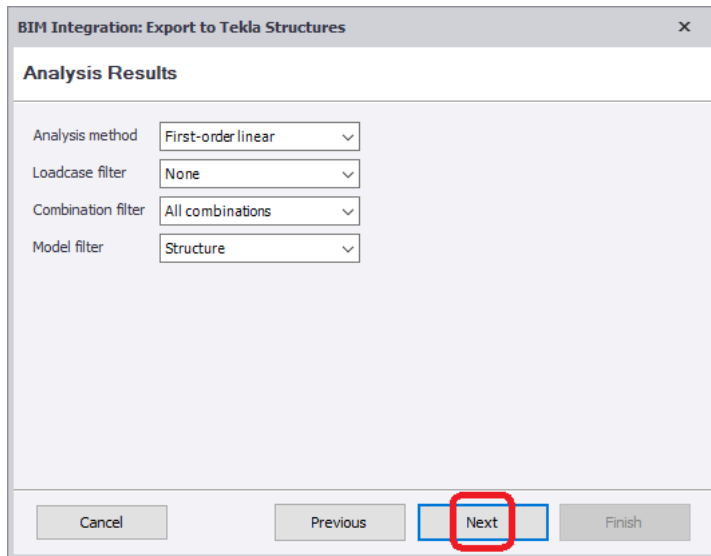
BIM Integration: Export to Tekla Structures

Integration Filter

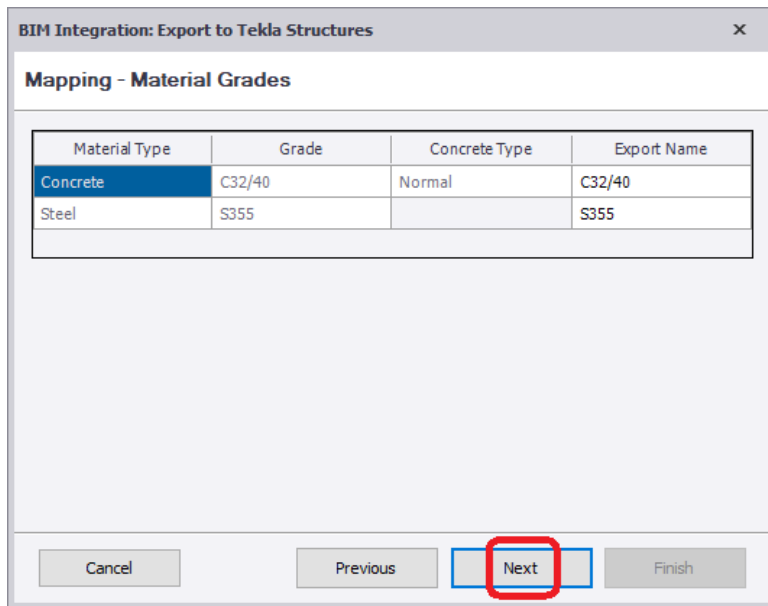
Item	Include	Openings
Grids	<input checked="" type="checkbox"/>	
Levels	<input checked="" type="checkbox"/>	
Slabs / Deck	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Members	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Walls	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Foundations	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Analysis Results	<input checked="" type="checkbox"/>	

Cancel Previous **Next** Finish

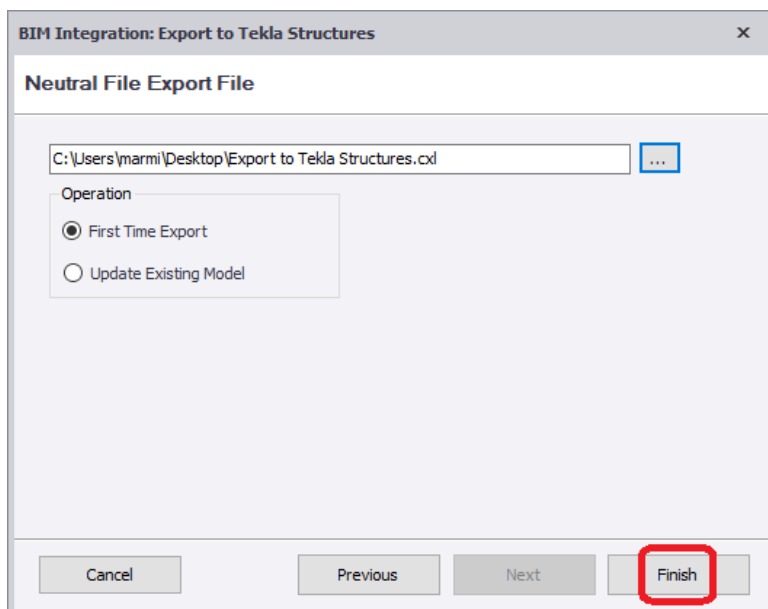
In this example, we have chosen to export **Analysis Results** as the model has been successfully analyzed and designed within Tekla Structural Designer. This option (deselected as default) directs us to a new dialog where we can choose which analysis methods, loadcase results and load combination results we can choose to export. We keep the default setting of first order linear analysis results for all combinations and simply click on the **Next** button to advance.



Mapping of materials to recognized grades will be then shown. Here you can view the different materials being used in the Tekla Structural Designer model and the option to overwrite the exported materials with a more preferred grade.



Following on from **Material** mapping, the dialog for **Decking** mapping will be shown (if applicable). Again this allows users to view the decking types being used in the model and have the option of overwriting the exported details if required.

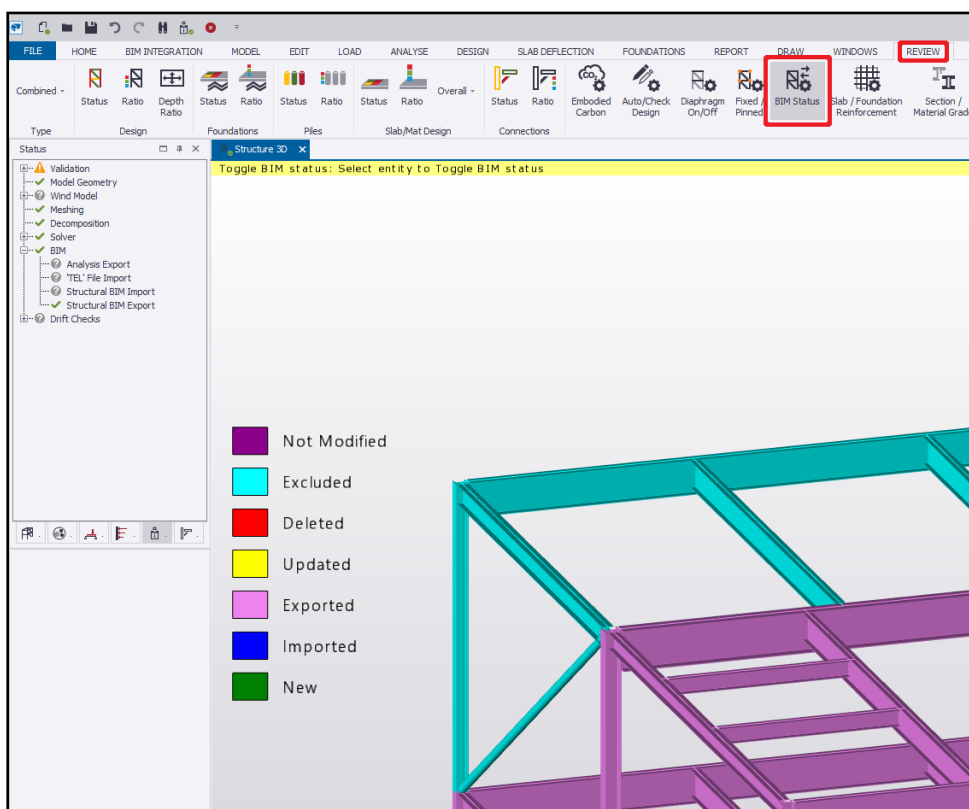


The final dialog screen of the export wizard will prompt for a filename and location of the CXL file to be created. Please note that there are two options relating to a **First Time Export** and an option to **Update Existing Model**.

For the initial export, the option **First Time Export** should be chosen. (The option to **Update Existing Model** will be used to pass alterations in the event of a Tekla Structures model already in existence.)








4.3.2 BIM Integration command

The **BIM Status** command (held under the **Review** tab) can be used to provide a color coded indication of how the model has been affected in the last import and also control the content of the integrated model.



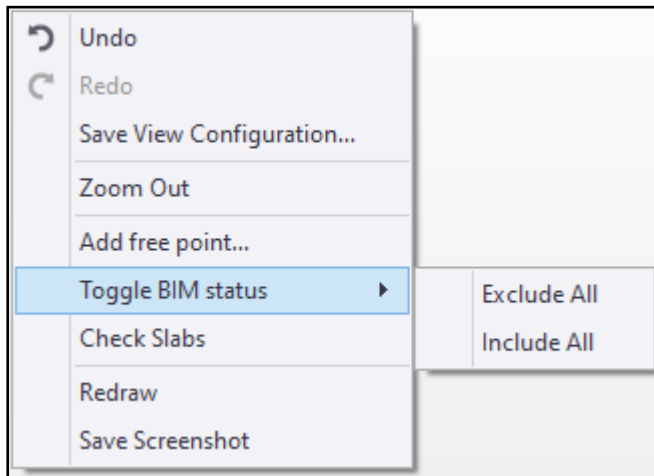
By clicking on each member, wall and slab within the model it is possible to exclude the object from the integration process. Please note that clicking on the excluded object again will revert the status to the original coloring.

A full list of the status is shown below, please note that some of the status entries are related to the synchronization stage and may not be relevant at this stage.

Color coding	Description
 New	Object has been created in Tekla Structural Designer and has not yet been exported to Tekla Structures.
 Imported	Object has been created by the import from Tekla Structures.
 Exported¹	Object has been previously exported to Tekla Structures (prior to any import processes). ¹
 Updated	Member has been modified as a result of the Structural BIM import. Check the BIM Status tree for details.
 Deleted	Object has been deleted in Tekla Structures but has been retained during the merge process due to the Integration Filter settings.
 Excluded	Object will not be communicated from Tekla Structural Designer to Tekla Structures.
 Not Modified	Object has not been altered in any way by the Structural BIM Import process.

¹ The **Exported** status is only used in conjunction with **.cxl** format neutral files. If a model is imported from **.tsmd** model files then no object inside the Tekla Structural Designer model will be flagged as being **Exported**.

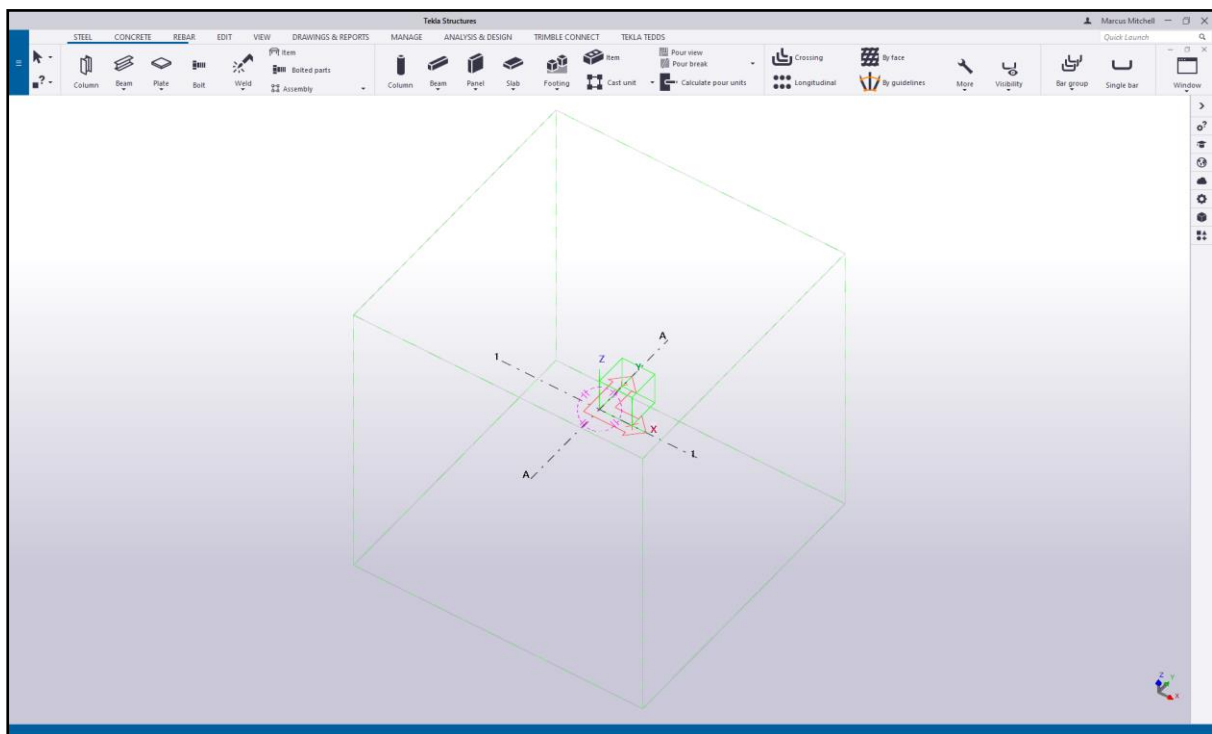
Please note that it is possible to change the exclusion status to all objects in the Tekla Structural Designer command by right-clicking and using the **Toggle BIM status** command.



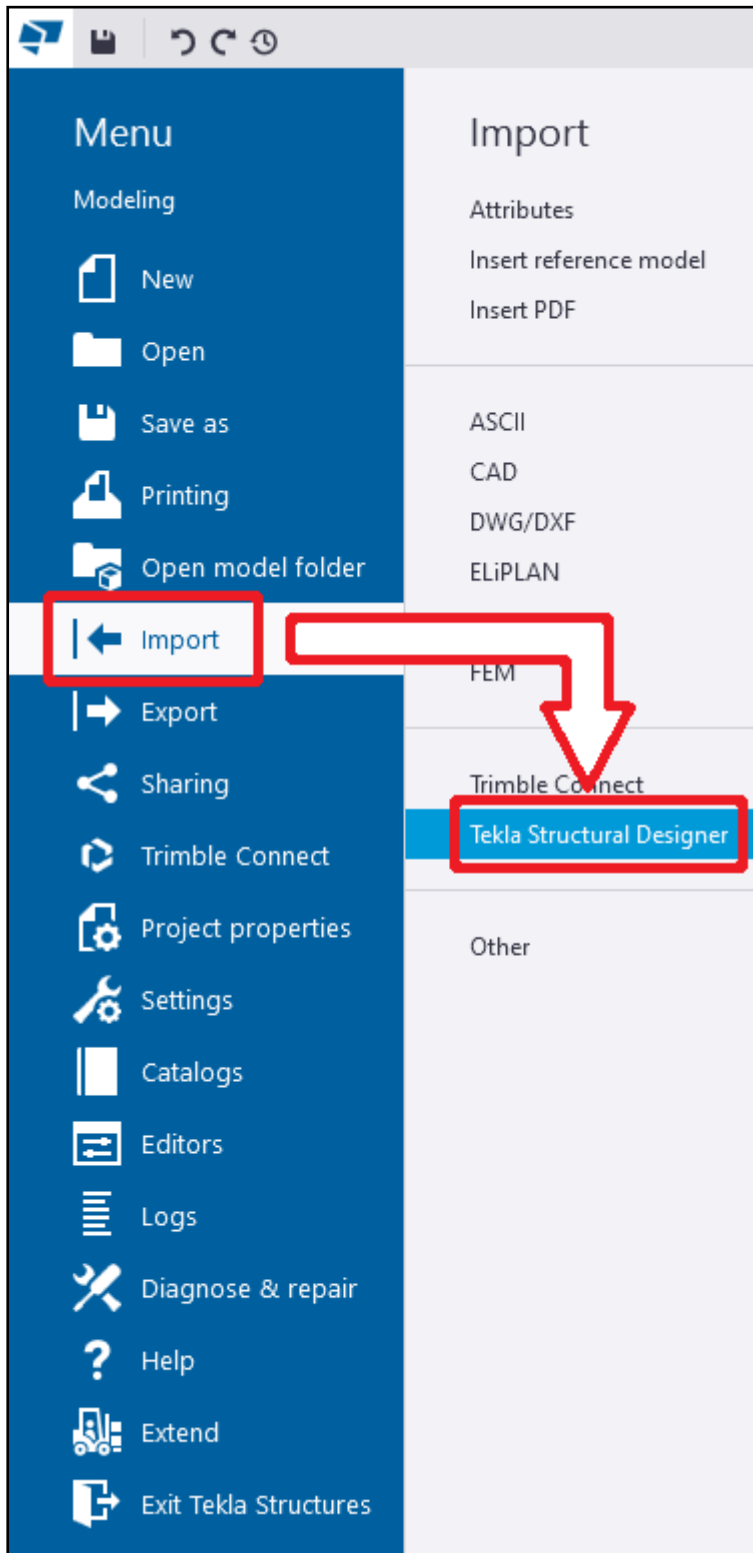
4.4 Importing a model into Tekla Structures using .tsmd model files

This example covers the import of a model into Tekla Structures using a .tsmd format model file. The file that we are using contains no mapping problems (section sizes not being automatically recognized by the integration process) and reference should be made to **Section 6 - Managing the conversion process** if you find that your own files do contain problems regarding unrecognized sections.

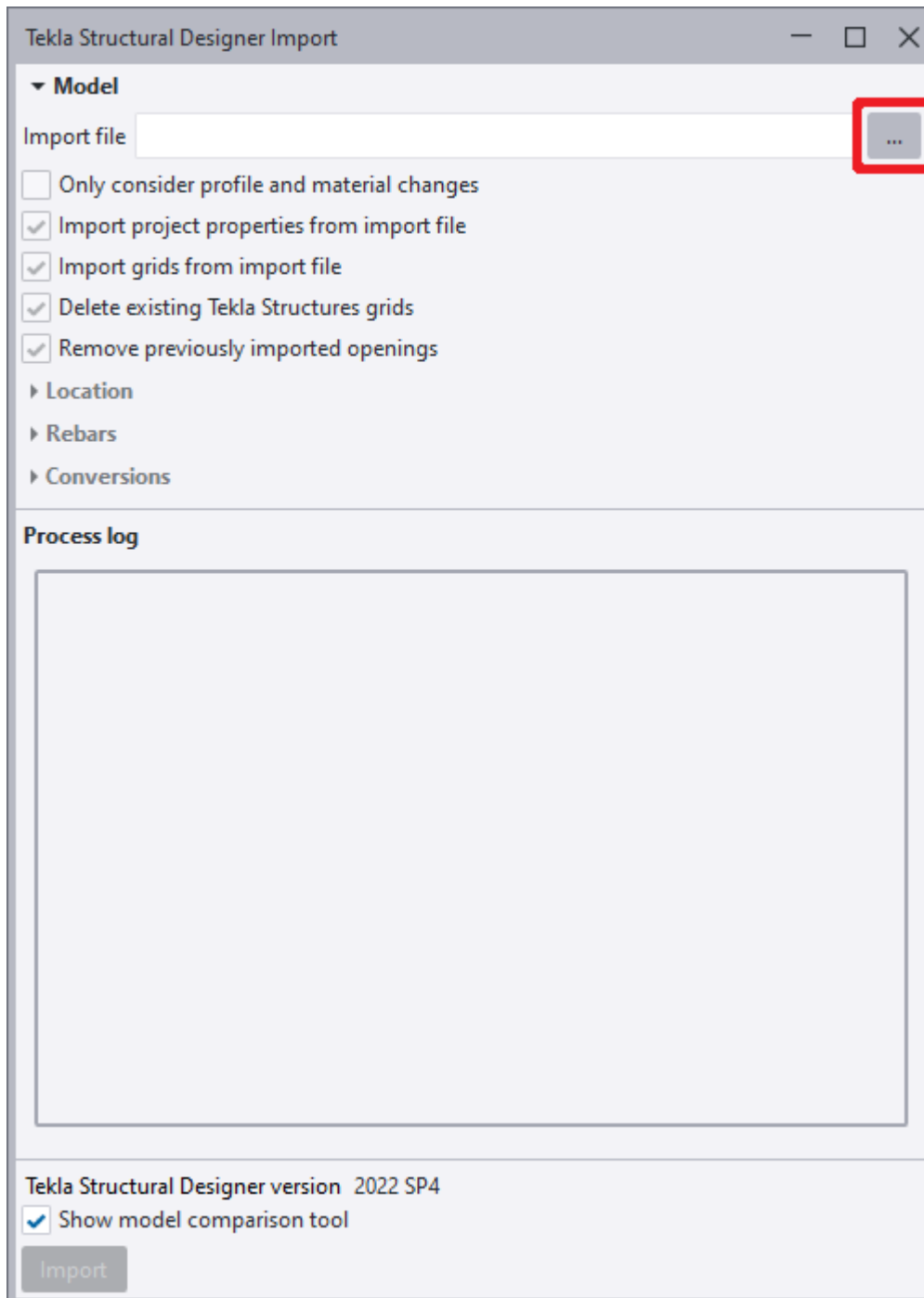
This example is going to follow a first time import into Tekla Structures from Tekla Structural Designer so initially we start with a new Tekla Structures model.



To import a model we need to use the command **Import - Tekla Structural Designer** which is available from the software **File** menu.

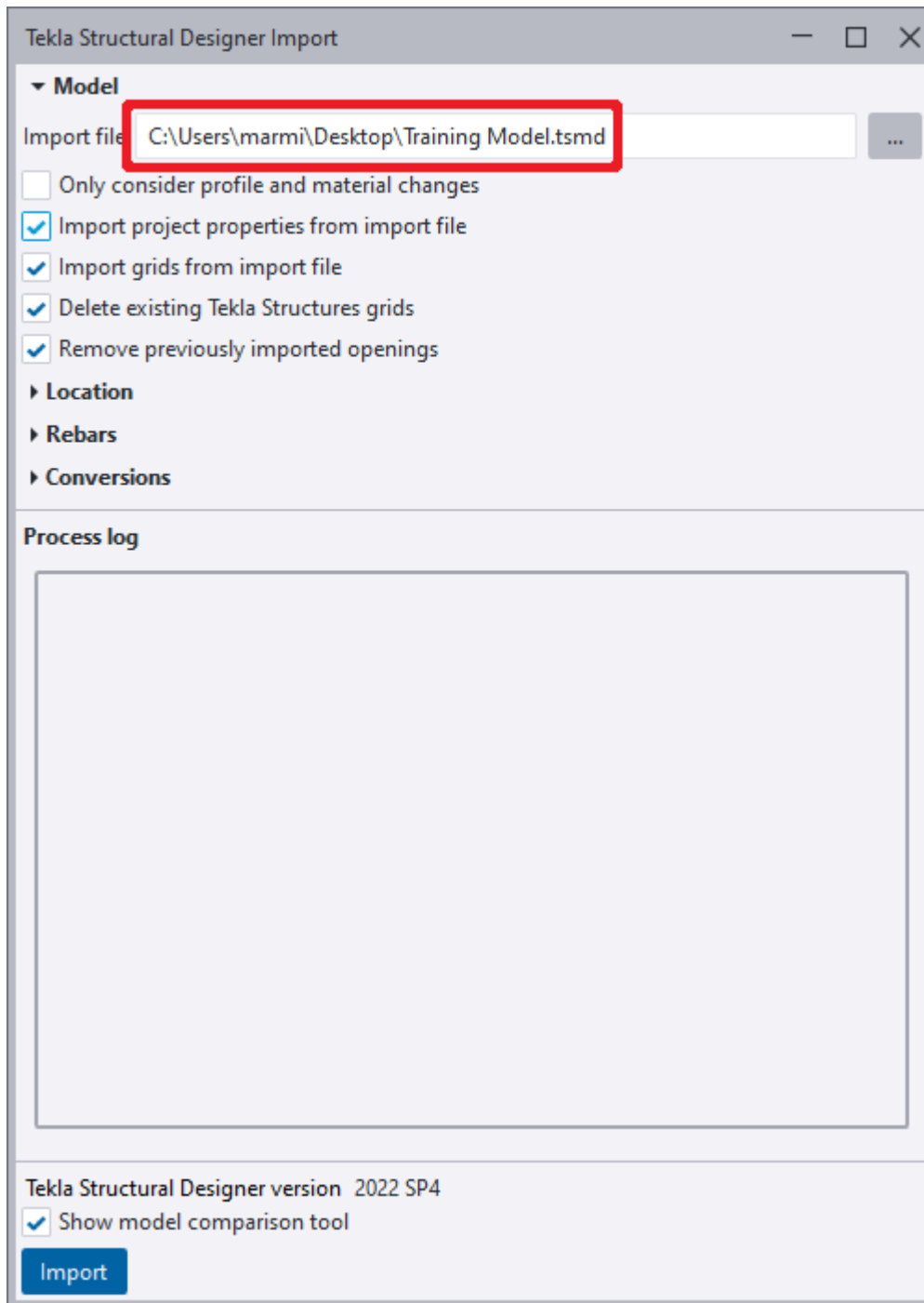


When the **Import From Tekla Structural Designer** command dialog appears, the first step should be to select the **.tsmd** file to be imported into the model. This can be done by clicking on the ... button to the top right and browsing to the file with a simple windows dialog.



There are a number of options held in the Import dialog which may be considered during the integration process.

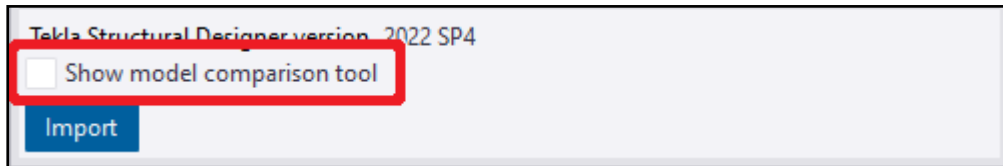
- Only consider profile and material changes
 - This option is used when importing updated models into an existing model. As it suggests, it will ignore all positional modifications made as part of the update process.
- Import project properties from import file
 - This option populates the Tekla Structures **Project Properties** dialog (**File** → **Project Properties**) with the contents of the Tekla Structural Designer **Project Wiki** command (**Home** tab).
- Import grids from import file
 - This option will import the grid pattern defined within the Tekla Structural Designer neutral file.
- Delete existing Tekla Structures grids
 - This option will delete all grid objects from the Tekla Structures model prior to performing the import process.
- Remove previously imported openings
 - This option will remove all openings created from previous import processes. It will not affect any openings created as part of the modeling process within Tekla Structures.
- **Location**
 - Offset X
 - This setting will offset the contents held in the **.tsmd** model file by the value entered. Please note that negative values are allowed.
 - Offset Y
 - This setting will offset the contents held in the **.tsmd** model file by the value entered. Please note that negative values are allowed.
 - Offset Z
 - This setting will offset the contents held in the **.tsmd** model file by the value entered. Please note that negative values are allowed.
 - Pick
 - This option will allow a position to be chosen within the model which will automatically update the Offset X, Offset Y and Offset Z values to suit.
 - Rotation
 - This setting will apply a rotation to the model as a whole when imported into Tekla Structures. The values entered are given relative to the model imported origin, with positive values being taken counter-clockwise and negative as clockwise.



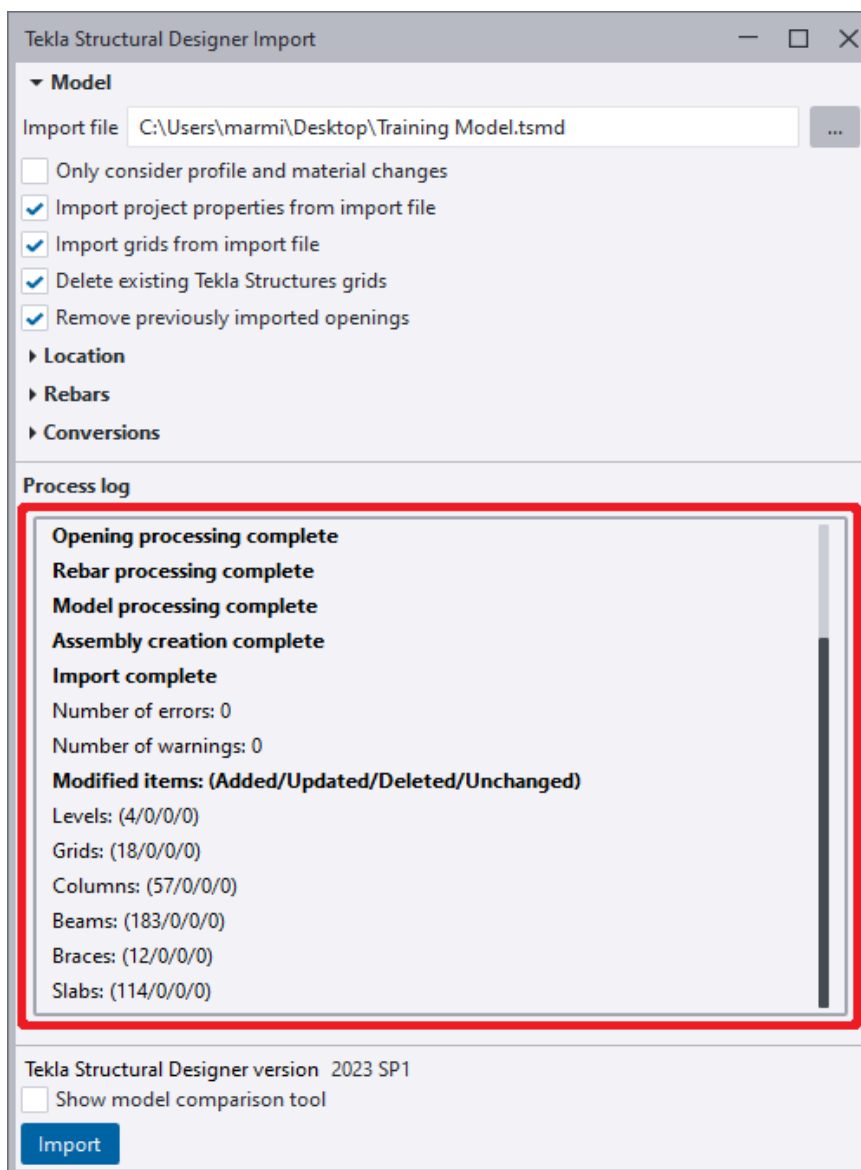
Once the file has been selected, the next stage should be to check the mapping of members between the software packages. This stage is covered in depth during **Section 6 - Managing the Conversion Process**.

Towards the bottom of the dialog is a final option for **Show model comparison tool**. This option is ideally used when importing updated models into an existing model. This option allows for updates to be checked and controlled and will be covered in detail within section **4.8.3**.

For this example, we will uncheck the option and then click on the Import button to start the processing of the **.tsmd** model file.



The processing stage will then commence and display the statistics of the import process.



The statistics show the processes performed and the part types which have been **Added**. Please note that there should be no entries for **Updated**, **Deleted** or **Unchanged** as this was not an update process into an existing Tekla Structures model.

Following on from this, the import has been completed and the **Tekla Structural Designer Import** dialog may be closed.

4.4.1 Minimum version and license requirements

Please note that in order to use the **.tsmd** model integration process, both Tekla Structural Designer and Tekla Structures must be both installed and licensed on the same machine. A minimum of Tekla Structures 2020 and Tekla Structural Designer 2020 needs to be installed to use the **.tsmd** model integration process.

Please note that the yearly version numbers should be identical to ensure successful model integration. e.g. Tekla Structural Designer 2022 should be installed alongside Tekla Structures 2022 or Tekla Structural Designer 2023 should be installed alongside Tekla Structures 2023.

- NB: This rule may be relaxed in future versions of both the Tekla Structural Designer and Tekla Structures software, please check with your local customer service team if any questions arise.

4.4.2 Rebar

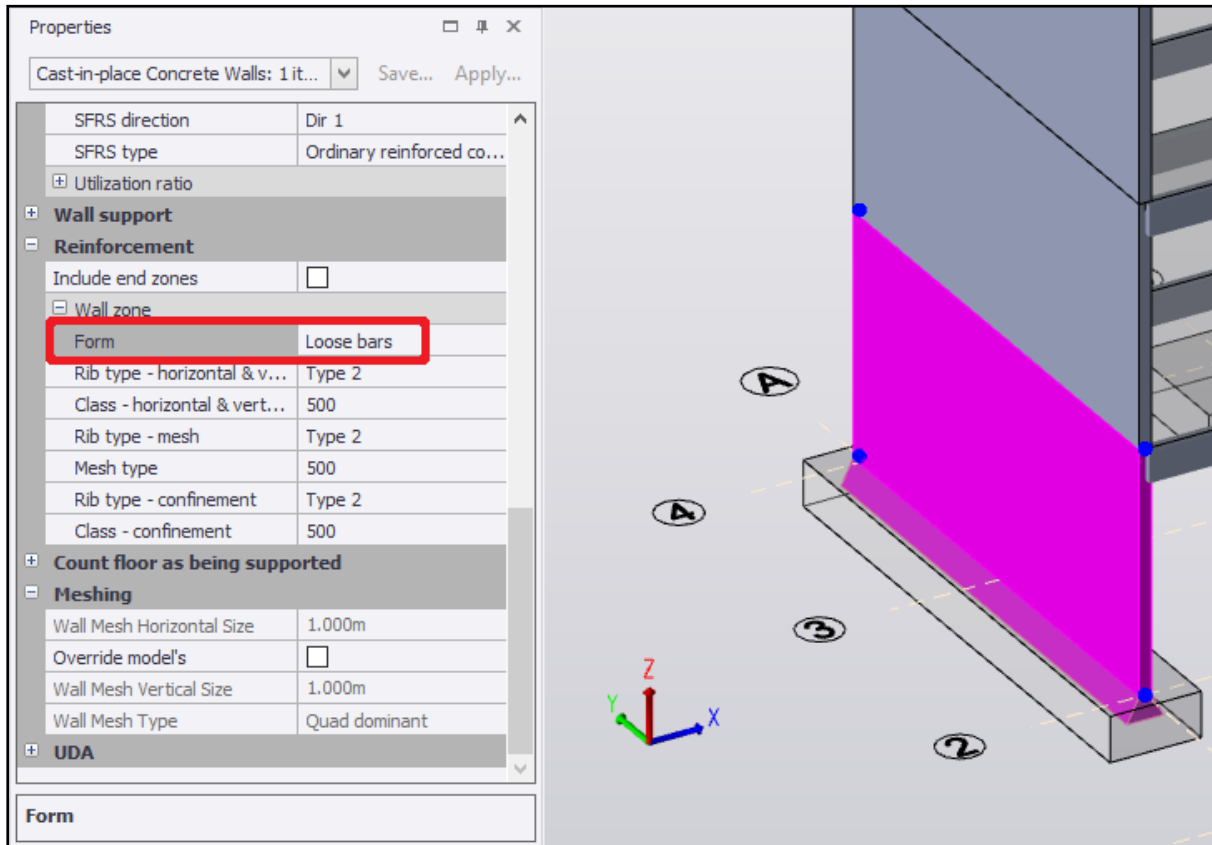
A benefit of the **.tsmd** model integration process is the ability to import design intent rebar objects. These will be imported for all designed reinforced concrete column, beam, slab or panel parts.

Please note that rebar objects will only be created for rectangular concrete columns and beam members. No rebar will be created for any non-rectangular column or beam parts. Please note that no rebar objects will be created for any precast concrete column or beam parts irrespective of the profile shape.

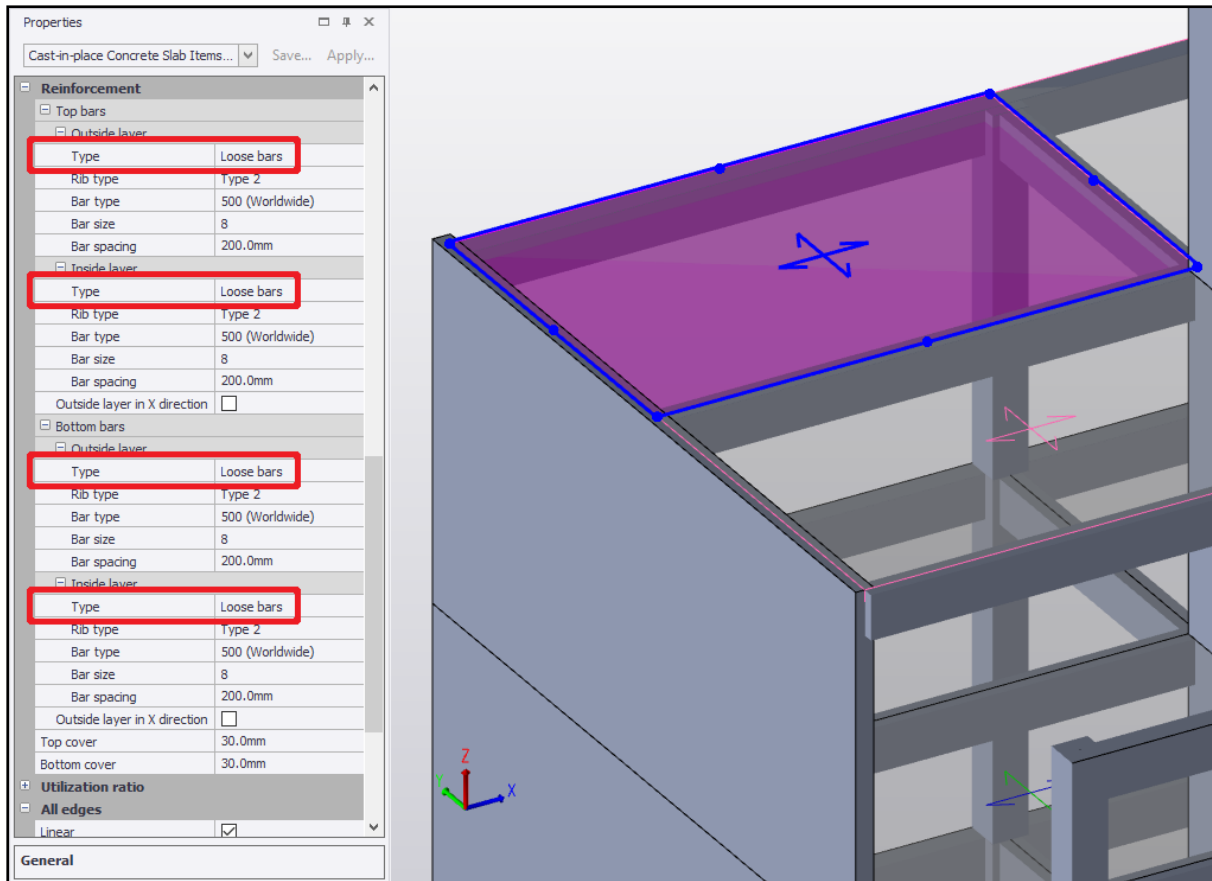
4.4.2.1 Loose bar reinforcement

When considering design intent rebar for slabs and panels, please note that only loose bar reinforcement will be created. No mesh reinforcement will be generated as part of the import process.

Options to use loose reinforcement can be set on each wall and slab object with Tekla Structural Designer. This option can be found under the **Reinforcement** heading in the **Properties** dialog.

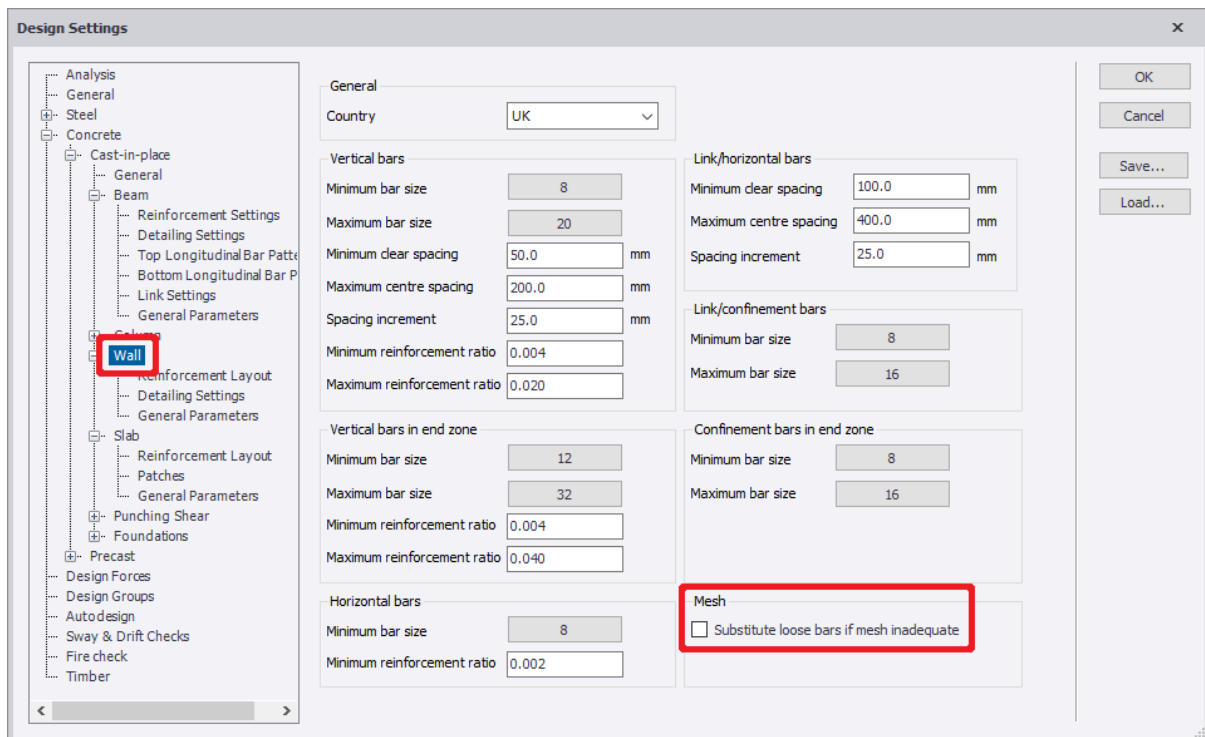


- Reinforcement option within Wall Properties

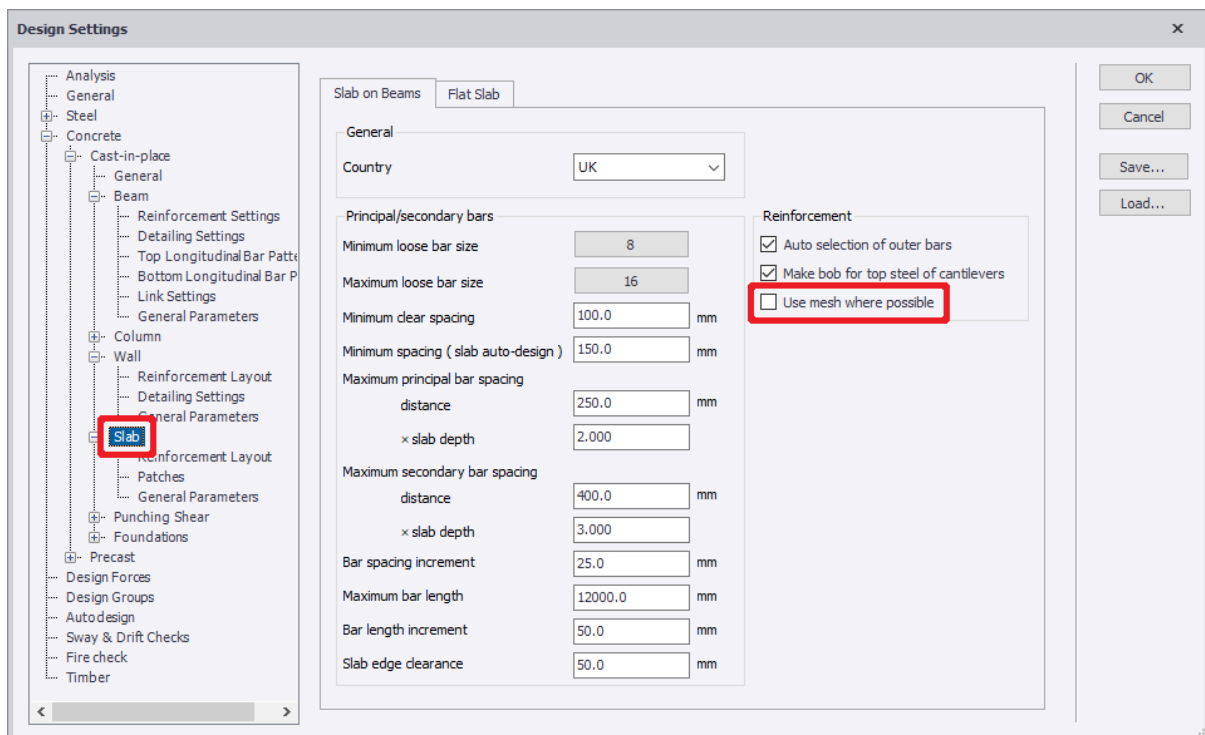


- Reinforcement option within Slab properties

Further options to create loose reinforcement rather than mesh reinforcement within Tekla Structural Designer are held within the **Settings** command on the **Design** tab.



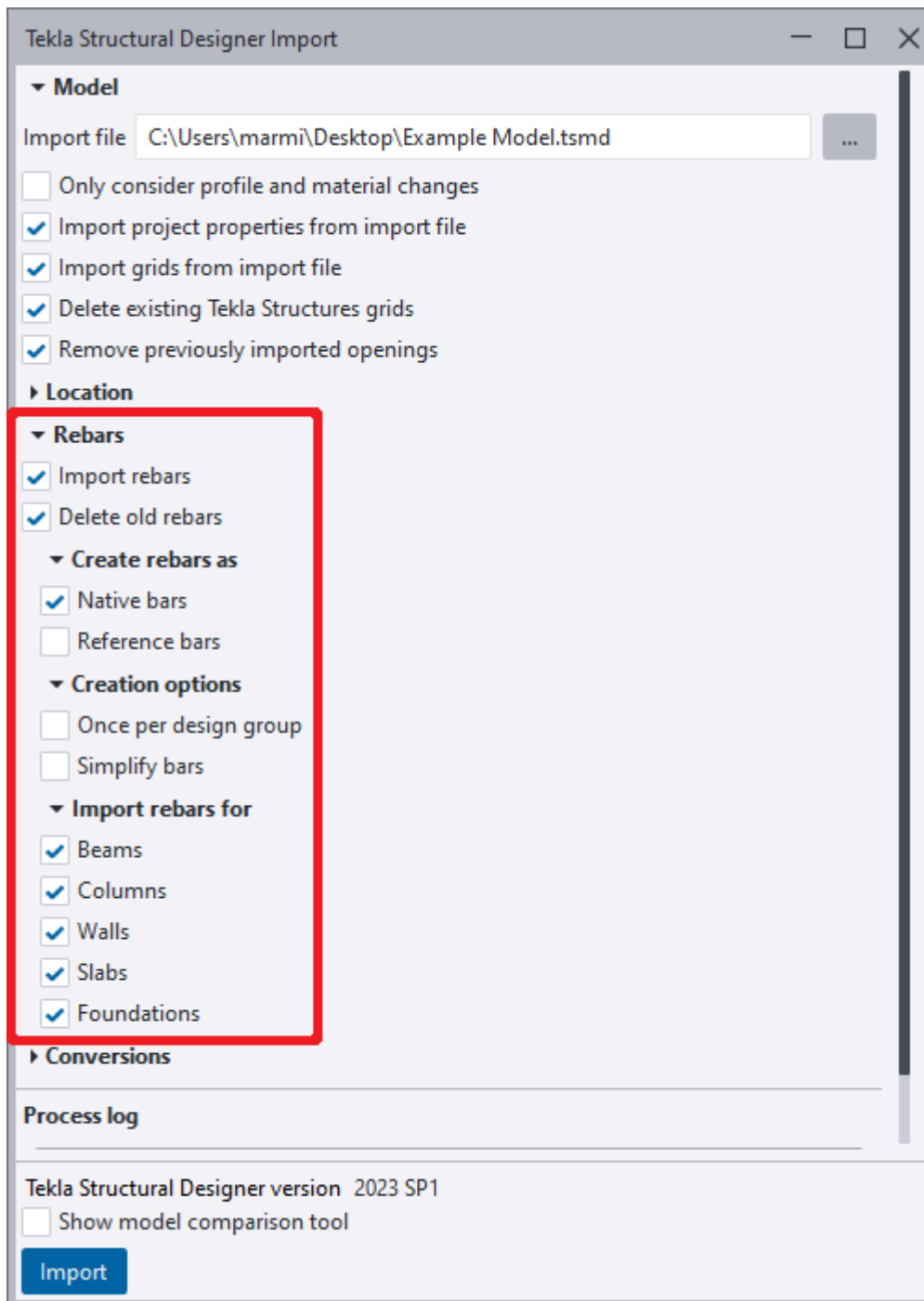
- Option for loose bars within Wall objects - this option affects panel parts within Tekla Structures.



- Option for loose bars within Slab objects.

4.4.4.2 Reinforcement import options within Tekla Structures

There are a number of options available within Tekla Structures which affect the integration of design intent rebar objects.



- **Rebars**
 - Import rebars (Enabled as default)
 - This option controls the import of rebar objects. If it is enabled, then design intent rebar will be created as part of the integration process.
 - Delete old rebars (Enabled as default)
 - If this option is enabled, any rebar previously created by the import process will be deleted as part of the integration process. Please note that this option will have no effect on rebar created manually outside of the integration process.
- **Create rebars as**
 - Native bars (Enabled as default)
 - Design intent rebar will be created as native bar objects using Tekla Structures rebar set technology. If the option is disabled, no rebar content will be created as native bars.
 - Reference bars
 - All design intent rebar will be created as a single reference model. This can then be used to trace model rebar objects if required. The reference model can be disabled or deleted using standard Tekla Structures commands.
- **Creation options**
 - Once per design group
 - Only one set of rebar will be created for each part in each design group. This option allows the detailer to modify and complete the detailing process before copying the rebar sets around other members held in the same design group.
 - Simplify bars
 - This option controls the import of information linked to end detail modifiers (hooks) and splitters (laps and cranks). If it is enabled then no end detail modifiers or splitter information will be enabled.
- **Import rebars for**
 - Beams (Enabled as default)
 - If enabled, design intent rebar will be created for beam parts. If disabled, no rebar will be created as part of the import process.
 - Columns (Enabled as default)
 - If enabled, design intent rebar will be created for column parts. If disabled, no rebar will be created as part of the import process.
 - Walls (Enabled as default)
 - If enabled, design intent rebar will be created for wall parts. If disabled, no rebar will be created as part of the import process.
 - Slabs (Enabled as default)
 - If enabled, design intent rebar will be created for slab parts. If disabled, no rebar will be created as part of the import process.

- Foundations (Enabled as default)
 - If enabled, design intent rebar will be created for foundation parts. If disabled, no rebar will be created as part of the import process. Please note that only rectangular pad bases and strip base wall objects within Tekla Structural Designer will be considered for rebar creation.

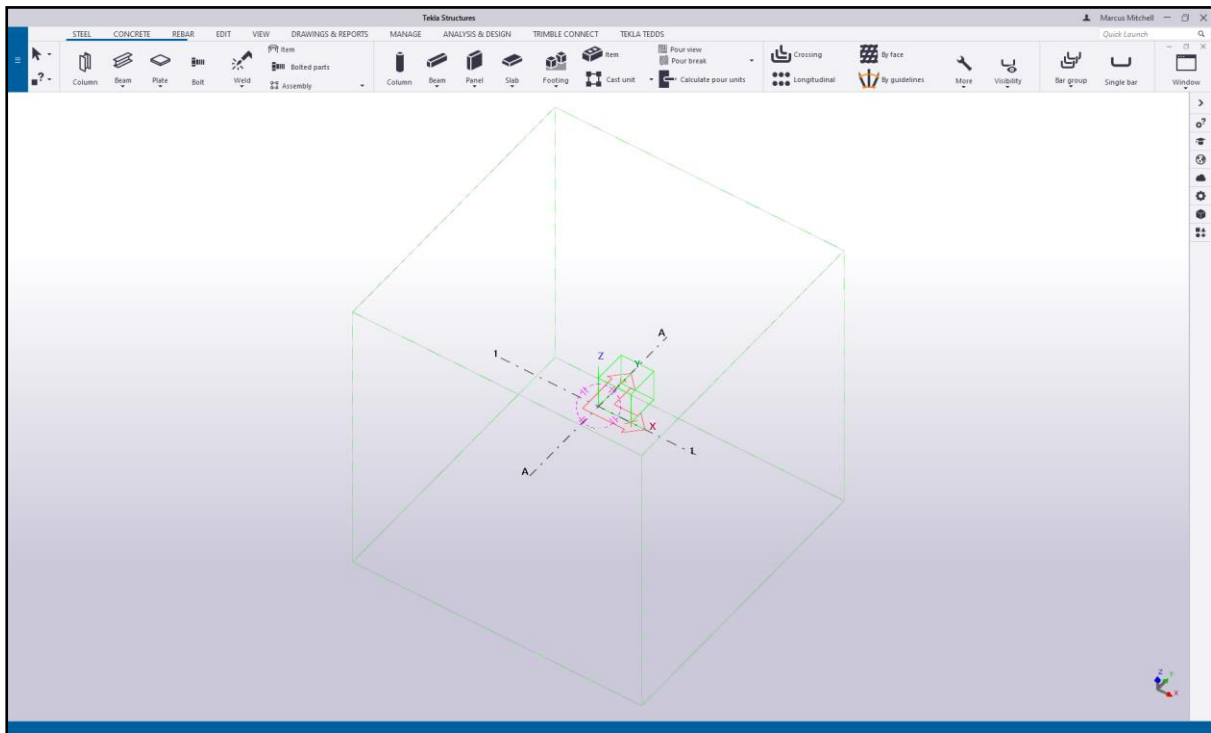
4.4.4.3 Using design intent rebar after the import process

- As mentioned above, design intent rebar is created using Tekla Structures rebar set technology. This allows rebar to be manipulated and adjusted easily after the initial rebar creation process has been completed.
- Please note that main bars will be created from the bottom of the lowest column stack, extending 1000mm less cover settings (e.g. 965mm for 35mm cover) below the column. This allows the rebar detailer to manipulate the rebar sets and any assigned end detail modifiers to suit the finalized detail requirements.
- Rebar sets are created from the Import into Tekla Structures, they cannot be exported back into Tekla Structural Designer. Any changes to rebar sizes or centers should be made to the Tekla Structural Designer model and then reimported into the Tekla Structures BIM model.

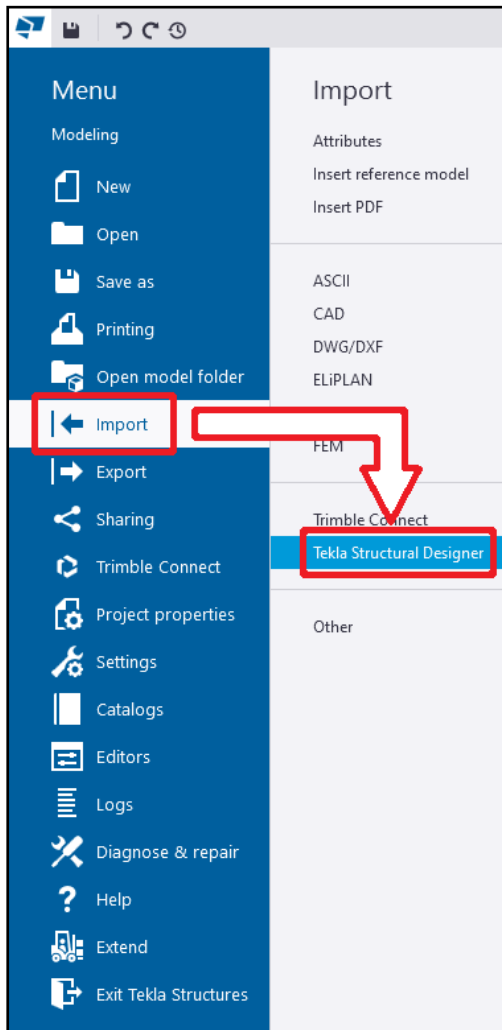
4.5 Importing a model into Tekla Structures using .cxl neutral files

This example covers the import of a model into Tekla Structures. The file that we are using contains no mapping problems (section sizes not being automatically recognized by the integration process) and reference should be made to **Section 6 - Managing the Conversion Process** if you find that your own files do contain problems regarding unrecognized sections.

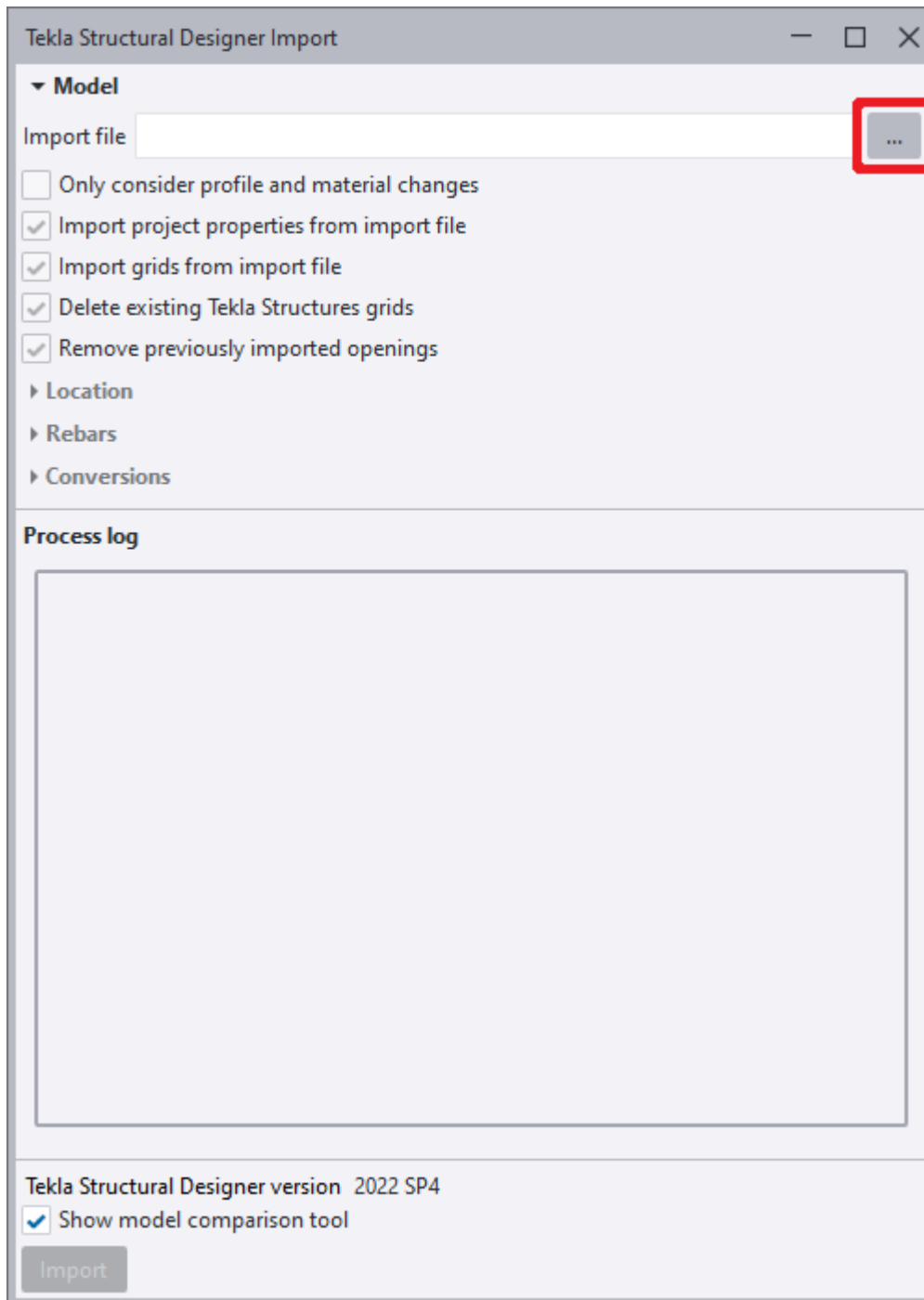
This example is going to follow a first time import into Tekla Structures from Tekla Structural Designer so initially we start with a new Tekla Structures model.



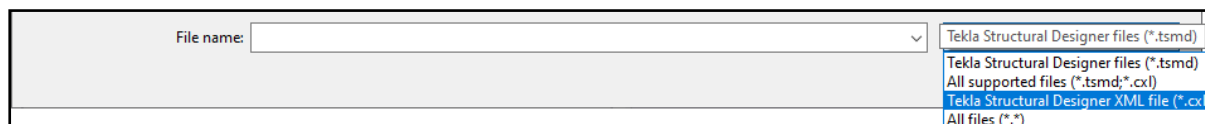
To import a model we need to use the command **Import - Tekla Structural Designer** which is available from the software **File** menu.



When the **Tekla Structural Designer Import** command dialog appears, the first step should be to select the **.cxl** format neutral file to be imported into the model. This can be done by clicking on the ... button to the top right and browsing to the file with a simple windows dialog.



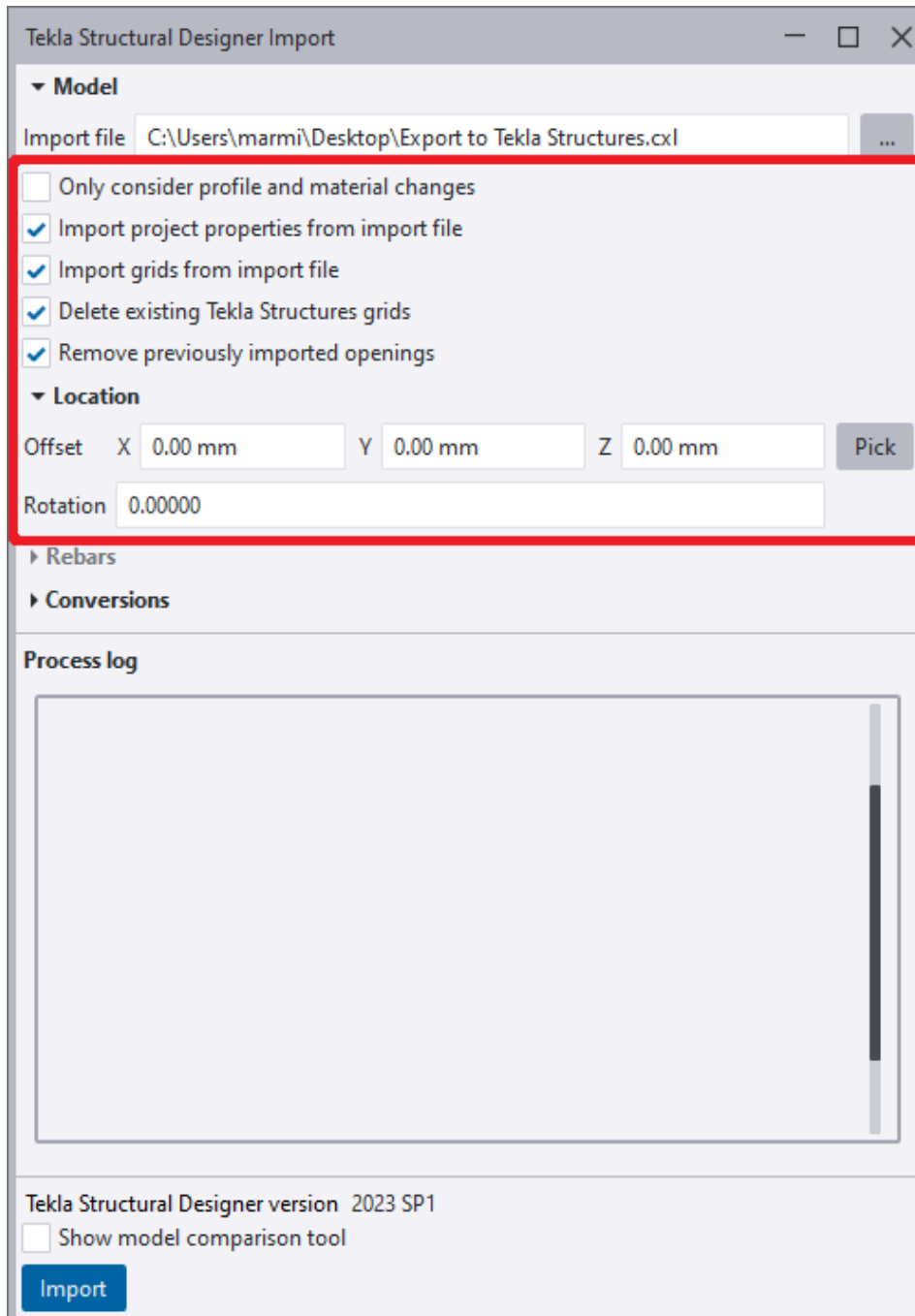
Please note that when selecting the file to be imported, the default file format is set to be a **.tsmd** model file. This filter needs to be changed to use the **Tekla Structural Designer XML** file format (**.cxl**) in order to select the previously exported file.



There are a number of options held in the Import dialog which may be considered during the integration process.

- Only consider profile and material changes
 - This option is used when importing updated models into an existing model. As it suggests, it will ignore all positional modifications made as part of the update process.
- Import project properties from import file
 - This option populates the Tekla Structures **Project Properties** dialog (**File** → **Project Properties**) with the contents of the Tekla Structural Designer **Project Wiki** command (**Home** tab).
- Import grids from import file
 - This option will import the grid pattern defined within the Tekla Structural Designer neutral file.
- Delete existing Tekla Structures grids
 - This option will delete all grid objects from the Tekla Structures model prior to performing the import process.
- Remove previously imported openings
 - This option will remove all openings created from previous import processes. It will not affect any openings created as part of the modeling process within Tekla Structures.
- **Location**
 - Offset X
 - This setting will offset the contents held in the **.cxl** neutral file by the value entered. Please note that negative values are allowed.
 - Offset Y
 - This setting will offset the contents held in the **.cxl** neutral file by the value entered. Please note that negative values are allowed.
 - Offset Z
 - This setting will offset the contents held in the **.cxl** neutral file by the value entered. Please note that negative values are allowed.

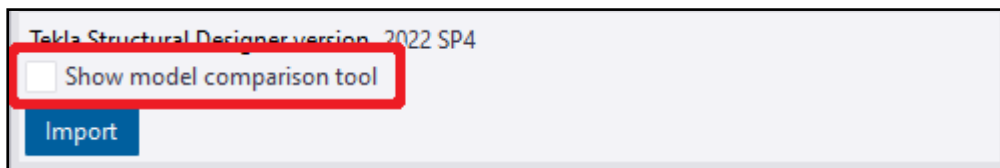
- Pick
 - This option will allow a position to be chosen within the model which will automatically update the Offset X, Offset Y and Offset Z values to suit.
- Rotation
 - This setting will apply a rotation to the model as a whole when imported into Tekla Structures. The values entered are given relative to the model imported origin, with positive values being taken counter-clockwise and negative as clockwise.



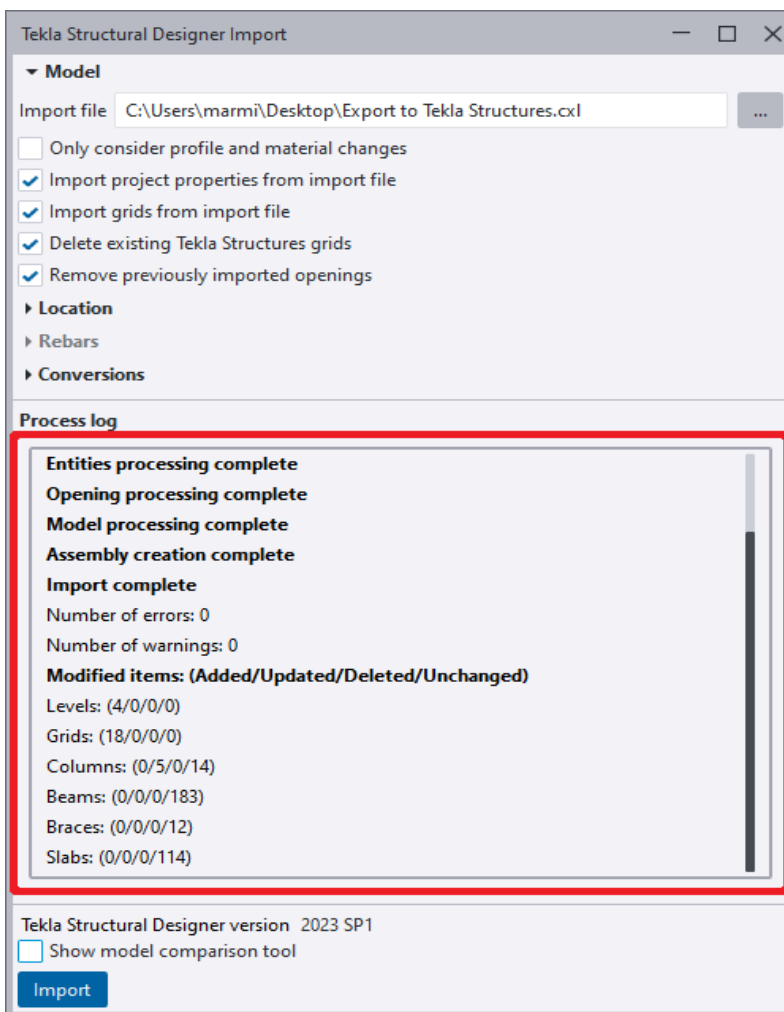
Once the file has been selected, the next stage should be to check the mapping of members between the software packages. This stage is covered in depth during **Section 6 - Managing the Conversion Process**.

Towards the bottom of the dialog is a final option for **Show model comparison tool**. This option is ideally used when importing updated models into an existing model. This option allows for updates to be checked and controlled and will be covered in detail within **Section 4.8 - Subsequent transfer from TSD into TS**.

For this example, we will uncheck the option and then click on the **Import** button to start the processing of the **.cxl** neutral file.



The processing stage will then commence and display the statistics of the import process.



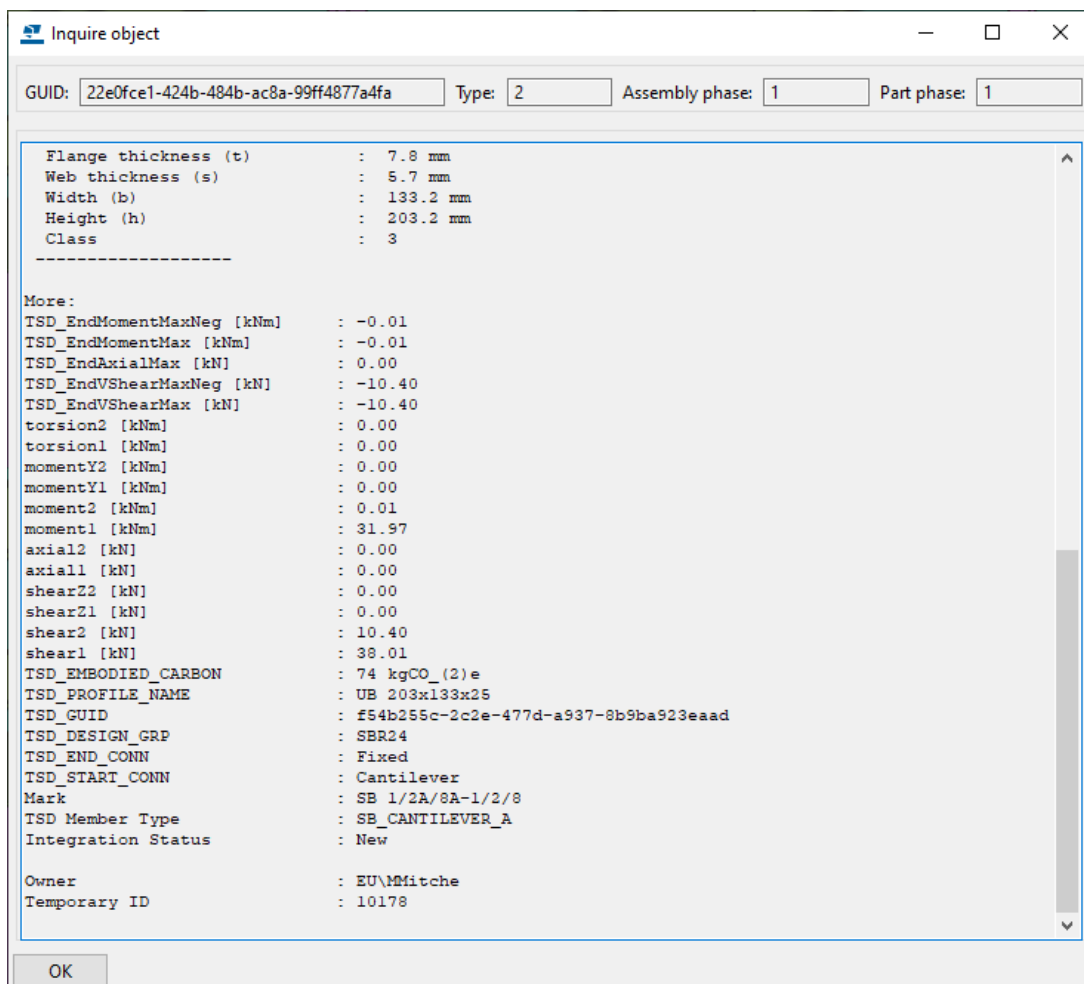
The statistics show the processes performed and the part types which have been **Added**. Please note that there should be no entries for **Updated**, **Deleted** or **Unchanged** as this was not an update process into an existing Tekla Structures model.

Following on from this, the import has been completed and the **Tekla Structural Designer Import** dialog may be closed.

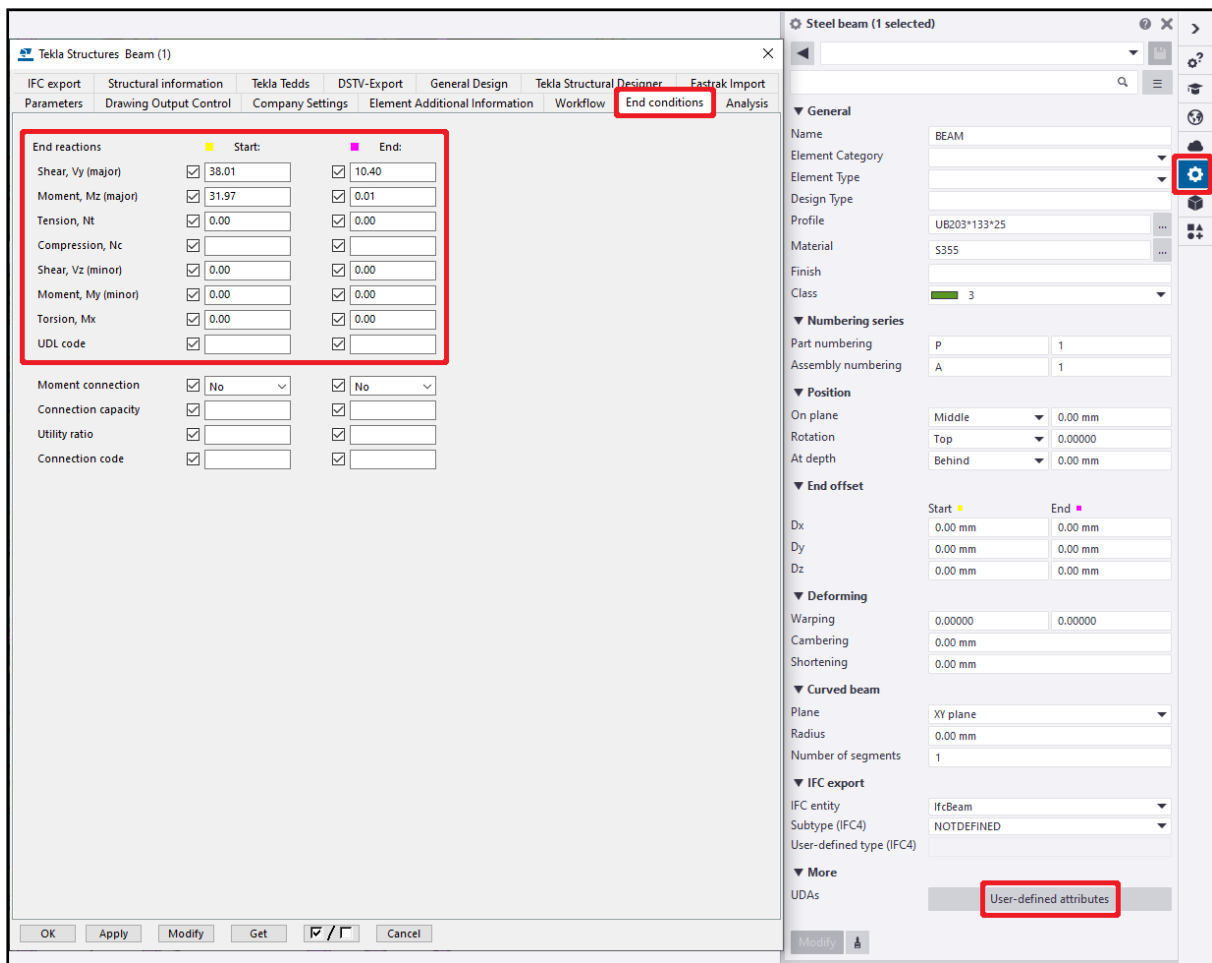
4.5.1 Viewing member end forces

Following on from a successful import process, the member end forces can be viewed. This can be done either by using the **Inquire Part** command or accessing the **User-defined attributes** → **End conditions** dialog through **Model Object Properties**.

A full list of the member end forces imported into Tekla Structures from Tekla Structural Designer can be found in **Appendix 3**.



- member end forces shown when using the **Inquire Part** command.



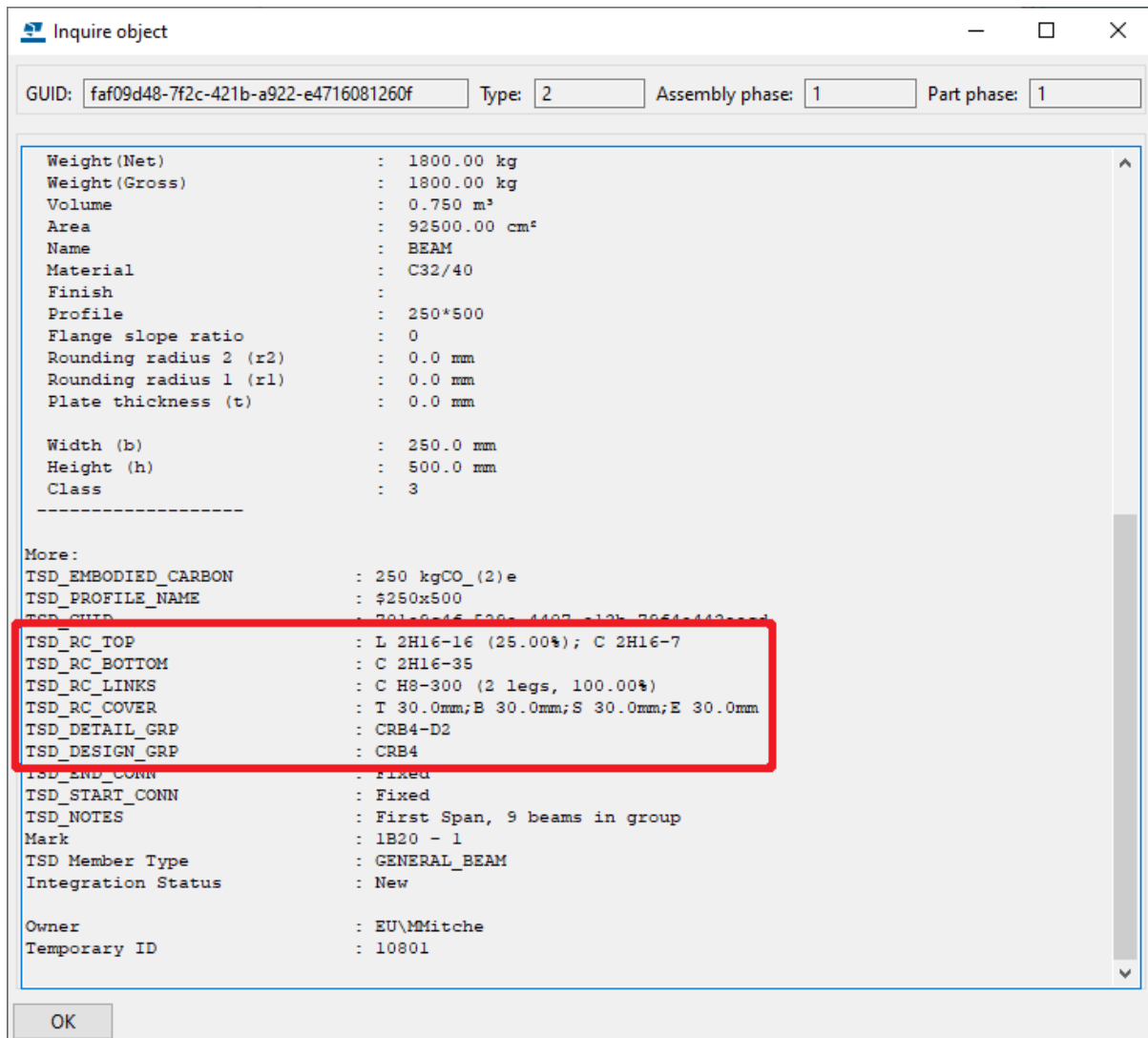
- member end forces shown within the **End conditions** dialog.

4.5.2 Concrete parts and designed rebar

The import of physical rebar objects is not supported by the **.cxl** neutral file format. In order to import the rebar design intent as physical objects the **.tsmd** model file import must be used.

Please note that attributes showing the design intent are still available when using the **.cxl** neutral file format, these can be viewed directly by using the **Inquire Part** command.

For a full list of imported attributes, please refer to **Appendix 3**.



- Rebar attributes shown using the **Inquire Part** command.

4.6 After import

After the import process has been completed, you may wish to investigate the created model and parts further. This section provides information relating to the different part and object types created by the Import from Tekla Structural Designer process.

4.6.1 Created objects

4.6.1.1 Grids

Construction Lines

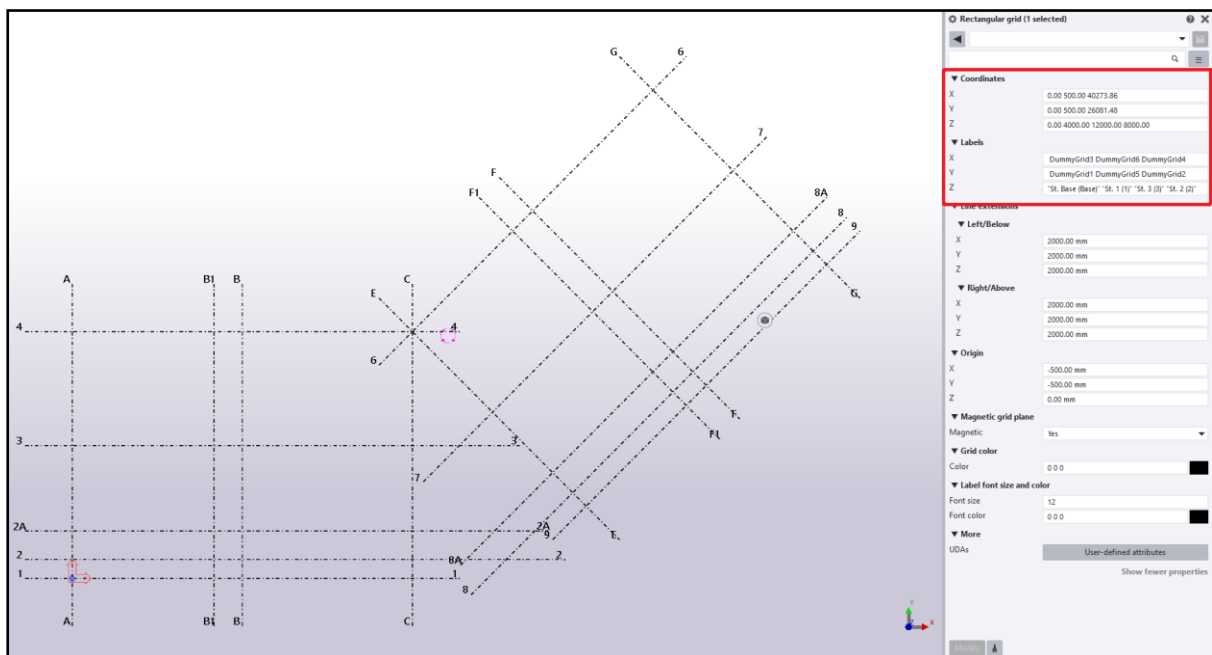
Please be aware that there is a clear difference between **Grid** objects and **Construction Line** objects within the Tekla Structural Designer software :-

Construction Lines are view specific objects and only appear on the view that they were created in.

Construction Lines will not be exported to Tekla Structures.

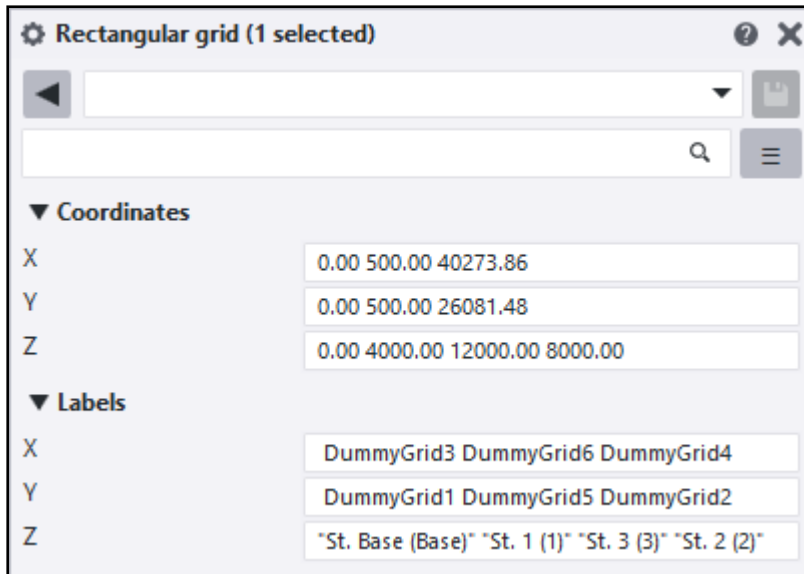
Grids

Grids are imported from Tekla Structural Designer as individual lines held within the single grid object and can be physically manipulated after import. When considering grid line names within Tekla Structural Designer, please note that there are no realistic limitations for individual grid names. However please note that only latin alphanumeric characters are transferred by the integration process.



Care should be taken when viewing the grid properties. The **Coordinates - X** and **Coordinates - Y** entries will only show the extent of the pattern but no detailed grid line information.

Similarly, the **Labels - X** and **Labels - Y** entries will not show any meaningful information related to the grid.

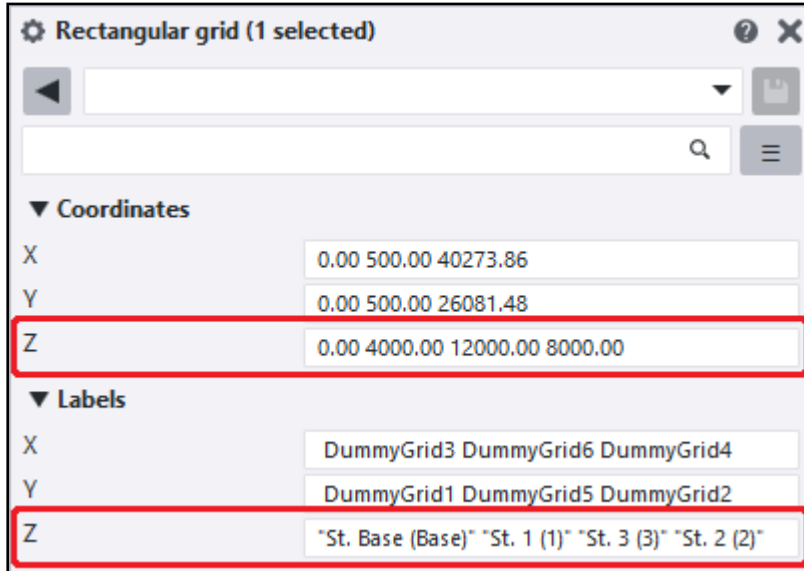


All grid information from Tekla Structural Designer will be imported into Tekla Structures using identical element definition points. As the amount of grids used in the Tekla Structural Designer model may not meet the requirements of the Tekla Structures user, extraneous grids may be removed or new entries added to suit their own needs.

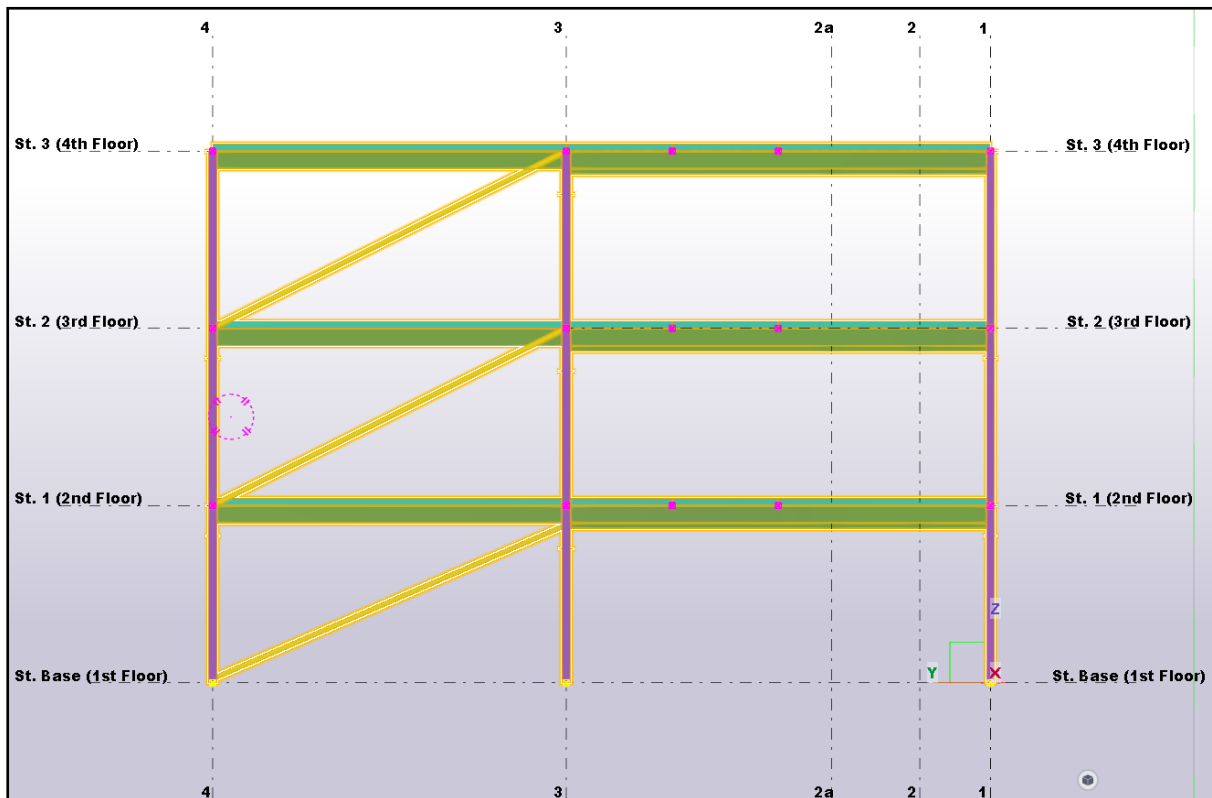
Please note that only linear grids can be integrated, curved grids are omitted from the integration process.

4.6.1.2 Construction levels

Levels are transferred from Tekla Structural Designer with data being entered into the **Grid** dialog. **Labels - Z** are populated from the **Name** entry held in the **Construction Levels** dialog and **Coordinates - Z** are created from the **Level** entry.



Please note that only Z-entries containing a part handle or the end of an analytical bar will be considered for export back to Tekla Structural Designer.

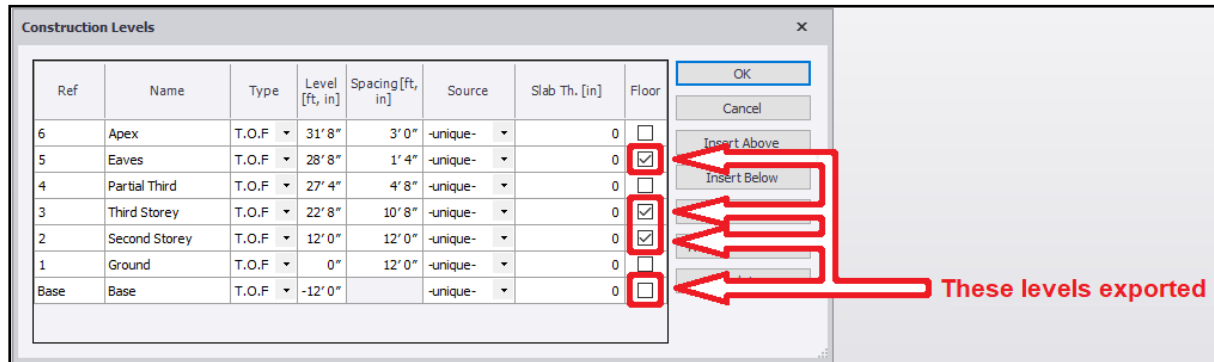


4.6.1.2.1 Floor Setting

When generating levels within Tekla Structural Designer, it is important to understand that not all levels need to be transferred using the Integrator.

For levels generated in Tekla Structural Designer, only levels that have been flagged as **Floor** items will be exported. The exception to this rule is the lowest most entry in the dialog, which is ALWAYS exported, regardless of the **Floor** flag setting.

e.g. When looking at the example below, we find that four levels would be exported. Three of the levels are flagged as **Floor** whilst the lowest most level is always exported.

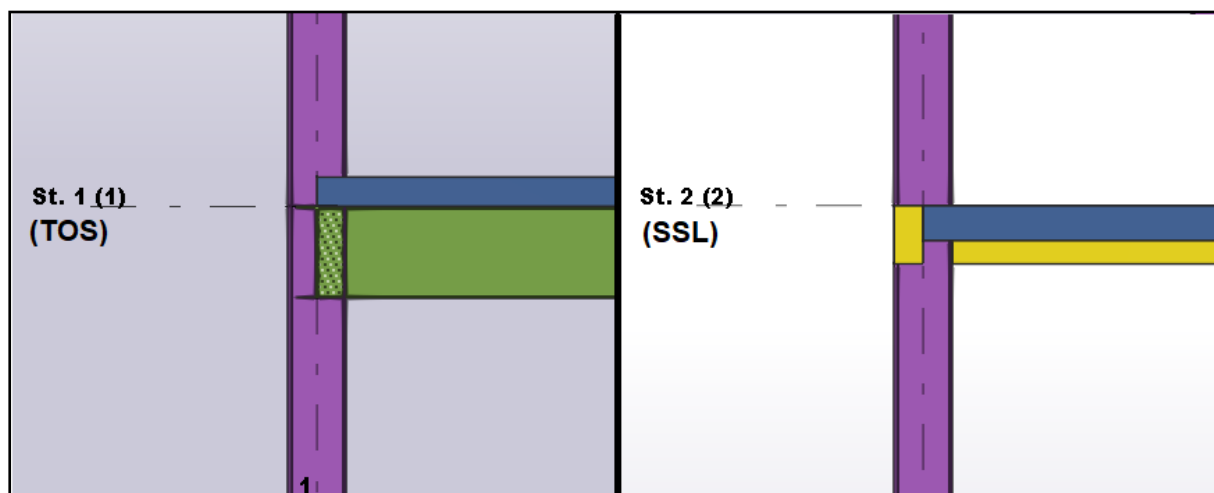


4.6.1.2.2 Level Type

Level entities in Tekla Structural Designer can be defined as **Structural Slab Level (S.S.L.)**, **Top of Foundations (T.O.F.)** or **Top of Steel (T.O.S.)**. Concerning the integration process with Tekla Structures, this affects the vertical slab location.

Where levels are defined as **Top of Steel**, the slab will be offset equal to its depth so that the underside of the slab is located in line with the level entity.

Where levels are defined as either **Structural Slab Level** or **Top of Foundations**, the slab will not be offset. The top of the slab will be in line with the level entity.



4.6.1.2.3 Level Source

Tekla Structural Designer can use the concept of source levels to duplicate the content and simplify the modeling process. It is important to note that Revit has no concept of duplicate floors within the software, therefore duplicate levels are imported into Revit as independent unique levels.

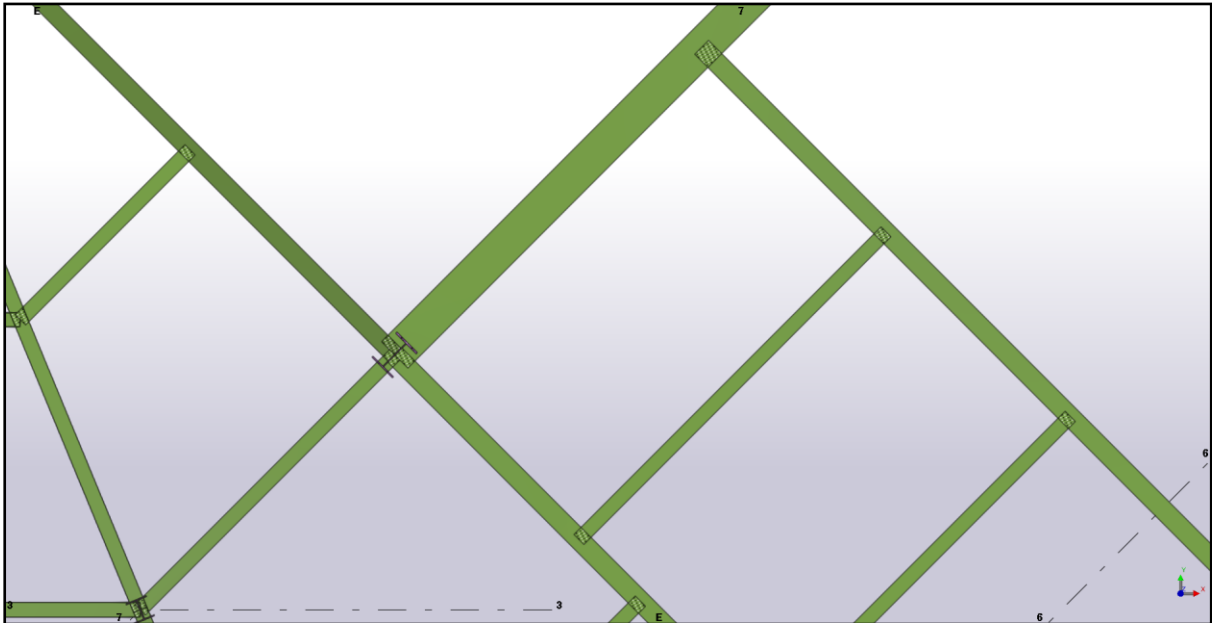
If this model is then returned from Revit to Tekla Structural Designer, the source/duplication settings are reset during the merge process and all levels are flagged as unique.

No items will be physically lost as part of this change and the flag can be reapplied if necessary.

Ref	Name	Type	Level [ft, in]	Spacing [ft, in]	Source	Slab Th. [in]	Floor
12	12	T.O.S	150' 0"	10' 0"	-unique-		<input checked="" type="checkbox"/>
11	11	T.O.S	140' 0"	10' 0"	-unique-		<input checked="" type="checkbox"/>
10	10	T.O.S	130' 0"	10' 0"	1		<input checked="" type="checkbox"/>
9	9	T.O.S	120' 0"	10' 0"	1		<input checked="" type="checkbox"/>
8	8	T.O.S	110' 0"	10' 0"	1		<input checked="" type="checkbox"/>
7	7	T.O.S	100' 0"	10' 0"	1		<input checked="" type="checkbox"/>
6	6	T.O.S	90' 0"	10' 0"	1		<input checked="" type="checkbox"/>
5	5	T.O.S	80' 0"	10' 0"	1		<input checked="" type="checkbox"/>
4	4	T.O.S	70' 0"	10' 0"	1		<input checked="" type="checkbox"/>
3	3	T.O.S	60' 0"	10' 0"	1		<input checked="" type="checkbox"/>
2	2	T.O.S	50' 0"	10' 0"	1		<input checked="" type="checkbox"/>
1	1	T.O.S	40' 0"	10' 0"	-unique-		<input checked="" type="checkbox"/>
Base	Base	T.O.S	30' 0"	10' 0"	-unique-		<input checked="" type="checkbox"/>
B1.2	B1.2	S.S.L	20' 0"	10' 0"	Base	8	<input checked="" type="checkbox"/>
B1.1	B1.1	S.S.L	10' 0"	10' 0"	Base	8	<input checked="" type="checkbox"/>
B1	B1	S.S.L	0"		-unique-	0	<input checked="" type="checkbox"/>

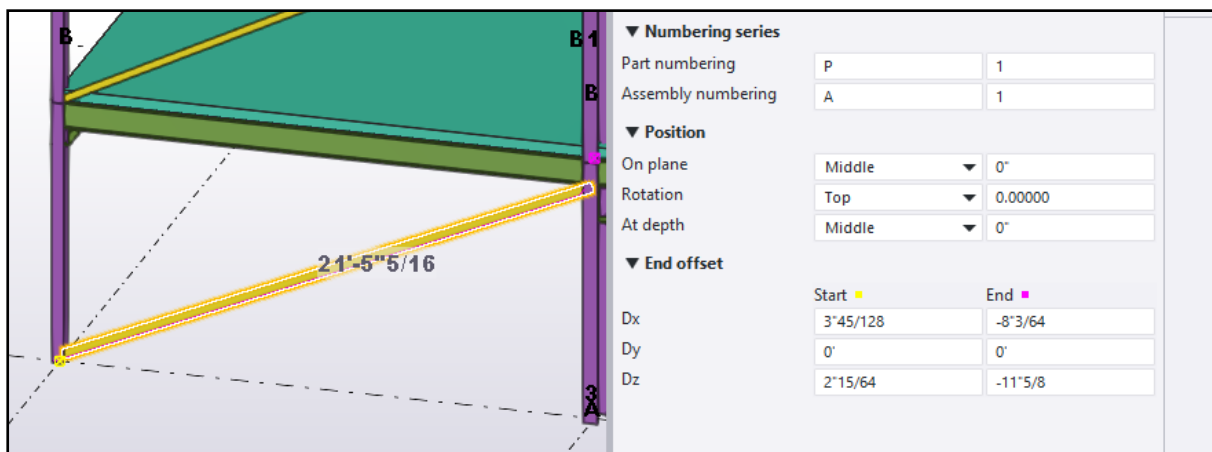
4.6.1.3 Parts

Parts will be generated inside Tekla Structures to suit all content exported from Tekla Structural Designer. Parts will be created with part handles set to suit the overall analysis wire position set within Tekla Structural Designer.



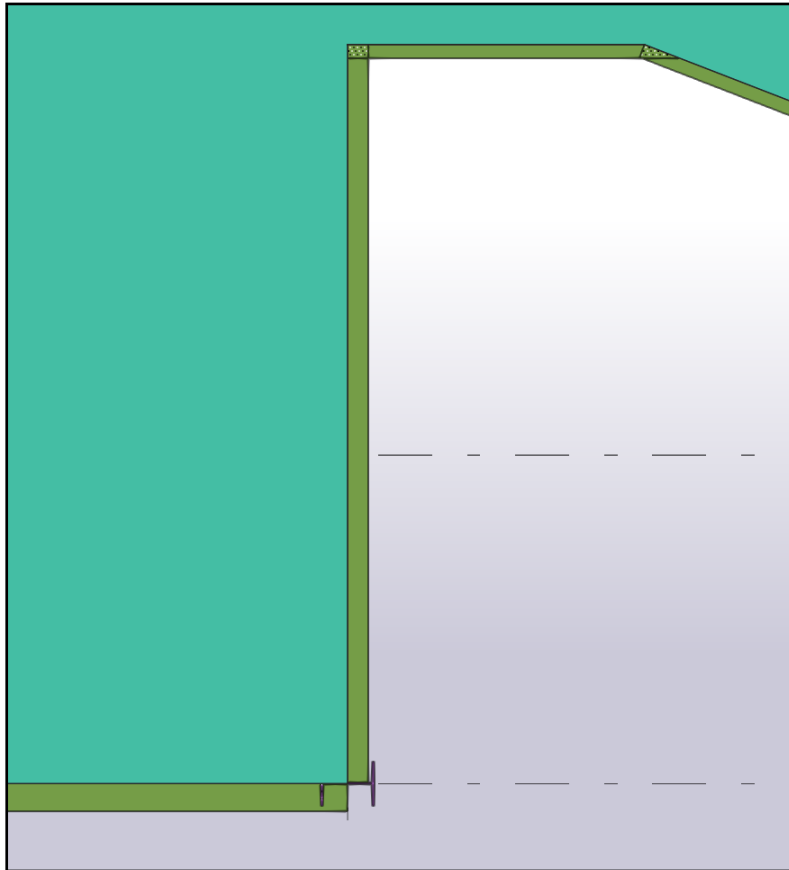
4.6.1.3.1 Offsets

End offsets are transferred from Tekla Structural Designer to Tekla Structures and vice-versa. (Global End-Offset settings within Tekla Structural Designer). These settings can be used to integrate positional settings.



4.6.1.4 Slabs

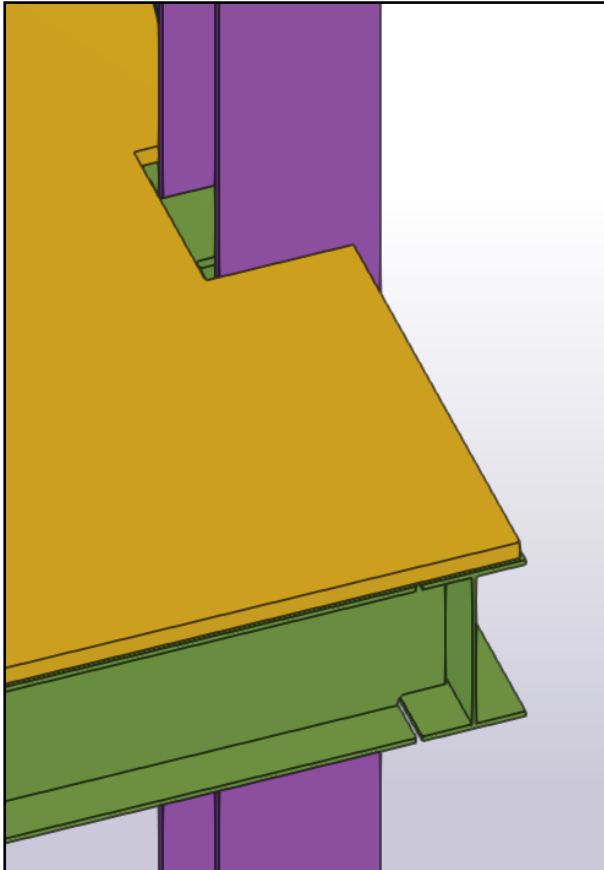
Slab objects are integrated in both directions between Tekla Structural Designer and Tekla Structures. Please note that the slab analysis wire is defined by the boundary outline, this means that the slab will not cover the full flange extent after transfer into Tekla Structures.



4.6.1.4.1 Outlines

When transferring slab parts from Tekla Structures to Tekla Structural Designer, please note that the resulting slab in Tekla Structural Designer will be created based on the physical outline within Tekla Structures.

Depending on the slab type being analyzed, this may lead to the slab being flagged as analytically unsupported within Tekla Structural Designer.

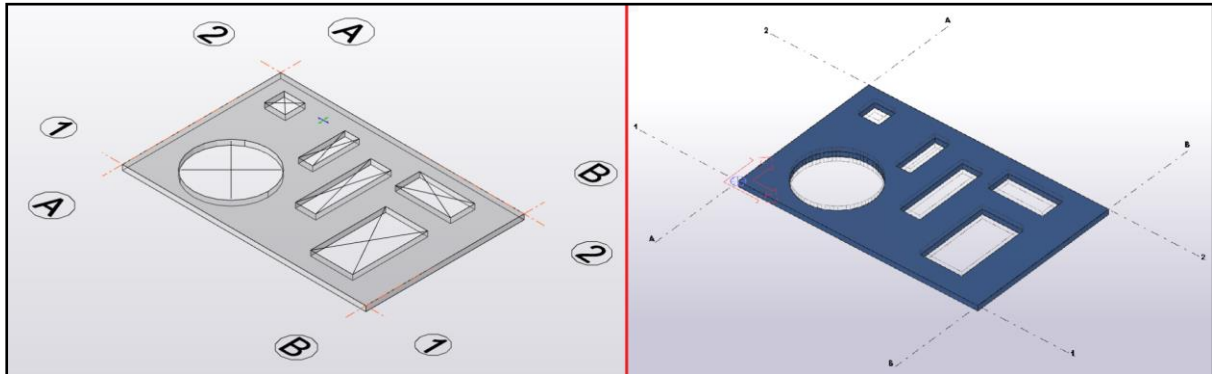


If intending to integrate slabs from Tekla Structures to Tekla Structural Designer please create slab parts from common intersection points such as centers of supporting beam and column parts.

If this is not possible, please consider not integrating the slab parts and building these elements from scratch within Tekla Structural Designer. These same new slabs can then be omitted from the Structural BIM transfer process by using the **BIM Status** command.

4.6.1.4.2 Openings

Rectangular and circular openings in slabs are imported from Tekla Structural Designer to Tekla Structures.

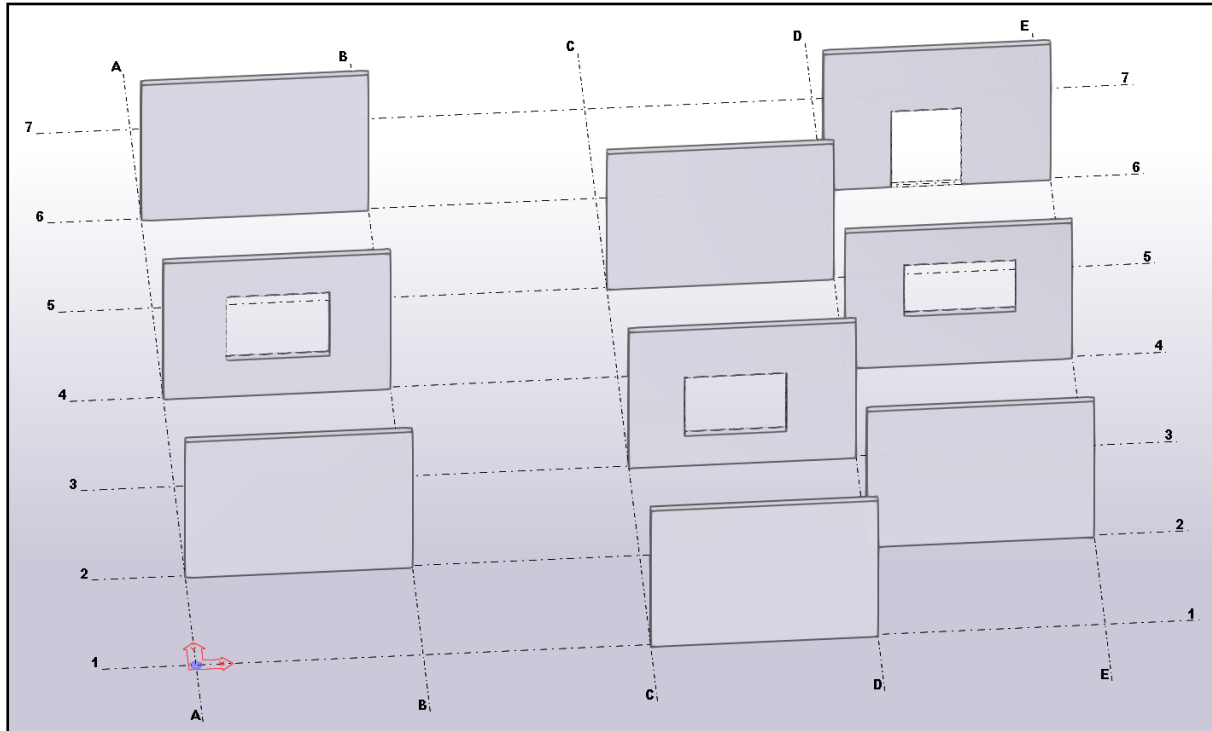


Openings modeled in Tekla Structures will only be exported when using the **Export to Tekla Structural Designer with analysis model** command.

If using the command **Export to Tekla Structural Designer**, no opening information will be included.

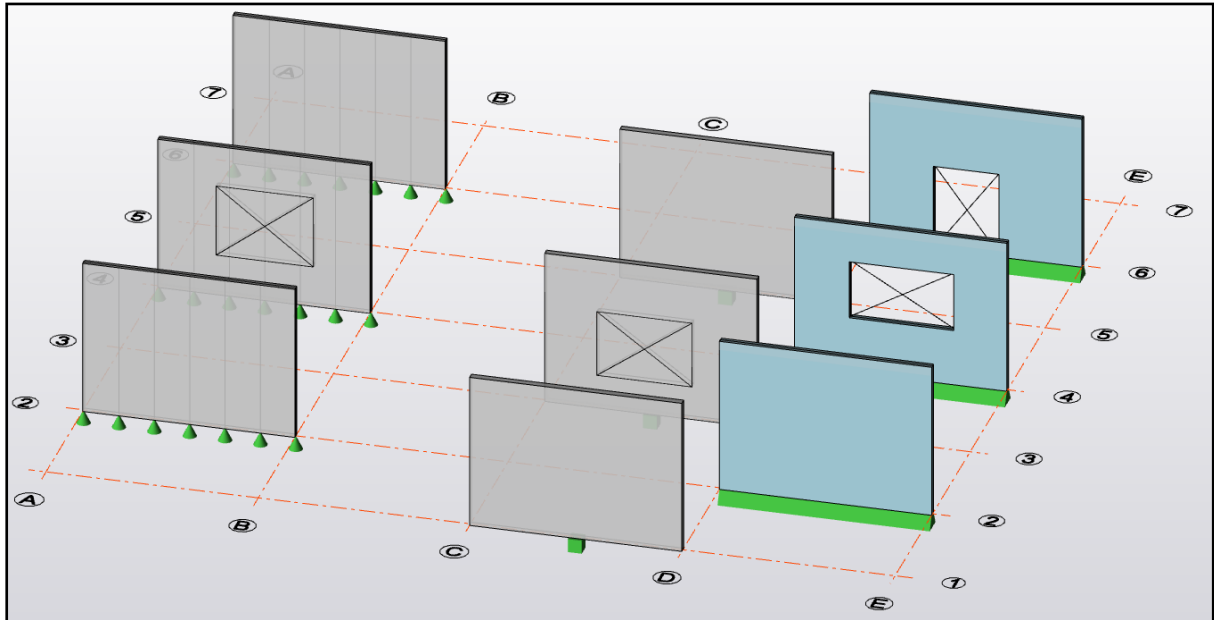
4.6.1.5 Walls

Bearing wall, **Shear Only wall** and **General Wall** objects are integrated between Tekla Structural Designer and Tekla Structures. These panel parts will also be returned from Tekla Structures into Tekla Structural Designer.

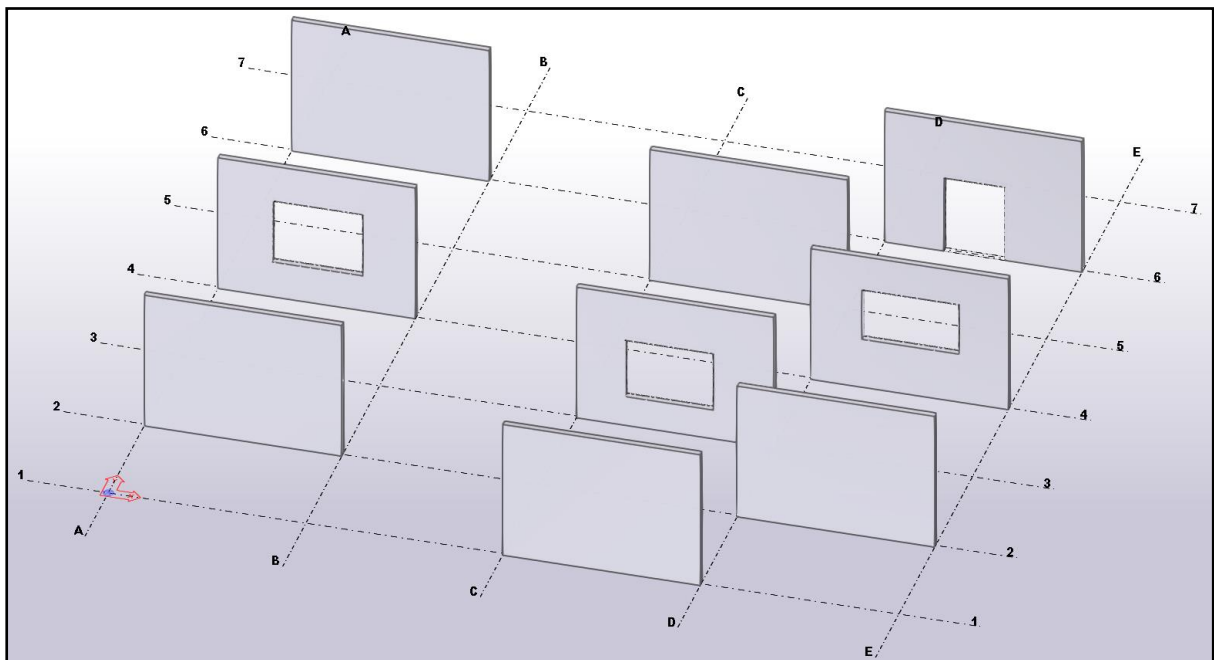


4.6.1.5.1 Openings

It should be noted that some wall openings cannot be created within Tekla Structural Designer. If wall openings are created within **Bearing** wall and **Shear Only** wall objects within Tekla Structural Designer, the boundary will be shown but no opening will be created.

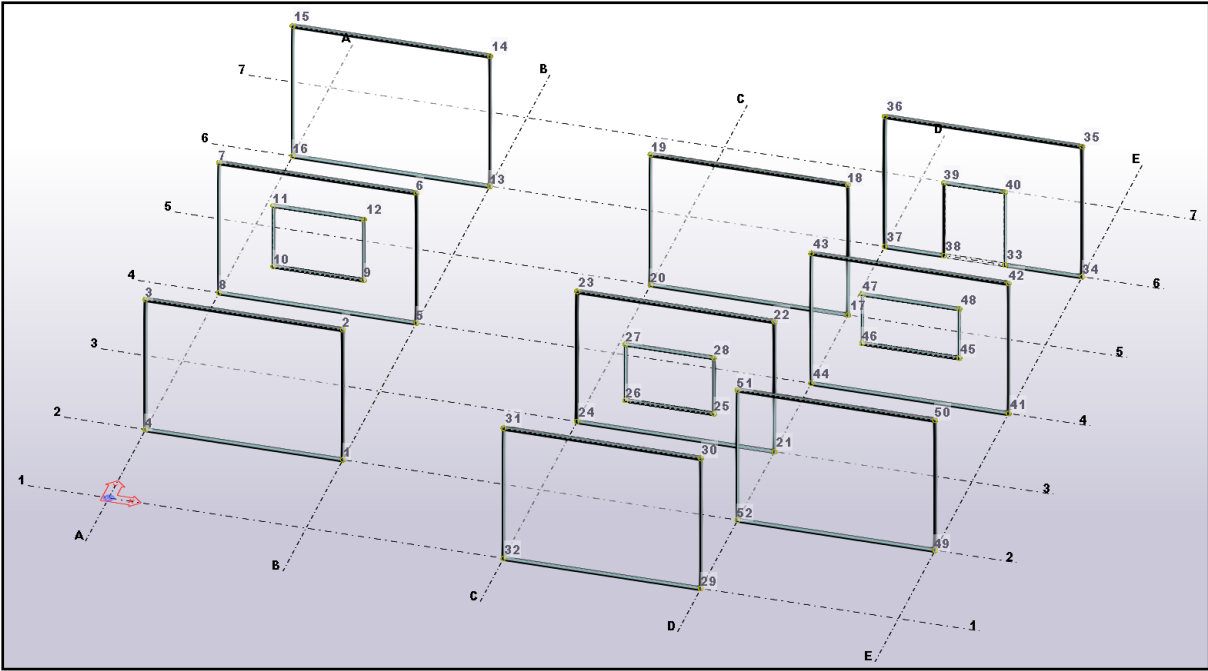


When these walls are integrated into Tekla Structures, the openings for these walls are successfully created.



Openings modeled in Tekla Structures will only be exported when using the **Export to Tekla Structural Designer with analysis model** command.

If using the command **Export to Tekla Structural Designer**, no opening information will be included.

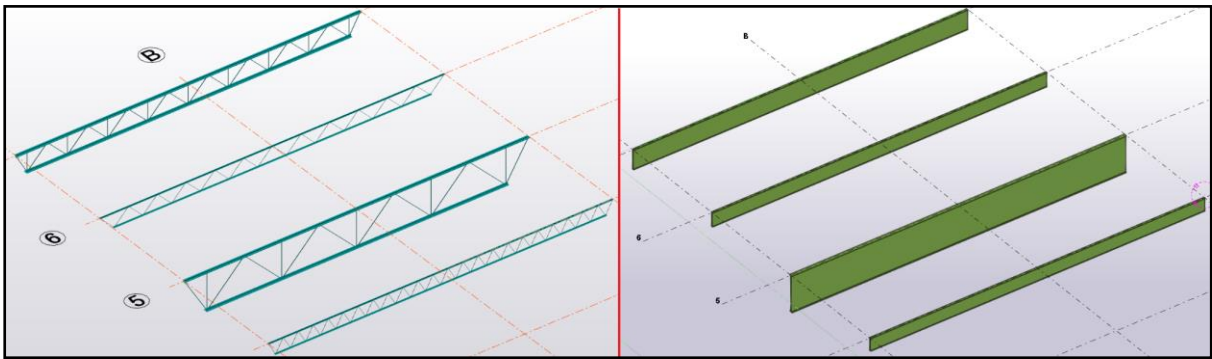


If holes are exported from Tekla Structures for **Bearing** walls or **Shear Only** walls, no actual opening will be created within Tekla Structural Designer, instead the opening shape will be imported as a sketched outline only.

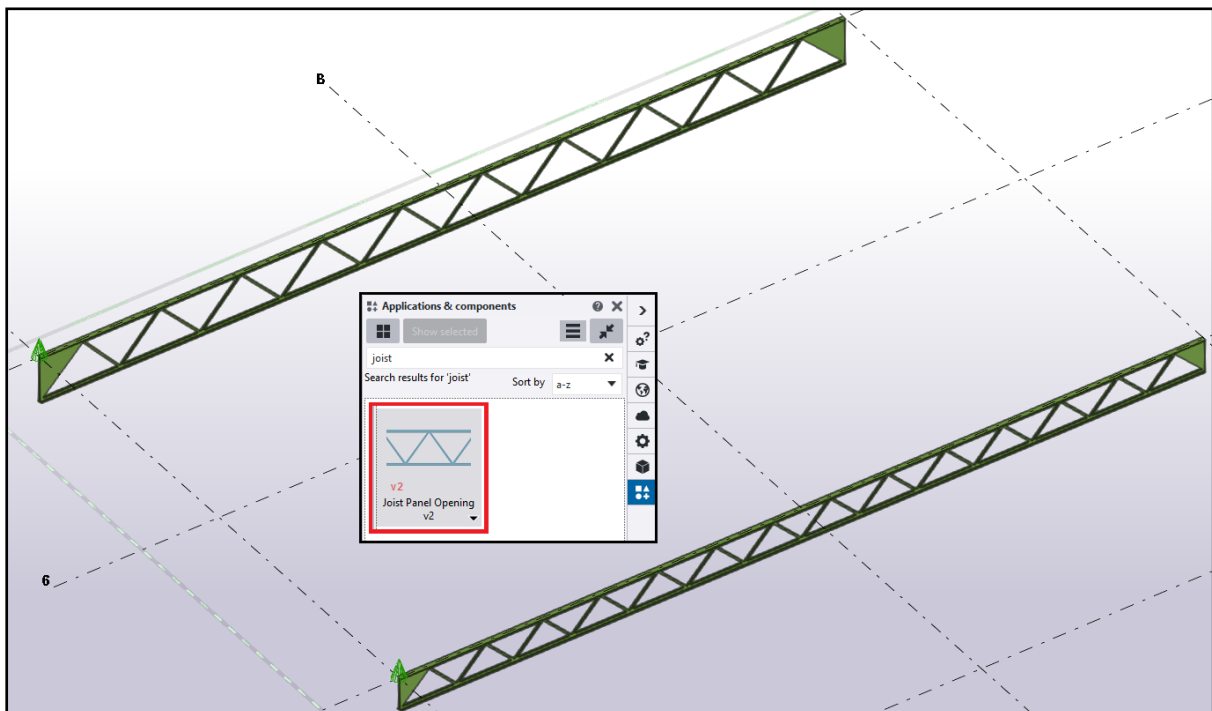
4.6.1.6 SJI Joists

US region SJI Joists are integrated between Tekla Structural Designer and Tekla Structures in both directions. Please note though that Tekla Structures uses an alternative physical representation for the joists than Tekla Structural Designer

Please note that Tekla Structures doesn't contain the same range of sections in the part catalog as Tekla Structural Designer. Reference should be made to **Section 6 - Managing the conversion process**.

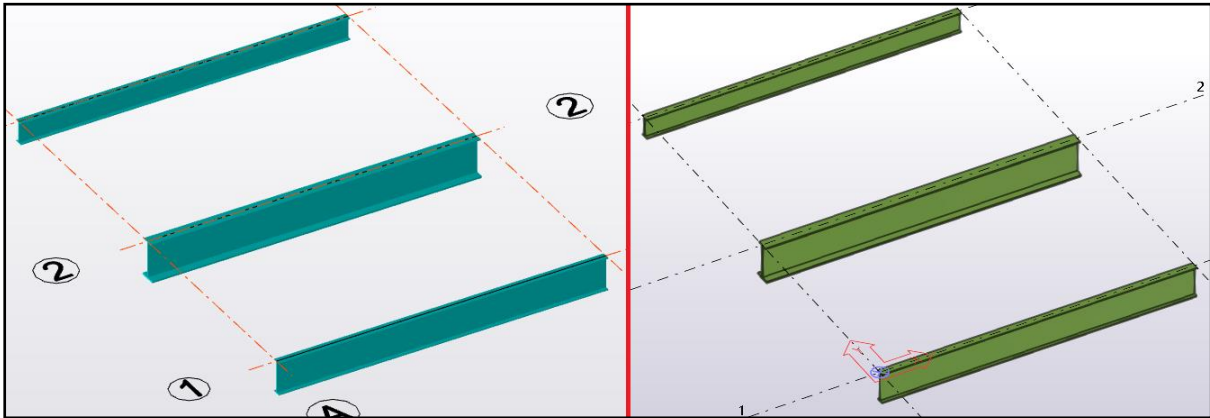


Changes to the visual representation of the joists within Tekla Structures can be made using components.



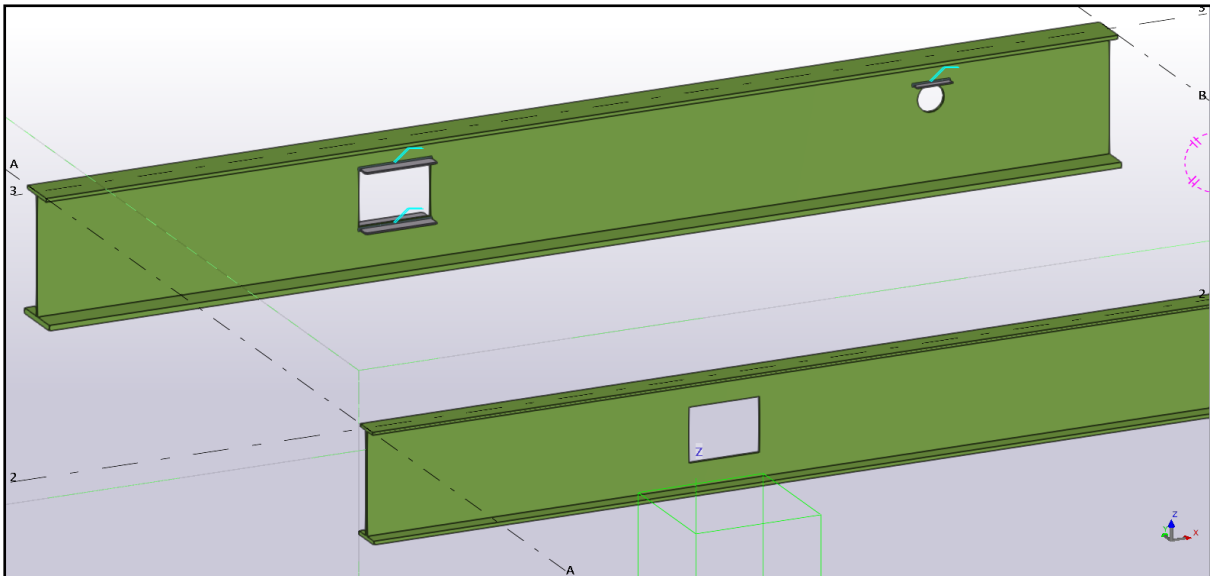
4.6.1.7 Plate Girder, Fabsec and Westok Plated Beams

Plate Girder objects, Fabsec beams and Westok Plated Beams are all integrated between Tekla Structural Designer and Tekla Structures. Mapping for these objects is automated so no manual conversion is required.



4.6.1.8 Web openings and stiffeners

Web openings are imported from Tekla Structural Designer along with any associated stiffeners when using **.cxl** format neutral files. No web openings or stiffeners will be imported when using **.tsmd** format model files to perform integration.

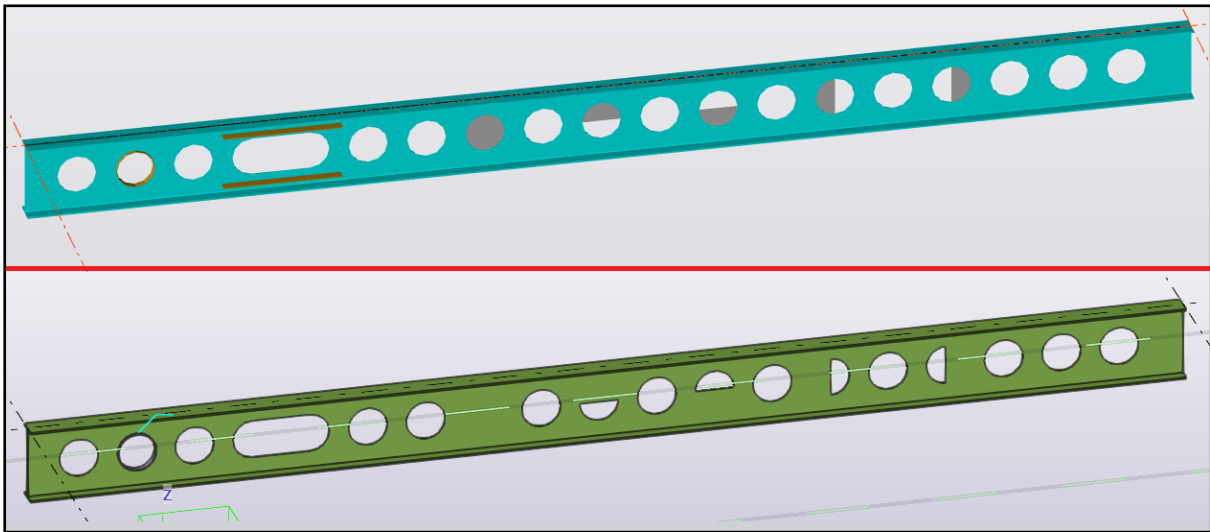


No web openings or stiffeners are exported from Tekla Structures to Tekla Structural Designer.

4.6.1.9 Westok cellular beams

Westok cellular beams are imported into Tekla Structures from Tekla Structural Designer. Profile information for Westok cellular beams is not exported from Tekla Structures to Tekla Structural Designer though. If Westok cellular beams are integrated from Tekla Structures to Tekla Structural Designer, one of two outcomes will arise :

- If no existing Westok is present in Tekla Structural Designer, Analysis elements will be created.
- If an existing Westok cellular beam is present in Tekla Structural Designer, no changes to the section will occur and the original beam will remain unaffected by the update process.



If the integration between Tekla Structural Designer to Tekla Structures has been performed using .cxl format neutral files, infill data and ring stiffener information will also be transferred into the Tekla Structures model. Stiffeners for elongated openings are omitted however.

If integration between Tekla Structural Designer to Tekla Structures has been performed using .tsmd model files, no infill or stiffener data will be transferred.

4.6.2 Parameters created

After importing models into Tekla Structures from Tekla Structural Designer, parameters relating to the design will be created on each part. These parameters can be included in drawing labels, the organizer and in any generated lists.

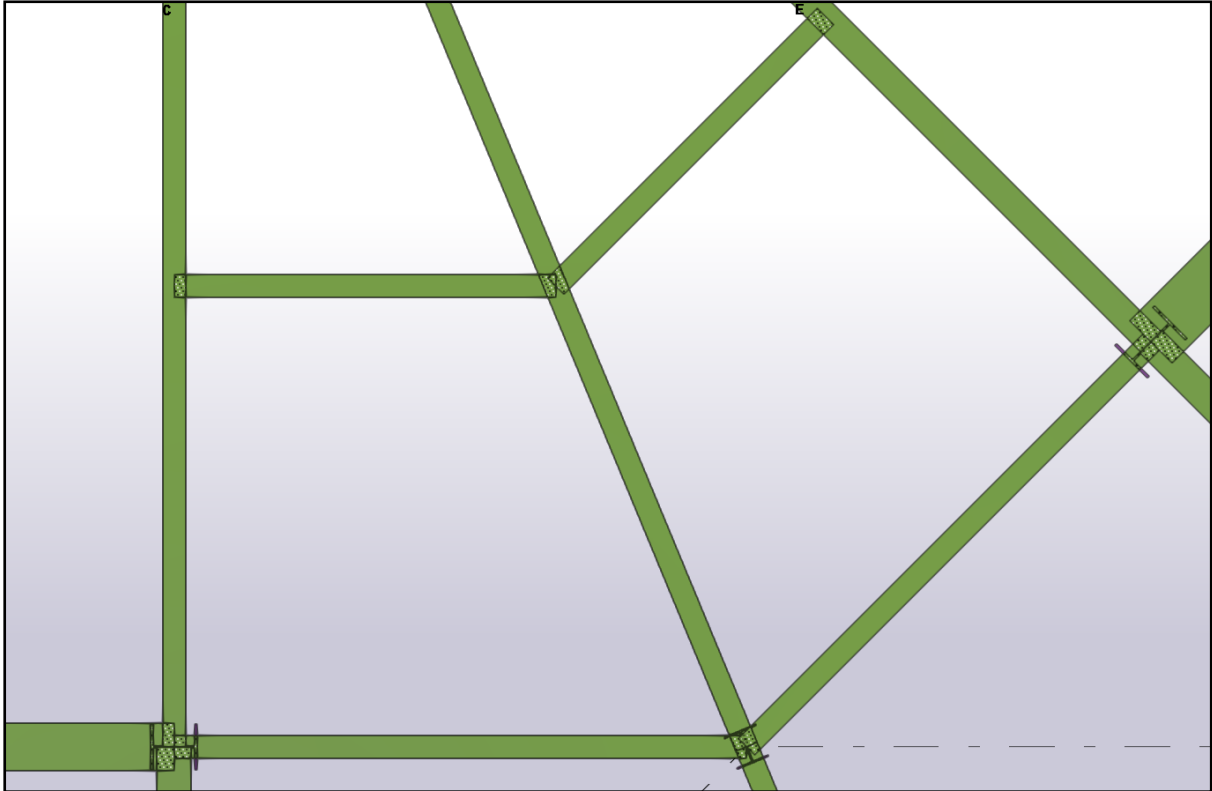
Parameters are created for all beam, column, bracing, slab and wall parts, with additional parameters included for member end forces and reinforced concrete parts.

- For a full range of the parameters populated during the integration process, please refer to **Appendix 3** at the end of this document.

4.6.3 Build parts from common intersection points

The import from Tekla Structural Designer creates parts with the part handle location set to suit the insertion points used in the Tekla Structural Designer model.

This means that all parts in the created Tekla Structures model will intersect at common insertion points such as centers of columns or grid intersections.



In order to export an analytically connected model back to Tekla Structural Designer from Tekla Structures, any additional parts should be modeled from similar locations. These may be centers of supporting columns, centers of supporting beams or grid intersections.

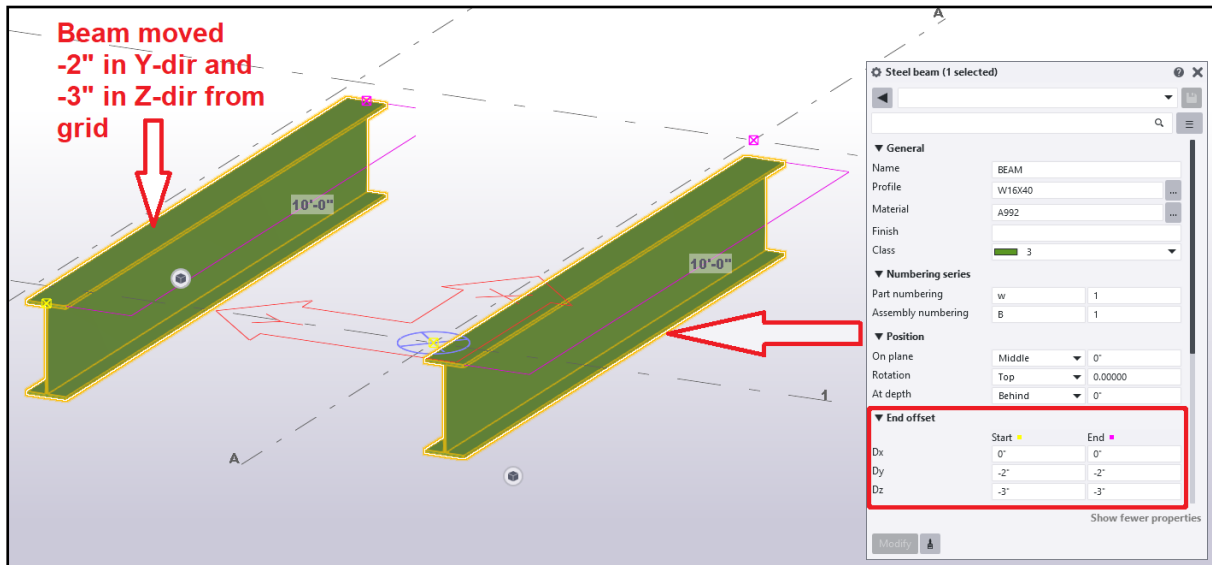
If parts are not modeled from these common intersection points, there is a risk that the part will be analytically unconnected after transfer into Tekla Structural Designer. This will require manual adjustment before any analysis or design procedure can be attempted.

Please note that this rule applies to exports performed using the **Export to Tekla Structural Designer** command only. Integration processes created using the **Export to Tekla Structural Designer with analysis model** command use a different procedure to ensure analytical model connectivity. Please refer to **Section 5 - Starting the workflow with Tekla Structures** for further details.

4.6.3.1 Move parts or Offset parts?

With regards to parts created in Tekla Structures, please note that there is a difference between moving a part and applying an offset to a part.

- Moving a part will move the part handles as well as the physical representation. This may mean that the part moved is no longer analytically supported after transfer to Tekla Structural Designer.
- Applying an offset to a part will adjust the location of the physical representation, but will keep the grip handles in the original position. This is the recommended method of adjusting the physical representation but ensuring analytical connectivity.

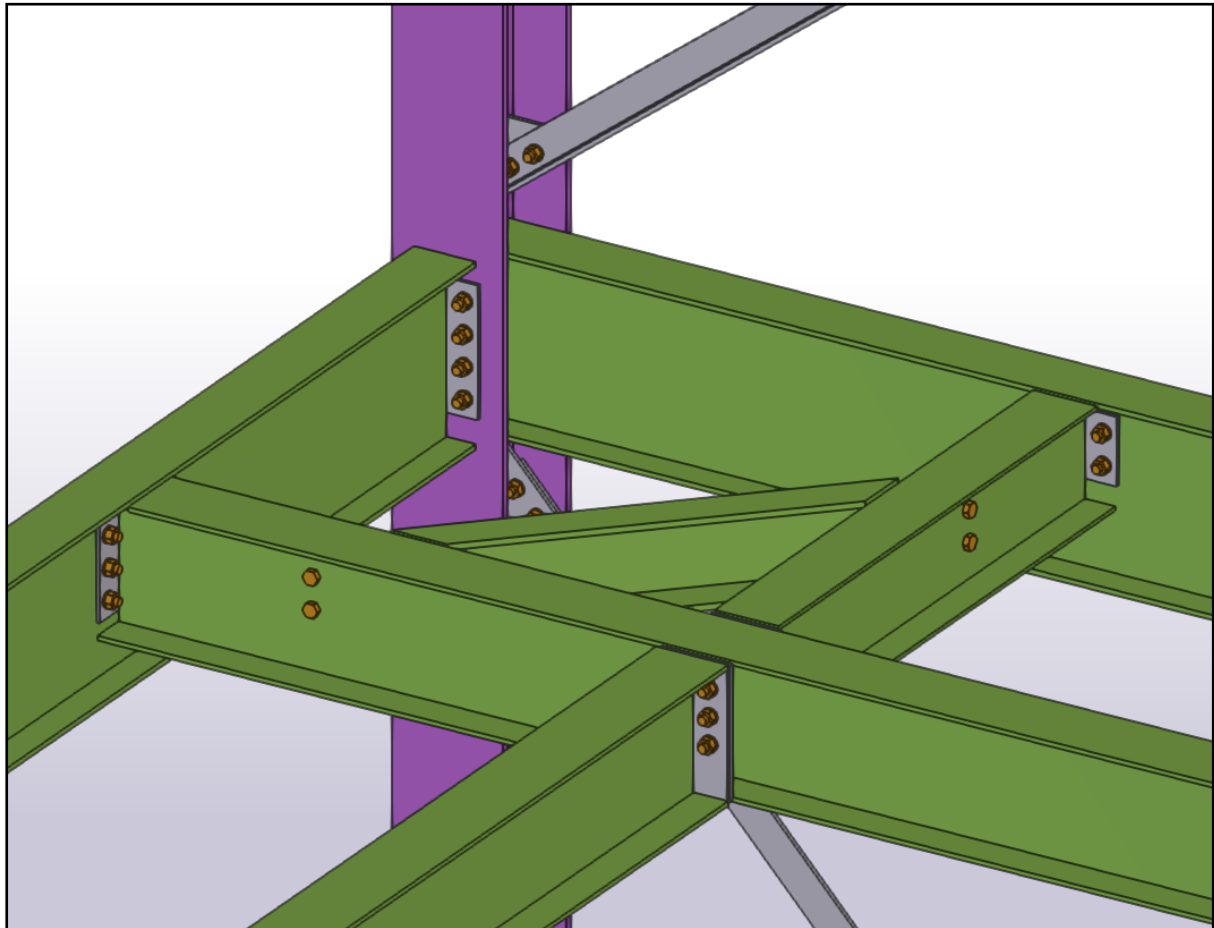


4.6.4 Components

After completing the import process into Tekla Structures from Tekla Structural Designer, you may want to complete the detailed design stage and move into the construction phase of the project.

In order to do this, you can add components creating the end connections, or amend any imported rebar to be more constructible.

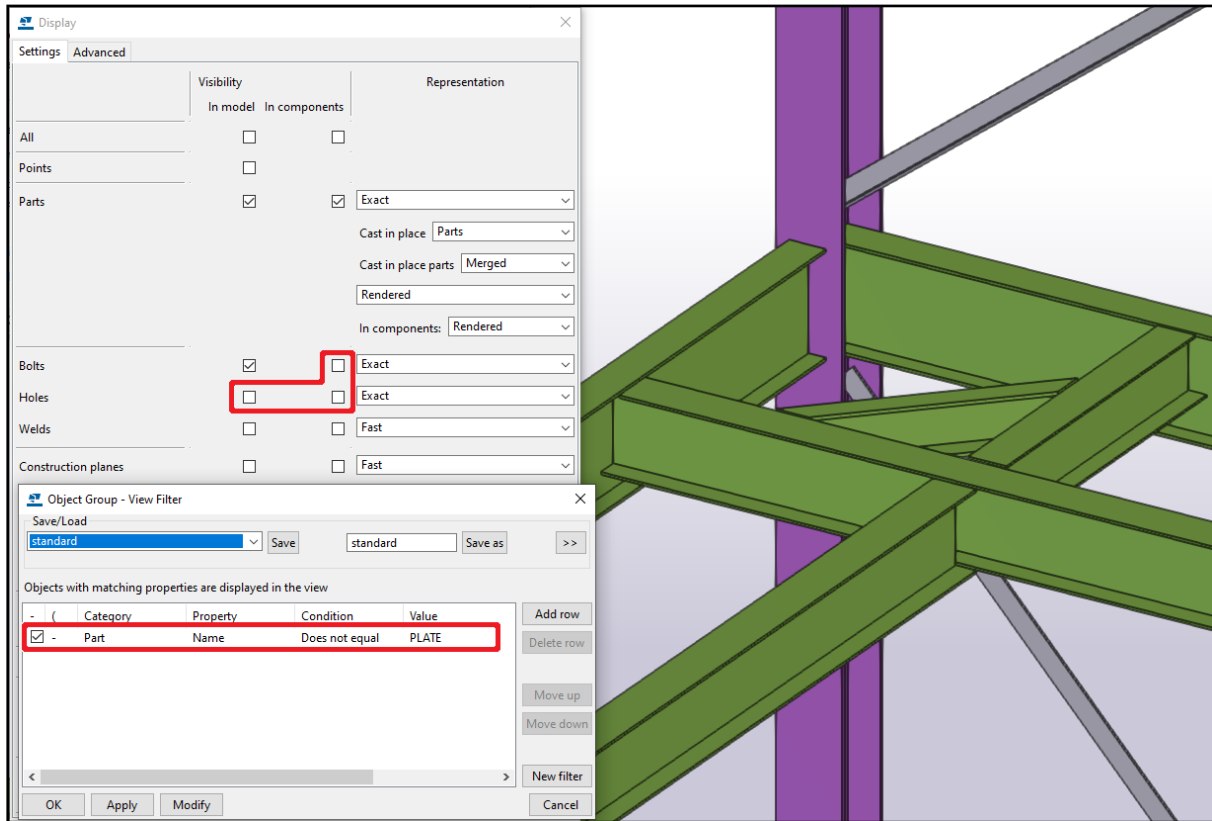
This can be done after the entire process of updating the model with amendments from the Structural Engineer has been completed.



It is possible to add components as the integration processes with the structural engineer are ongoing, but please ensure that all connections are excluded from any individual export process. See the following note for further details.

4.6.4.1 Should you detail when design is ongoing?

Please note that any export processes performed from Tekla Structures are based on selected parts, potentially including connections and other ancillary items which cannot be designed in Tekla Structural Designer.

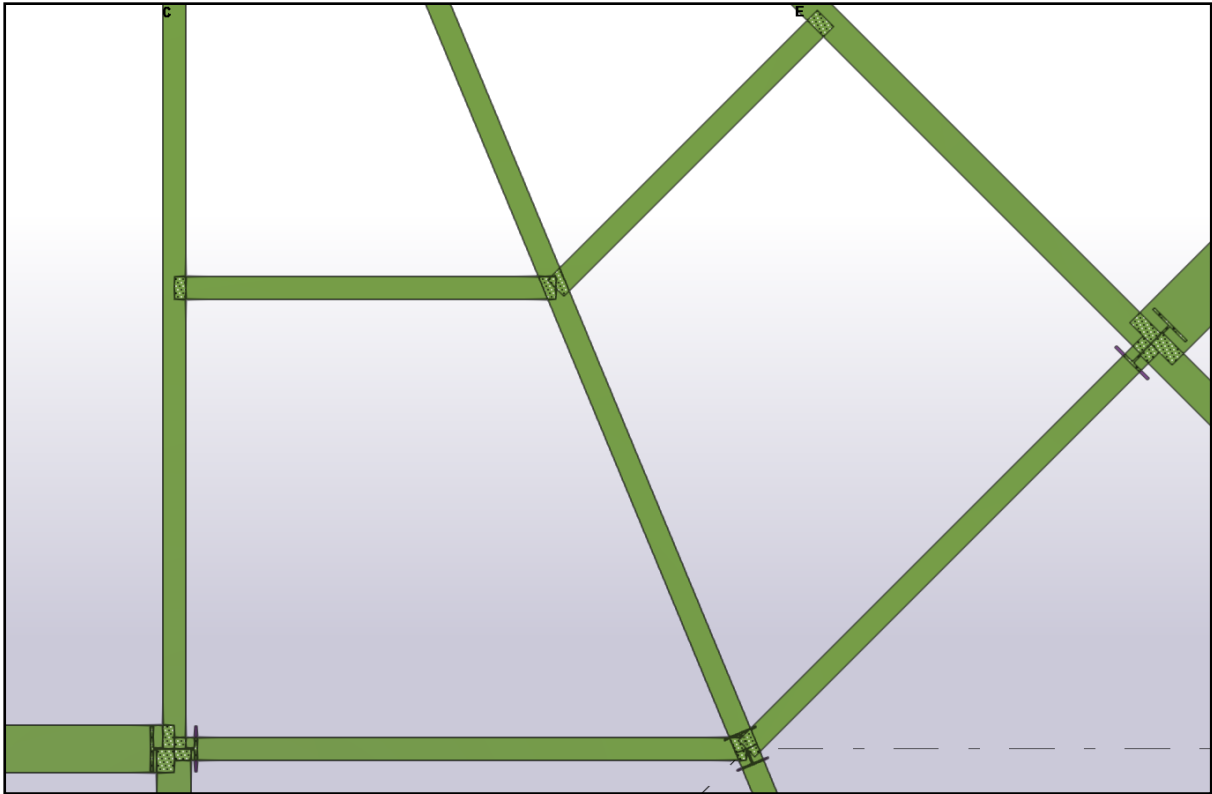


We would recommend the use of **Object Group - View Filters** to control the visibility of components and any manually created connections. Disabling the visibility of these items and then performing a selective export of the remaining visible parts should ensure a correct model is exported to Tekla Structural Designer.

We would recommend that the **Initial Scheme Stage** and **Detailed (Analytical) Design** stages are completed and the Tekla Structures model is updated with the finalized profile layout and sizes before any sort of detail is applied to the model.

4.7 Returning information from Tekla Structures to Tekla Structural Designer

4.7.1 Members created in Tekla Structures since the initial import



In order to export an analytically connected model back to Tekla Structural Designer from Tekla Structures, any additional parts should be modeled from common intersection points. These may be centers of supporting columns, centers of supporting beams or grid intersections.

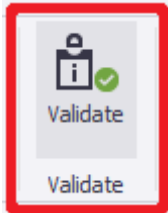
If parts are not modeled from these common intersection points, there is a risk that the part will be analytically unconnected after transfer into Tekla Structural Designer. This will require manual adjustment before any analysis or design procedure can be attempted.

Please note that this rule applies to exports performed using the **Export to Tekla Structural Designer** command only. Integration processes created using the **Export to Tekla Structural Designer with analysis model** command use a different procedure to ensure analytical model connectivity.

4.7.1.1 Ensuring connectivity

When using the Export to Tekla Structural Designer command to integrate models back to Tekla Structural Designer, it can be difficult to verify the connectivity status of parts created in Tekla Structures.

We would recommend that common intersection points are used as the basis of the modeling process, however there may be times when this is not possible.



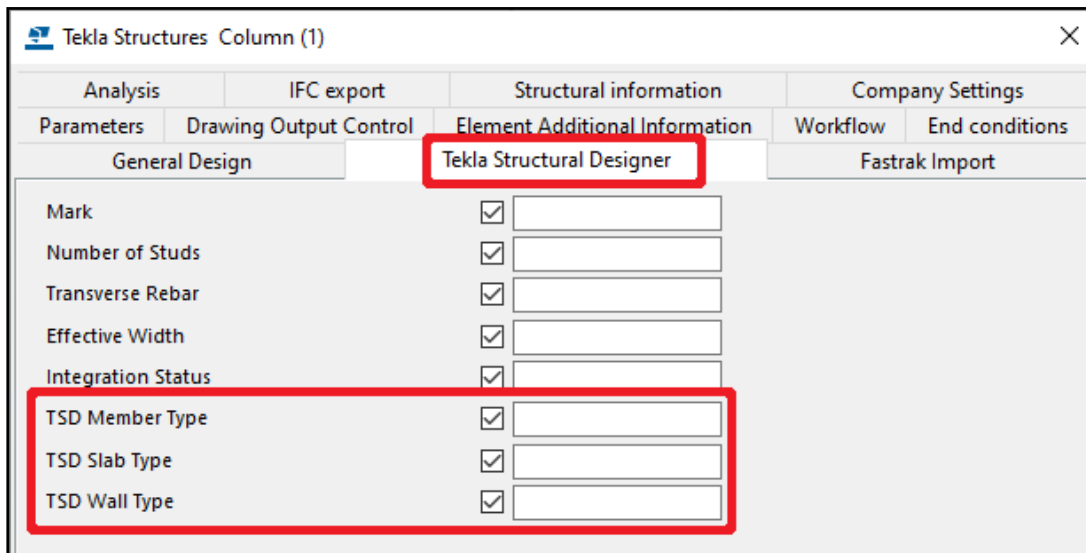
The **Validate** command held in Tekla Structural Designer is an essential tool when checking model connectivity and that valid models are being used for the analysis and design of structures. Using this command to check the structural integrity of the integrated model, unconnected members can then be manually corrected within Tekla Structures or Tekla Structural Designer.

4.7.1.2 Specifying object type

Parts inside Tekla Structures can be identified as specific object types within Tekla Structural Designer, avoiding alteration and editing after integration with Tekla Structural Designer.

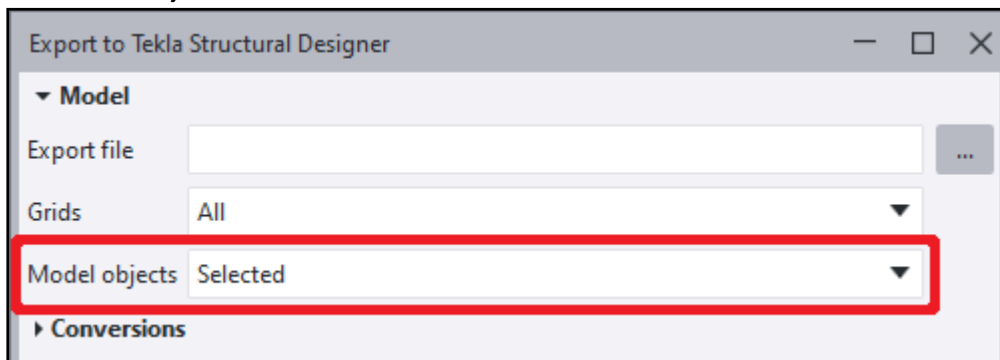
To set the object type, edit the **User defined attributes** for any selected part and access the tab **Tekla Structural Designer**. The entries of **TSD Member Type**, **TSD Slab Type** and **TSD Wall Type** can then be set to suit the desired value.

For a full list of object types, please refer to **Appendix 4** at the end of this document.



4.7.2 What are you exporting?

The default settings when integrating using the **Export to Tekla Structural Designer** command are to export **Selected** Model objects. The alternative option available is to export **All** Model objects.

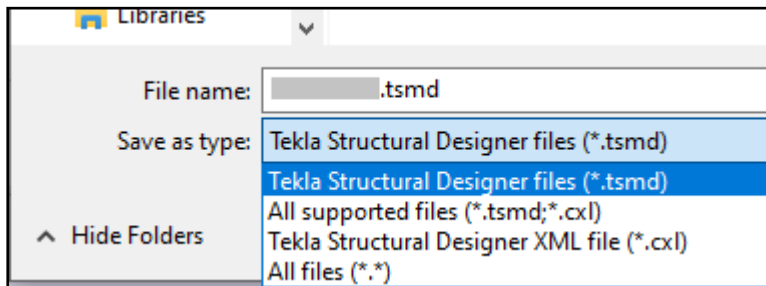


Please note that when using the option for **All** Model objects during the export process, this will include connections and other ancillary items which cannot be designed in Tekla Structural Designer.

If your model contains these items, we would recommend the use of **Object Group - View Filters** to control the visibility of components and any manually created connections. Disabling the visibility of these items and then performing a selective export of the remaining visible parts should ensure a correct model is exported to Tekla Structural Designer.

4.7.2.1 What file to create? .tsmd model file or .cxl neutral file?

When specifying the file name, the choice of file extension can be chosen as either a **.cxl** format neutral file or as a **.tsmd** format model file.



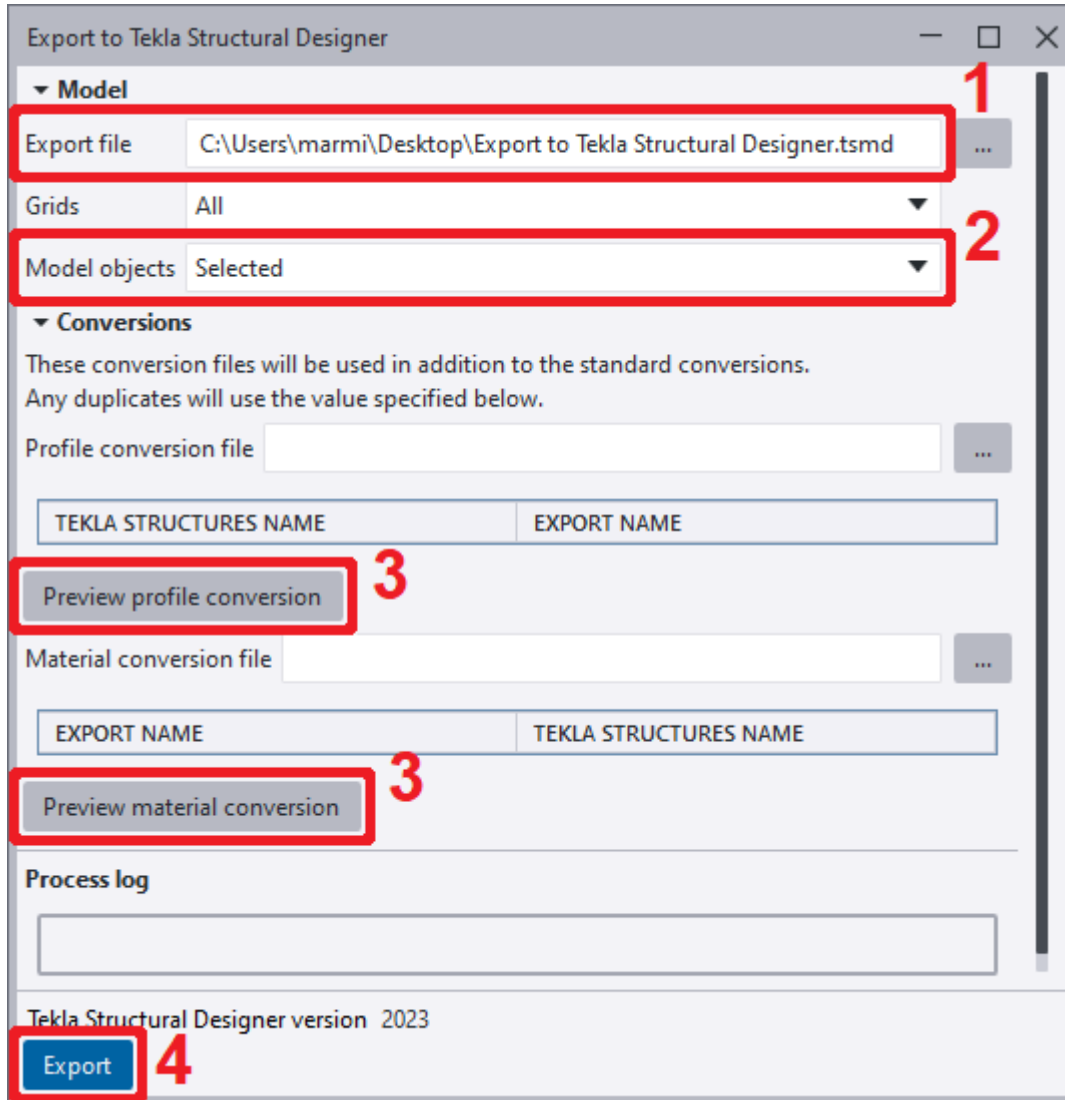
With regards to the functionality of the integration, there is no real difference between the two file formats during the integration process between Tekla Structures and Tekla Structural Designer. If you do not have Tekla Structural Designer licensed on the same machine as Tekla Structures, you should choose the **.cxl** format neutral file option.

4.7.3 Performing the export

Having set the export filename and extension type (1), the Model objects option can be flagged (2).

The next stage is to check the profile conversion and material conversion (3), see **Section 6 - Managing the conversion process** for further details on how this is done.

Click on the Export button (4) and the export process has been completed.



If a **.tsmd** model file has been created then Tekla Structural Designer will now open and the import process will begin. If a **.cxl** format neutral file has been created, you can close down the **Export to Tekla Structural Designer** dialog and provide the created **.cxl** file to the engineer running Tekla Structural Designer.

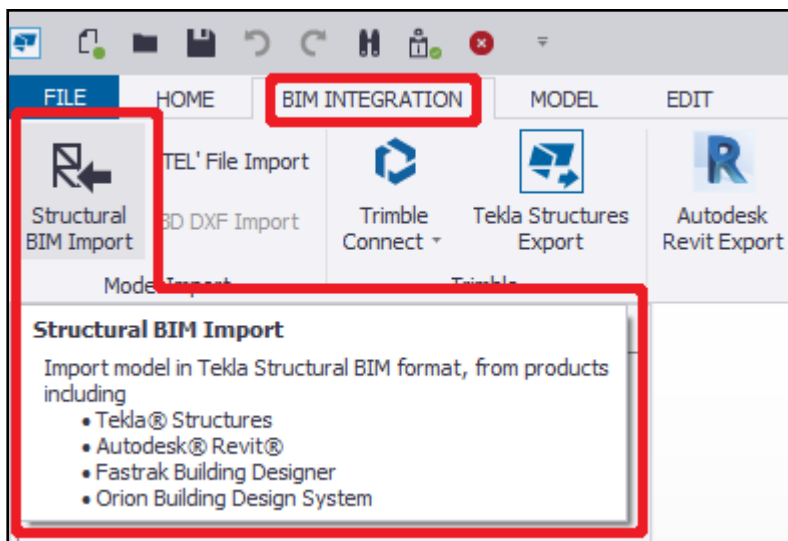
4.7.4 Import into Tekla Structural Designer (No existing model)

This section covers how to import a model into Tekla Structural Designer from Tekla Structures, if no existing model is open. If you intend to import changes into an existing Tekla Structural Designer model, please refer to section 5.4.

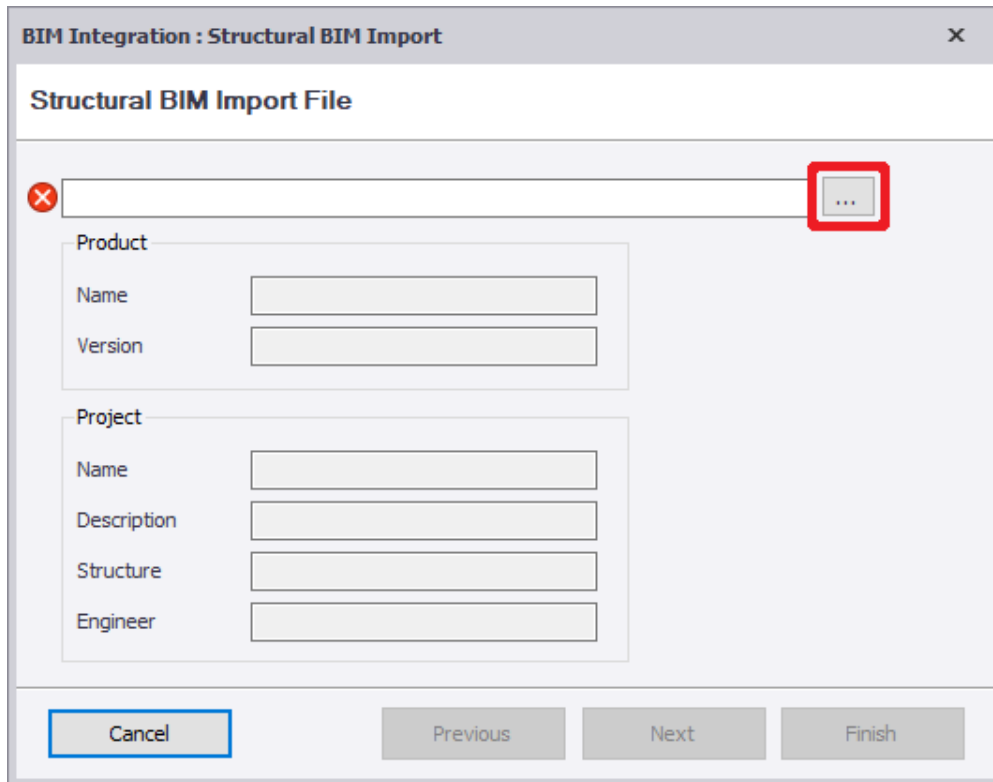
The import method does differ if using a .cxl format neutral file or a .tsmd format model file, but only during the initial import phase. This will be described below.

4.7.4.1 Initial import process using .cxl format neutral files

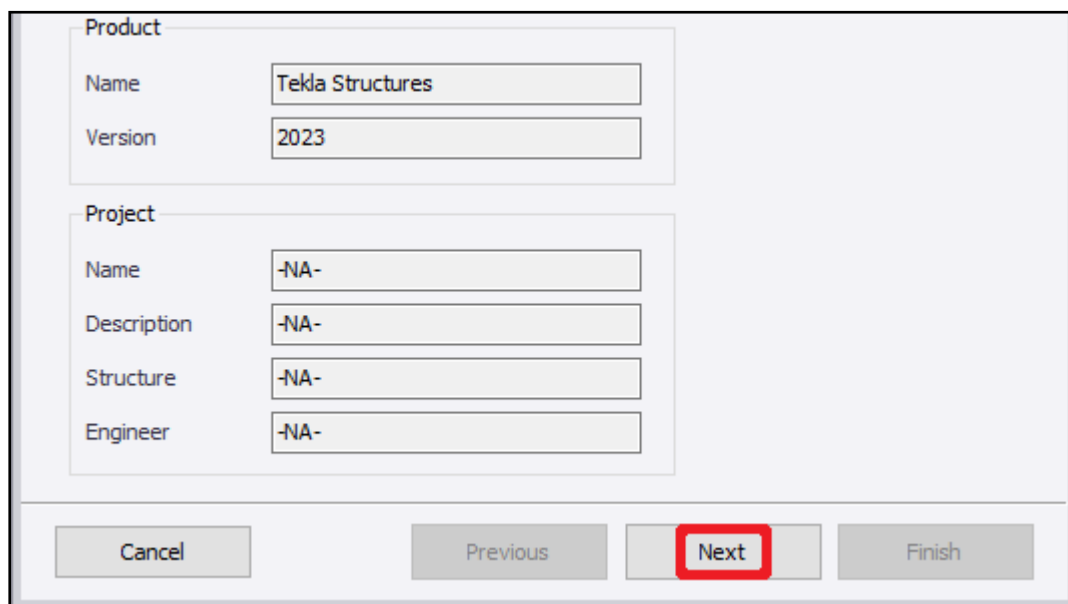
When using .cxl format neutral files exported from Tekla Structures, the first stage should be to create a new model and then launch the Structural BIM Import command (held on the BIM Integration tab).



This then launches the **BIM Integration** wizard as shown below :
The opening screen of the wizard prompts for the filename to be selected.



Click on the ... button to select the file to import. The **Product Name** and **Version** will then be populated along with any **Project** details. The **Next** button should then become available after the file has been selected, click on this button to continue.

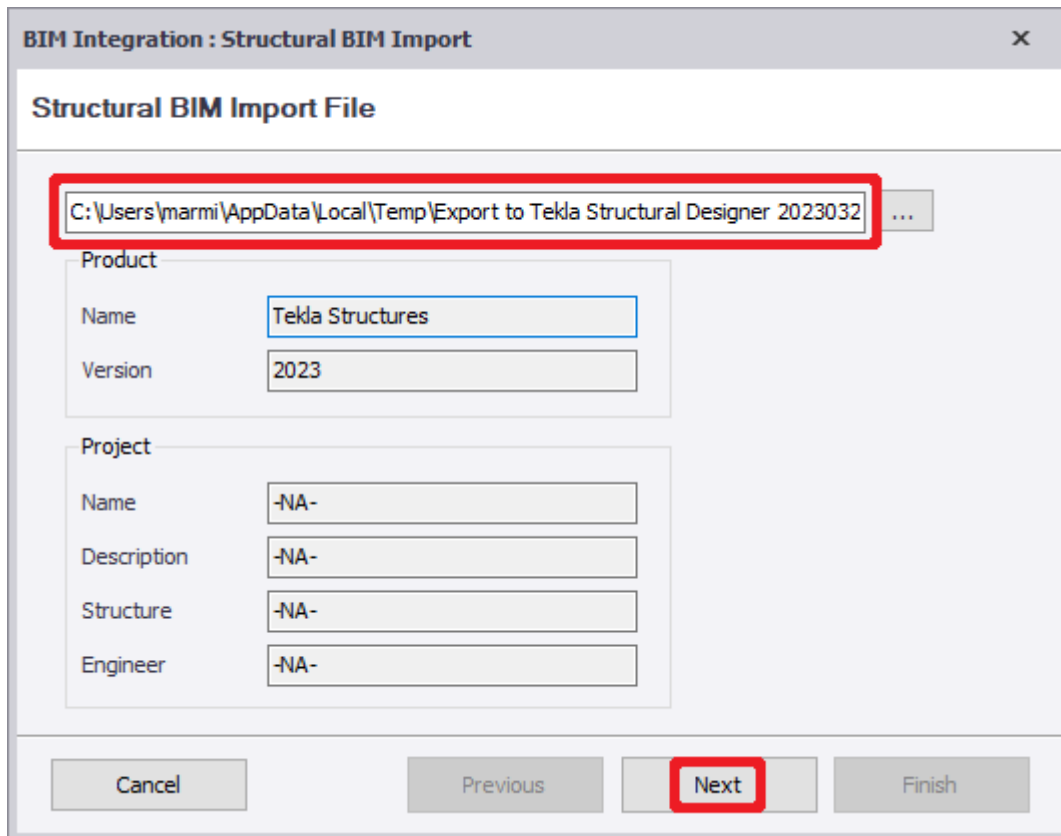


The following stage covers the initial import process using **.tsmd** model files, please skip this section if it's not relevant and continue with section **4.7.4.3**.

4.7.4.2 Initial import process using .tsmd format model files

After performing the export using .tsmd format model files, the first stage performed is to create a .cxl format neutral file automatically. This is done by creating a file in the windows temporary directory with a similar name to the chosen export but containing a date and time stamp suffix.

The process will then open a session of Tekla Structural Designer and the **Structural BIM Import** command will be run in the background.



The created .cxl file will then be selected and the details populated within the dialog. Click **Next** to continue onto the next screen.

The next screen of the wizard provides options for the Operation and the Settings used during the import process.

4.7.4.3 Import Options

The screenshot shows a dialog box titled "BIM Integration : Structural BIM Import". Inside, there is a section titled "Import Options". Under "Operation", there are two radio buttons: "First Time Import" (which is selected) and "Update Existing Model". Under "Settings", there are three dropdown menus: "Unit System" (set to "US Customary"), "Regional Code" (set to "United States (ACI/AISC)"), and "Default Level Type" (set to "T.O.S."). At the bottom, there are four buttons: "Cancel", "Previous", "Next" (which is highlighted with a blue border), and "Finish".

- **Operation**
 - **First Time Import**
 - Used when no Tekla Structural Designer model currently exists.
 - **Update Existing Model**
 - Used when importing changes made in Tekla Structures back into an existing Tekla Structural Designer model
- **Settings**
 - **Unit System**
 - For First Time Import routines, it allows you to specify whether the Unit System for the created model will be US Customary units (feet and inches) or Metric.
 - **Regional Code**
 - This sets the regional design codes which are going to be used for the created model.
 - **Default Level Type**
 - This sets all newly created levels Type to be Top of Foundations (T.O.F.), Top of Steel (T.O.S.) or Structural Slab Level (S.S.L.)

Please note that the **Unit System** and **Regional Code** settings are defaulted to suit the **Model Settings** of the Tekla Structural Designer file.

In this example, we can keep all of the values at their default setting and click **Next** to continue.

4.7.4.4 Relocate Import Model

This dialog allows models generated at real world coordinates (by using the **Base Points** command within Tekla Structures) to be relocated to the **X : 0, Y : 0, Z : 0** location. It is important to have models located as close to the **0,0,0** location within Tekla Structural Designer to avoid rounding errors being introduced during any subsequent model analysis phase.

The range of imported coordinates on the right of the dialog will give an indication of the coordinates used within the incoming file. If these are excessive (i.e. over 30,000 ft (10,000m) in any direction), please refer to the Tekla Structures user to determine the values used within the **Base Points** command.

When relocating, please place in the inverse values in the **Move import model by** dialog. E.g. A model located at **East coordinate** 50000' and **North coordinate** 40000' would have entries of **X : -50000'** and **Y : -40000'**.

Move import model by	Range for imported coordinates
X <input type="text" value="0"/> ft, in	X -1' 8" to 134' 8 5/8" ft, in
Y <input type="text" value="0"/> ft, in	Y -1' 8" to 87' 7 1/4" ft, in
Z <input type="text" value="0"/> ft, in	Z 0" to 30' 0" ft, in
Rotation <input type="text" value="0.0000"/> °	

Buttons: Cancel, Previous, Next, Finish

In our example, our model is already close to the 0,0,0 coordinates and doesn't require relocation. We can click **Next** to continue.

4.7.4.5 Integration Filter

The Integration Filter dialog allows control over the various object types in the incoming model. When performing an initial import process, only two options are available :

- **Include**
 - This toggles whether the type of items will be imported (checkbox enabled) or omitted from the import (checkbox disabled).
- **Include Openings**
 - This option controls whether openings modeled within object types are imported (checkbox enabled) or omitted from the import process (checkbox omitted).

The four columns which are grayed are used for update processes and are not relevant at this stage.

Please note that this command is an universal command affecting all software imports and not just Tekla Structures. Some of the options are not relevant to Tekla Structures, such as member openings.

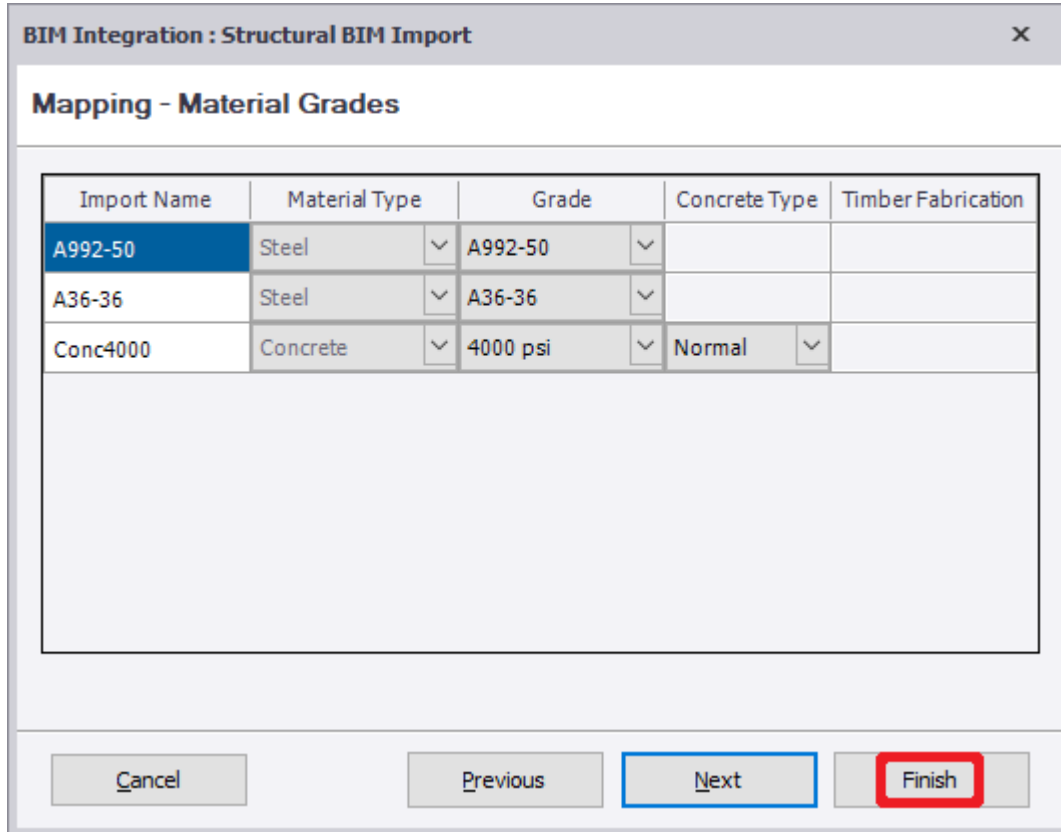
The screenshot shows the 'BIM Integration : Structural BIM Import' dialog box. The 'Integration Filter' section contains a table with the following data:

Item	Include	Delete Existing if not in Import File	Include Section / Grade	Include Position	Include Openings	Include Other Data
Grids	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
Levels	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
Slabs / Deck	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Members	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Walls	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Foundations	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

At the bottom of the dialog, there are four buttons: 'Cancel', 'Previous', 'Next', and 'Finish'. The 'Next' button is highlighted with a blue border.

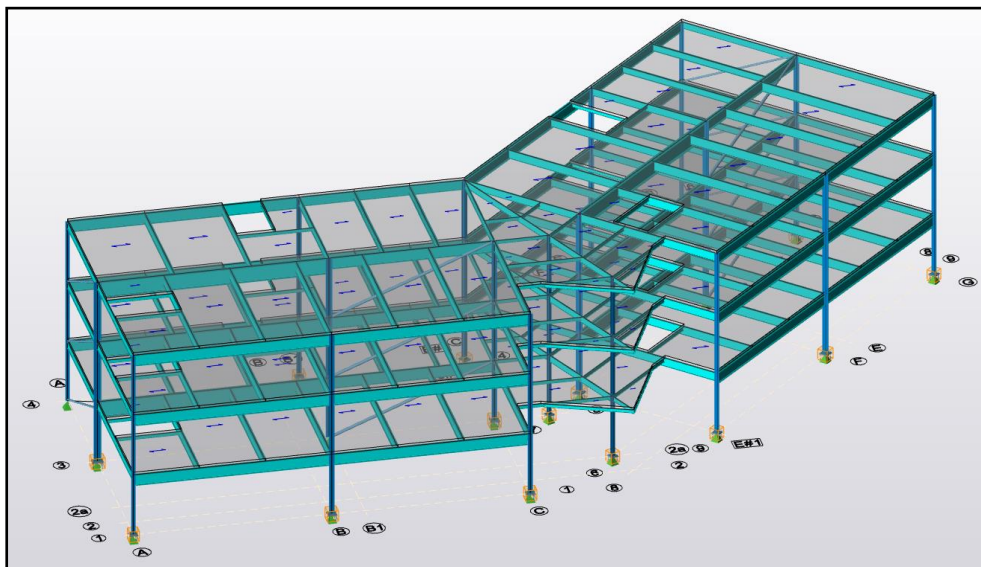
4.7.4.6 Mapping and completing the import.

The final stages of the import process is to check the mapping of **Material Grades** and **Decking**. The dialogs can be checked to ensure that valid grades and profiles are set before clicking on the **Finish** button to commence the import.

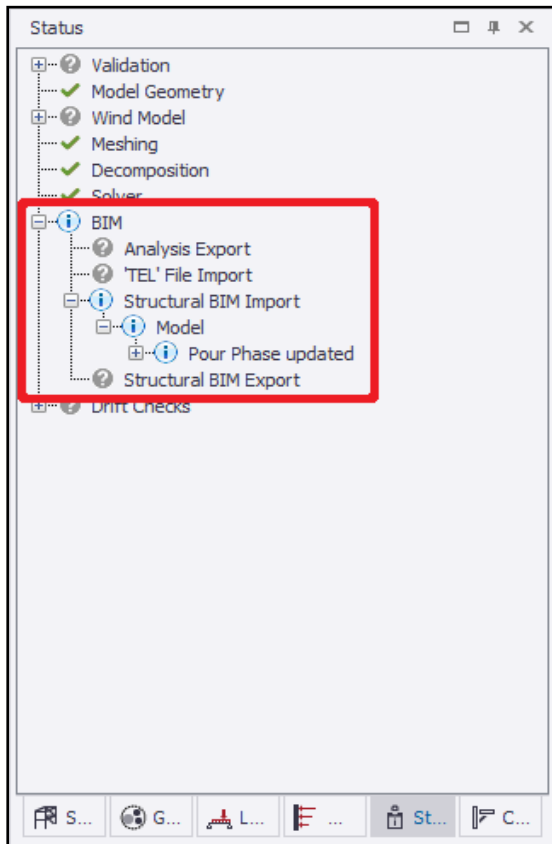


4.7.4.7 The created model and validation.

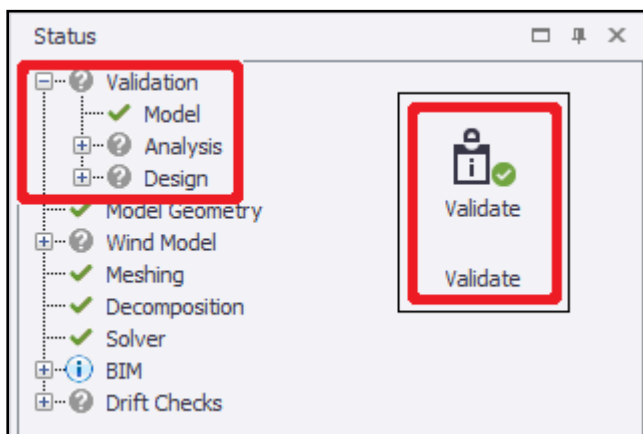
After completing the Structural BIM Import, the model will be shown...



...and the **Structural BIM Import** branch within the **Status Tree** will show the status of the overall process.



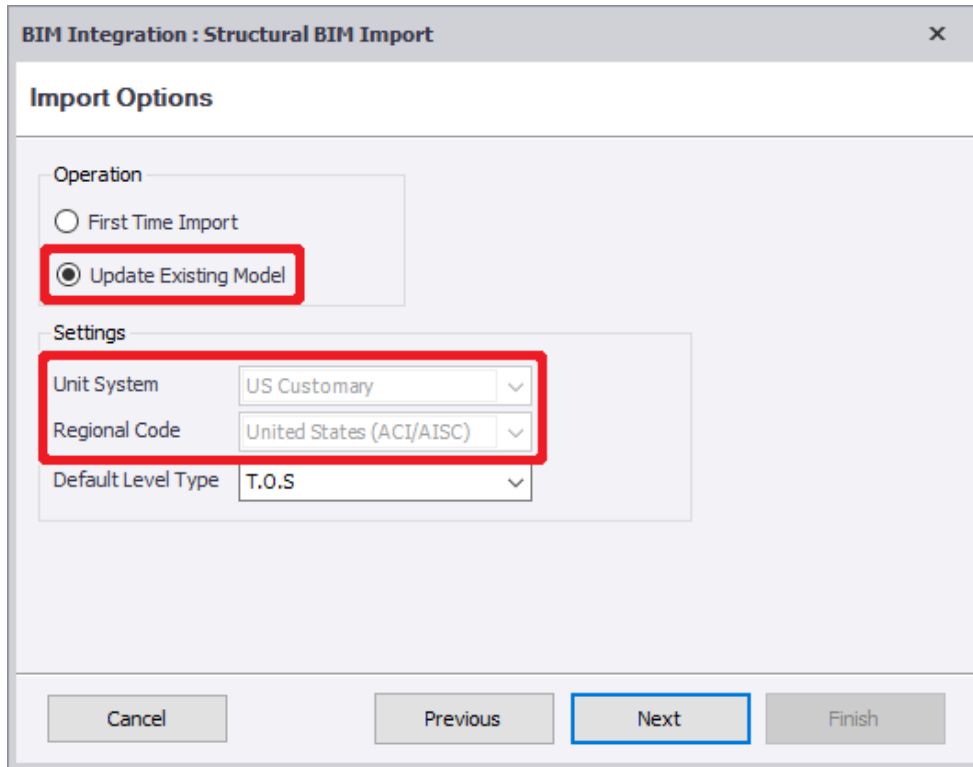
Following on from a successful import process, the next stage should be to **Validate** the model. This command will pick up on any problems with connectivity, overlapping objects, duplicate objects and general analytical integrity. Successful validation is essential to perform an accurate design of the model at a later stage.



4.7.5 Subsequent import processes into Tekla Structural Designer

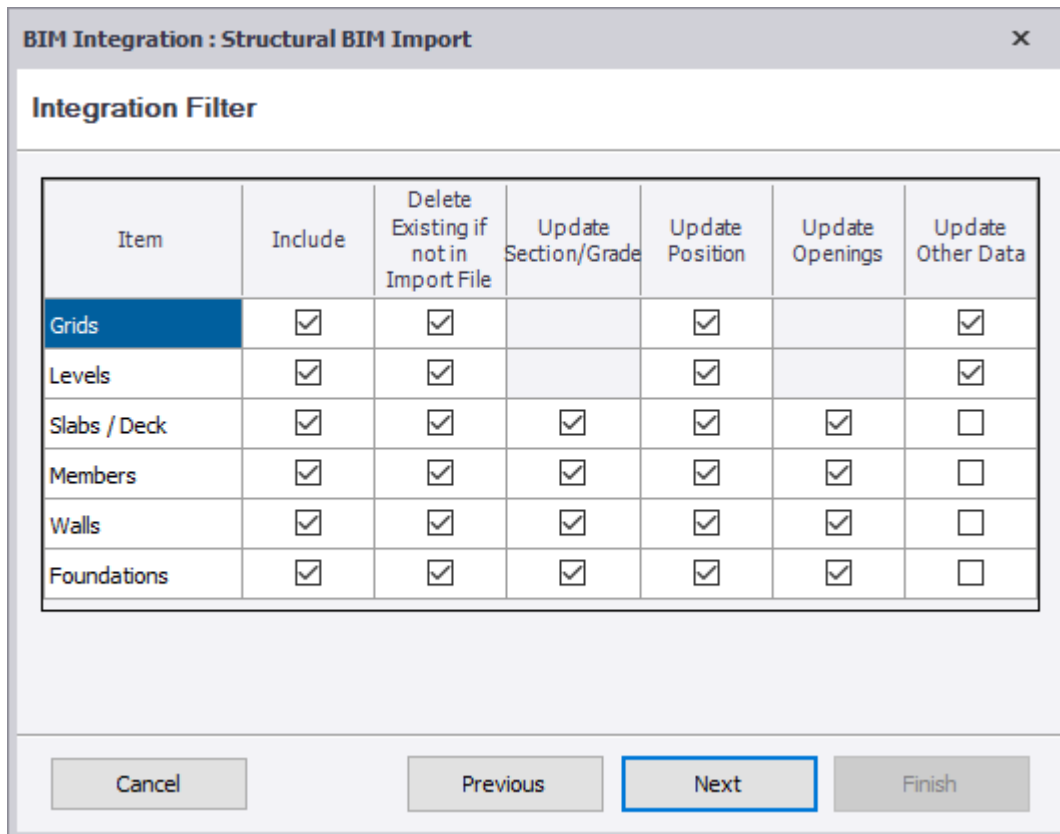
Additional import processes into Tekla Structural Designer from Tekla Structures are virtually identical to the initial import process.

The only differences during the process are firstly on the **Import Options** dialog.



The Operation should now default to **Update Existing Model**. The additional change is that the **Settings** for **Unit System** and **Regional Code** are now grayed out as these have already been assigned during the initial import process.

The second change during the process is that the **Integration Filter** now has all columns available.



The options shown here allow you to verify if grids, levels etc. are to be imported. You should also determine whether the five additional options are appropriate to the synchronization that you are performing. All of the options in this dialog can be described as follows :

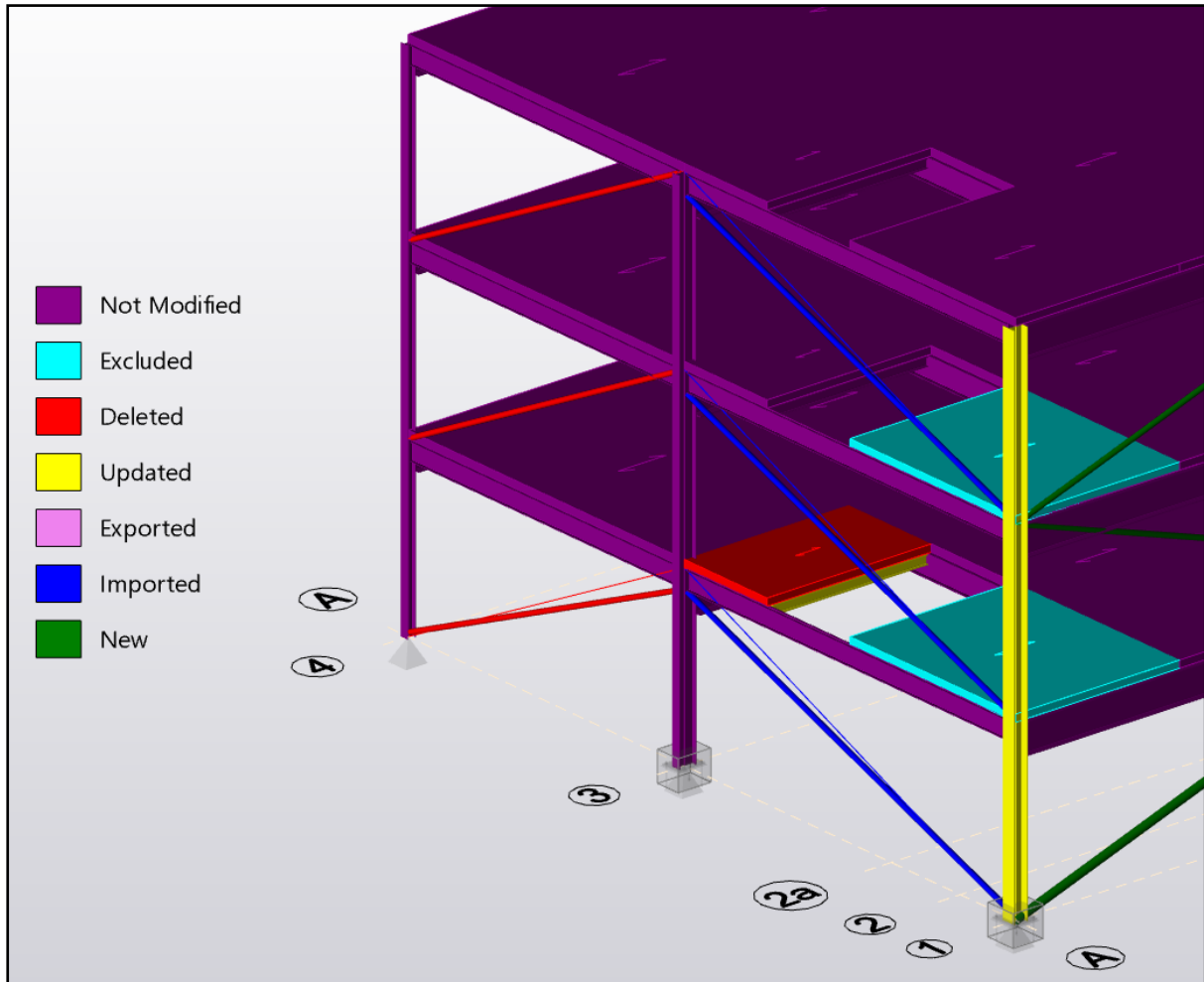
- **Include** (enabled as default)
 - Simply controls whether objects of this type are considered by the Import, (added, modified or deleted if checked) or left as currently defined in the existing model, (not checked).
- **Delete Existing if not in Import File** (enabled as default)
 - If enabled, then an object in the existing model that is not in the import file (most likely already deleted in Tekla Structures) will be deleted from the Tekla Structural Designer model.
 - If you are unsure and wish to double check, uncheck the box and you will find the member retained for manual deletion at a later date.
 - There are exceptions, depending on the object's BIM Status. If the status is **New** or **Excluded**, then the object will not be deleted during the update process whether this option is checked or not.
 - This option affects models created in Tekla Structures from **.tsmd** model files as the BIM Status is not changed to Exported as no actual export takes place within Tekla Structural Designer.
- **Grids**
 - **Update Position** affects the start and / or end of a grid line. **Update Other Data** affects changes made to the grid name only.

- **Levels** (Construction Level)
 - **Update Position** affects any changes made to the level height within Tekla Structures.
 - **Update Other Data** changes the name of the level to suit the Tekla Structures model.
- **Slabs / Deck** (Slab Items)
 - **Update Section / Grade** updates any alterations made to Slab Depth, Concrete Grade or Decking Properties (if relevant).
 - **Update Position** makes changes to the outline of the slab, alignment (vertical offset) and plan rotation.
 - **Update Openings** adds, removes or modifies the outline for openings associated with the slab item. See section 4.6.1.4.2 for restrictions
 - **Update Other Data** will alter the type of slab if amended in Tekla Structures.
- **Members** (Columns, Beams, Braces etc.)
 - **Update Section / Grade** will update and changes made to the section size or the material grade.
 - **Update Position** changes the member to suit alterations made to the start and / or end of the physical member, alignment or rotation in section.
 - **Update Openings** adds, removes or modifies the outline for openings associated with the member.
 - **Update Other Data** will change any other characteristics such as the gravity only flag and end release conditions.
- **Walls** (Concrete and Bearing)
 - **Update Section / Grade** controls any updates to the wall thickness and material grade.
 - **Update Position** changes the wall to suit amendments made to the start and / or end of the physical wall along with changes made to the alignment.
 - **Update Openings** adds, removes or modifies the outline for openings associated with the wall.
 - **Update Other Data** affects the Use mid pier option (Note: for concrete walls only)

4.7.6 Integration management in Tekla Structural Designer

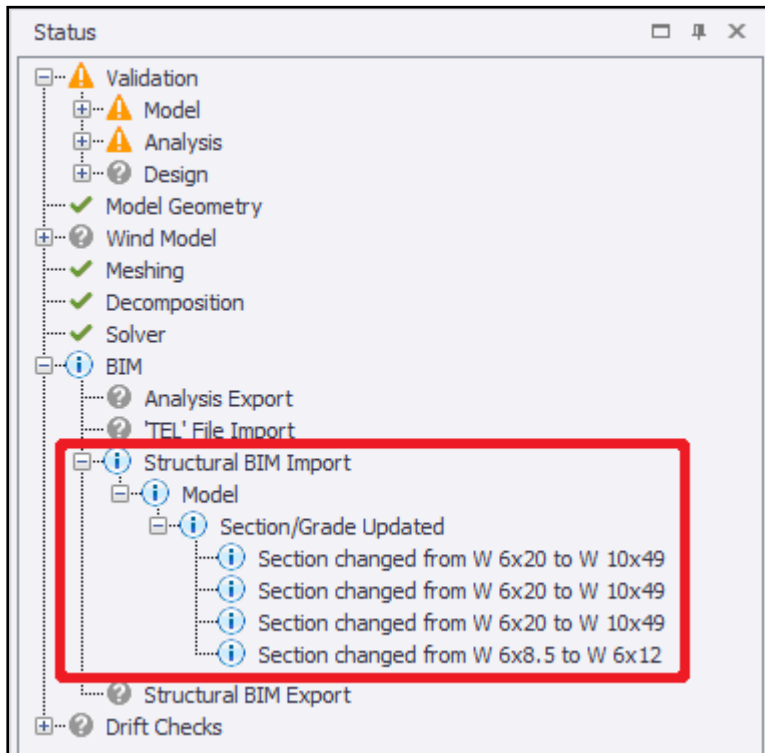
Once the synchronization process has been completed, the command **BIM Status** (held under the Review tab) can be used to provide a color coded indication of how the model has been affected in the last import.

This view identifies all the changes to Tekla Structural Designer members and slabs which have occurred as a result of the merge process.



Once the synchronization process has been completed, the **Structural BIM Import** status tree (held under the **Status** tab) will show all newly created items or modifications performed by the merge process. These alterations to the model can be identified by double clicking on each entry in turn. This will highlight the affected member/object within the main Structure 3D view.

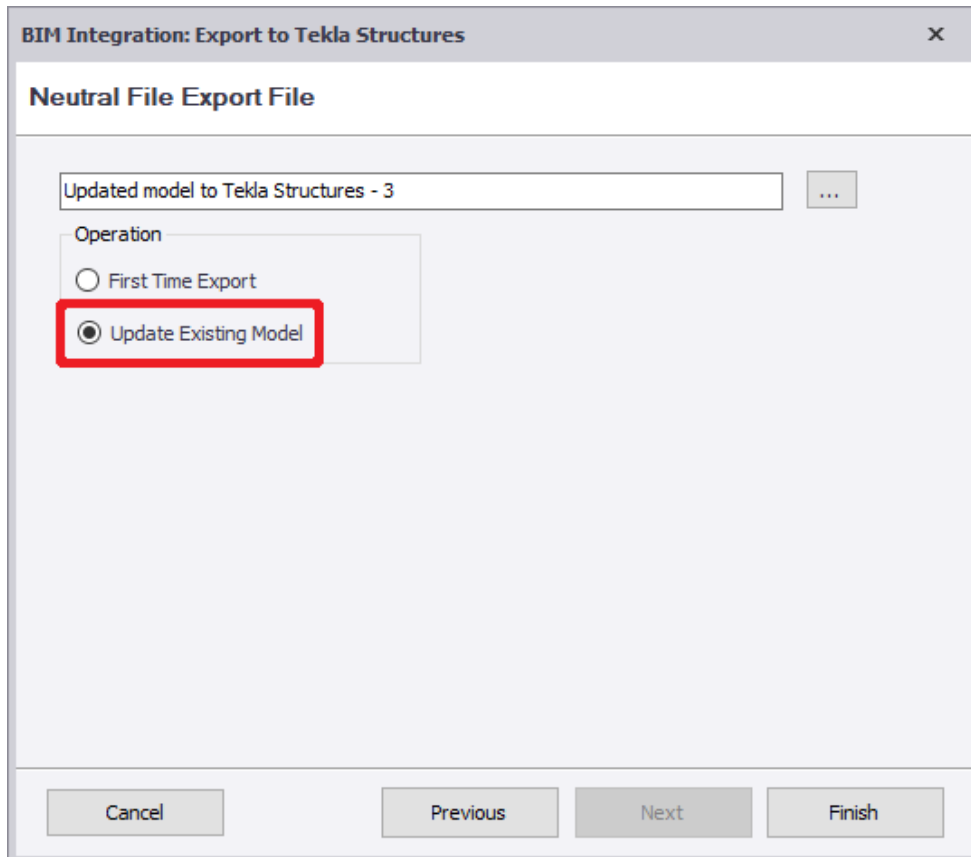
This status list can then be used to track alterations made to the model in the last import process



4.8 Subsequent transfer from TSD into TS

4.8.1 Export process

When performing subsequent integration processes from Tekla Structural Designer to Tekla Structures, the process is virtually identical to the initial export process. The only difference is when creating a .cxl format neutral file using the **Export to Tekla Structures** command, the **Operation** should be flagged as **Update Existing Model (Neutral File Export File screen)**.



4.8.2 Importing an updated model into Tekla Structures

To update existing Tekla Structures with amendments from Tekla Structural Designer, use the same **File** → **Import** → **Tekla Structural Designer** command and instructions as detailed in **Section 4.5**

The exception is at the bottom of the dialog, during an update process the option to **Show model comparison tool** should be enabled.



4.8.3 Model Comparison Tool

The Model Comparison Tool is used for updates into existing Tekla Structures model, allowing newly created, updated and deleted parts to be identified and providing change control to the model.

The tool is separated into four distinct tabs :

- **Added** parts
 - Parts which are going to be added to the Tekla Structural Designer model due to changes made to the Tekla Structural Designer model.
- **Updated** parts
 - Parts which exist within the Tekla Structures model and have been altered by Tekla Structural Designer. Note this may also include alterations made to attributes held by the part.
- **Deleted** parts
 - Parts which exist within the Tekla Structures model but have been deleted within Tekla Structural Designer.
- **Unchanged** parts
 - Parts which exist within the Tekla Structures model and have not been altered within Tekla Structural Designer.

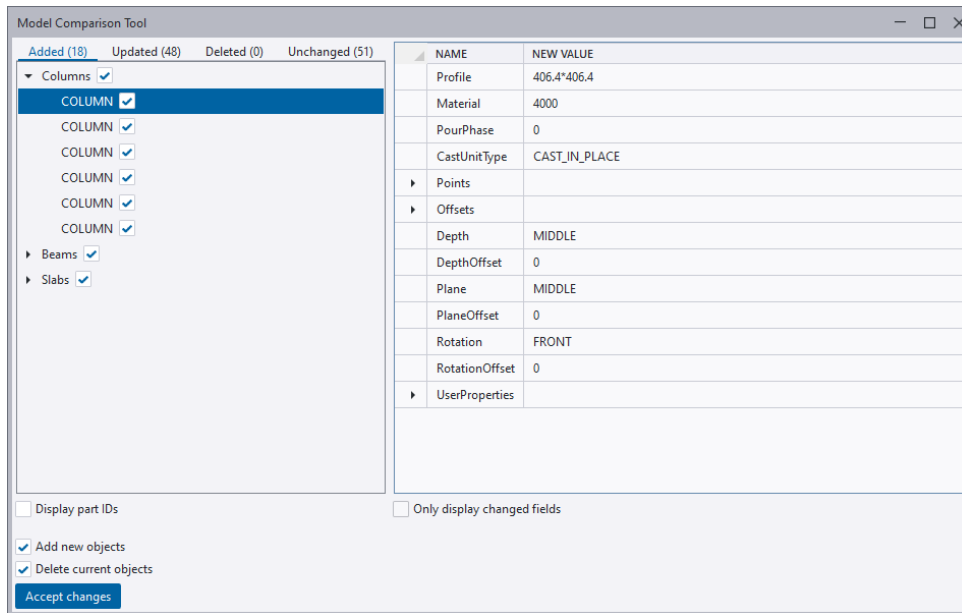
The numbers held in brackets indicate the number of parts held in the particular tab.

4.8.3.1 Added parts

The **Added** tab lists each part on an individual basis, grouped together by object type. Each part will list details on the right hand pane related to the profile, material, location, offsets and other information. This can be read for information purposes but not altered.

The checkboxes on the left hand pane listed against each part controls whether the part will be added to the model or not.

The **Add new objects** option at the bottom of the dialog acts as a global switch. If disabled, no new parts will be generated when importing the changes from Tekla Structural Designer.



4.8.3.2 Updated parts

The **Updated** tab lists all parts which have been altered within Tekla Structural Designer, grouped together by object type. Each of the parts are listed on an individual basis, with all details for the part shown on the right hand side.

The current values will be shown, along with the new values identified in the incoming model. Where alterations have been made, the individual line of data will be highlighted and the altered data can be easily identified.

The checkboxes on the left hand pane listed against each part control whether the part will be amended during the import process or not.

The **APPLY UPDATES** checkbox on each line of updated data allows control as to whether the individual update should be applied or not. This allows individual changes on parts to be controlled providing full control over potential part alterations.

Model Comparison Tool

Added (18) Updated (48) Deleted (0) Unchanged (51)

Columns

- COLUMN
- COLUMN
- COLUMN
- COLUMN
- COLUMN
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- COLUMN
- COLUMN
- COLUMN

NAME	CURRENT VALUE	NEW VALUE	APPLY UPDATES
Material	4000	4000	
Profile	D406.4	406.4*406.4	<input checked="" type="checkbox"/>
Points			
Offsets			
Depth	MIDDLE	MIDDLE	
DepthOffset	0	0	
Plane	RIGHT	MIDDLE	<input checked="" type="checkbox"/>
PlaneOffset	0	0	
Rotation	FRONT	TOP	<input checked="" type="checkbox"/>
RotationOffset	0	-30	<input checked="" type="checkbox"/>
PourPhase	0	0	
CastUnitType	CAST_IN_PLACE	CAST_IN_PLACE	
UserProperties			

Display part IDs
 Only display changed fields

Add new objects
 Delete current objects

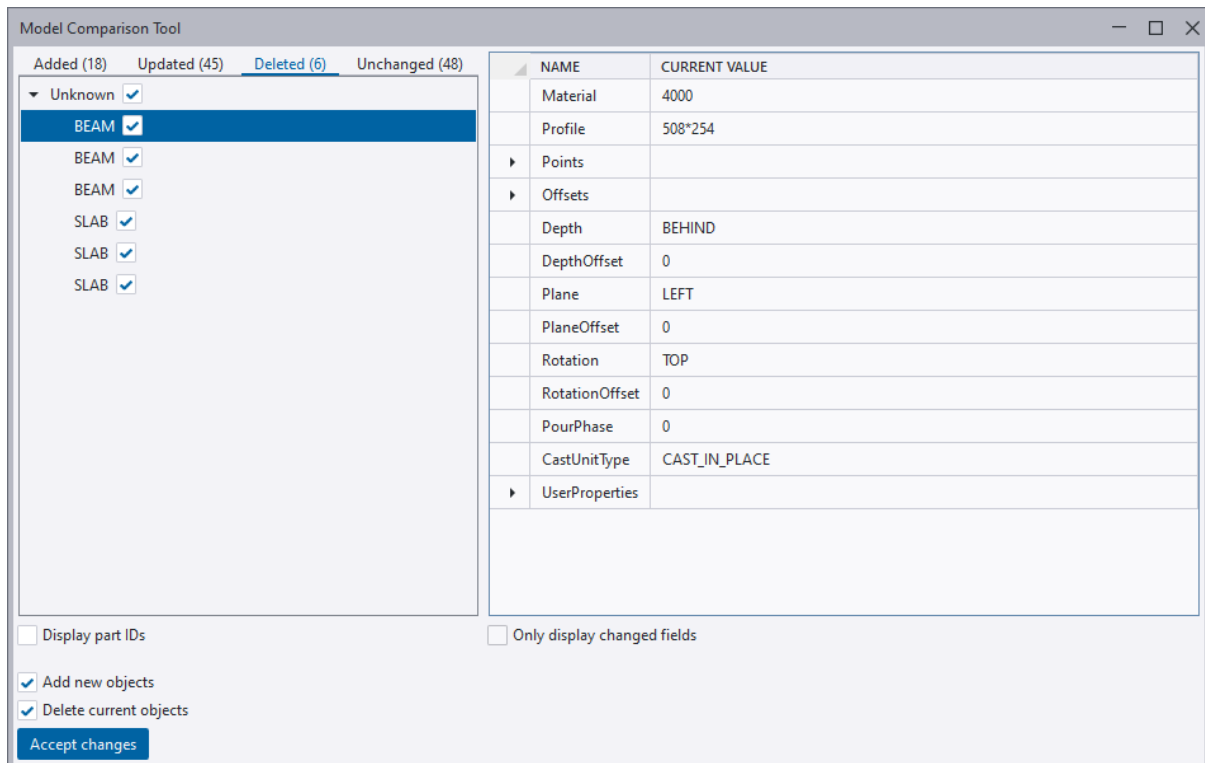
Accept changes

4.8.3.3 Deleted parts

The **Deleted** tab lists each part on an individual basis with details on the right hand pane related to the profile, material, location, offsets and other information. This can be read for information purposes but not altered.

The checkboxes on the left hand pane listed against each part controls whether the part will be deleted or not.

The **Delete current objects** option at the bottom of the dialog acts as a global switch. If disabled, no parts will be deleted when importing the changes from Tekla Structural Designer.



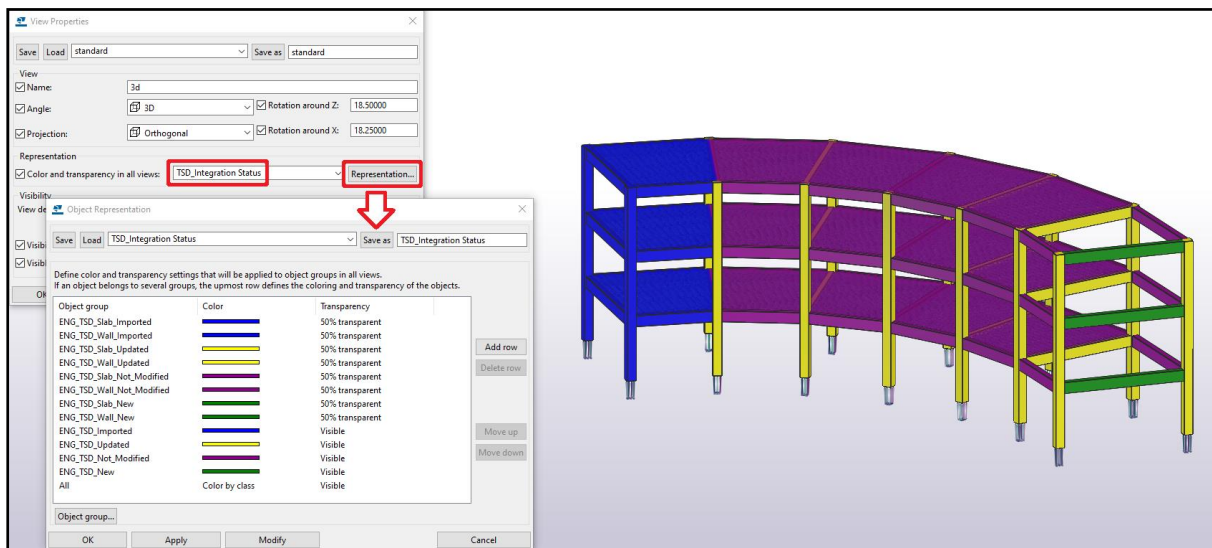
4.8.4 Rebar

The options relating to rebar are exactly the same as the initial import process. It should be noted however that the default settings are to delete the previously imported rebar from the model and generate new rebar in its place.

4.8.5 TSD Integration representation

After updating a model in Tekla Structures with a file from Tekla Structural Designer, it is possible to color the model with an predefined object representation. This colors all parts based on the Integration Status parameter, this will show four separate representations :

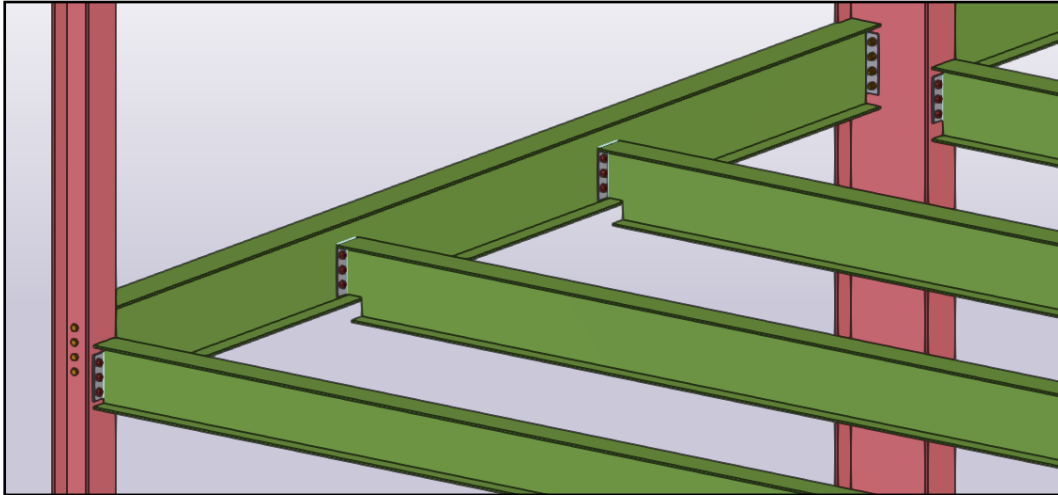
- **Green : New parts**
 - Parts which have been created in Tekla Structures since the initial import process and have not been integrated with Tekla Structural Designer yet.
- **Blue : Imported parts**
 - Parts which have been created in Tekla Structures as part of the integration process with Tekla Structural Designer.
- **Yellow : Updated parts**
 - Parts which have been amended by the integration process with Tekla Structural Designer.
- **Magenta : Unchanged parts**
 - Parts which have been integrated with Tekla Structural Designer but have not been altered by the most recent update.



5.0 Starting the workflow with Tekla Structures

The workflow with models originating from Tekla Structures differs from the workflow described in section 4 as the analysis model needs to be set up within Tekla Structures prior to being exported.

The model can be generally set up in locations used for detailing, and modeling from common intersection points is not mandatory.



5.1 Overview

The analytical model inside Tekla Structures is created using the **A & D models** command. This should be done in stages and checked to ensure analytical connectivity prior to performing an export to Tekla Structural Designer.

The use of filters to control the part visibility and the analytical content should be used. This will be covered in the sections below.

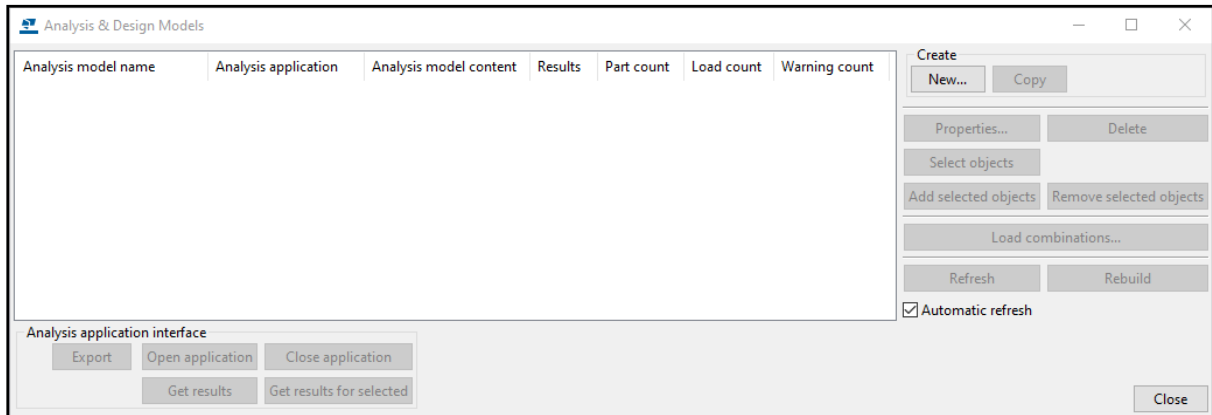
5.2 Limitations

As the analysis model within this workflow is controlled within Tekla Structures, there are some limitations with the process.

- The Tekla Structures model **MUST** act as the master model. No changes to position or offset can be made within Tekla Structural Designer.
- Alterations returning to Tekla Structures from Tekla Structural Designer are limited to profile size changes and material changes only. No other changes are permitted.
- Position changes must be made within Tekla Structures, the analysis model rebuilt and then re-exported to Tekla Structural Designer.
- Loads and load combinations defined within Tekla Structures are not integrated with Tekla Structural Designer. (Loads and load combinations are defined within Tekla Structural Designer itself)

5.3 A & D models Command

As mentioned above, the **A & D models** command must be used to create the analytical model inside Tekla Structures. This section covers the use of this command.



Note. If the Analysis & Design commands are unavailable within Tekla Structures, please refer to this support article :

- <https://support.tekla.com/article/enable-or-disable-analysis-design-options-in-the-ribbon>

5.3.1 Overview

In order to build a high quality analytical model, we would recommend that the model is generated in stages :

- Columns and Shear Walls
- Beams and Bracing
- Slabs
- Secondary items

The use of **Object Group - View Filters** to control the visibility of objects, and **Object Group - Selection Filters** to control the analytical model contents is vital to generate a correctly connected model.

Parts which should not be transferred to Tekla Structural Designer (such as ladders, staircases, end connections similar) can also be omitted using these filters.

5.3.2 Object Group - View Filters

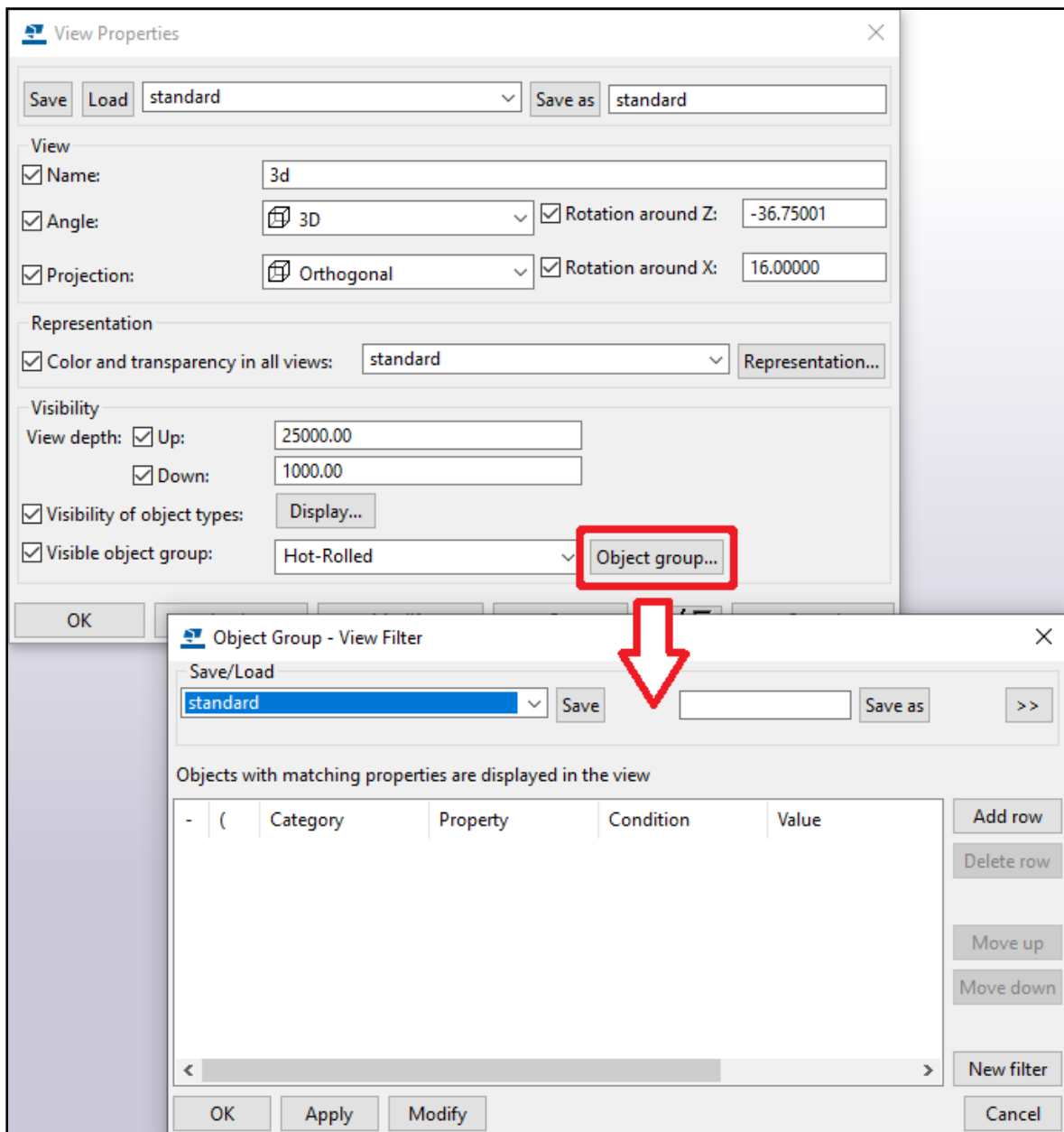
To suit the stages recommended in section 5.3.1, we would also recommend that view filters are created in Tekla Structures covering the objects required in each of the following groups :

- Columns and Shear Walls
- Beams and Bracing
- Slabs
- Secondary Items

An alternative to this would be to disable visibility of objects which shouldn't be included in any analytical model. Parts which may be included in this criteria could be :

- Parts in Components
- Bolts
- Endplates, cleats and gusset plates
- Reinforcing Bars
- Balustrading and handrail standards
- Ladders and staircases

This list isn't exhaustive though and should be determined on a model by model basis.

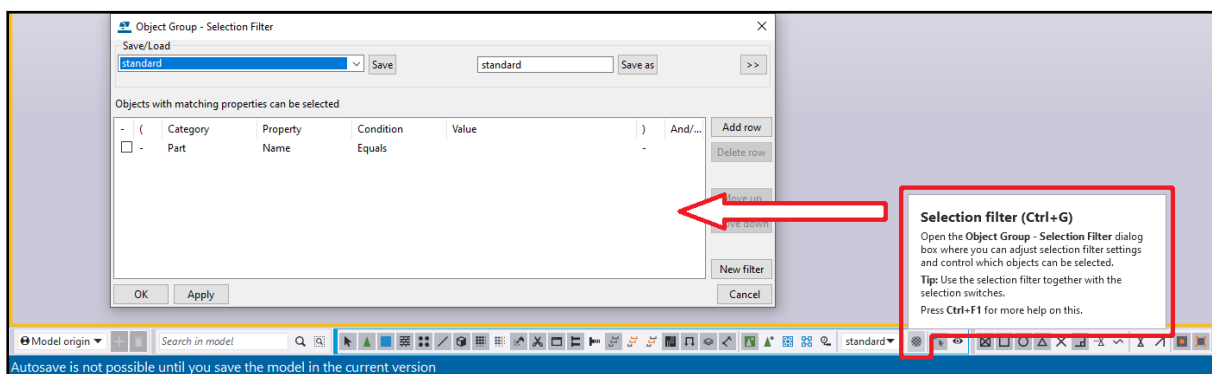


5.3.3 Object Group - Selection Filters

To suit the stages recommended in section 5.3.1, we would also recommend that **Object Group - Selection Filters** are created in Tekla Structures covering the objects required in each of the following groups :

- Columns and Shear Walls
- As above plus Beams and Bracing
- As above plus Slabs
- As above plus Secondary parts
- Bracing parts only
- Secondary parts only

The use of clear and defined selection filters is essential to creating effective analytical models within Tekla Structures.

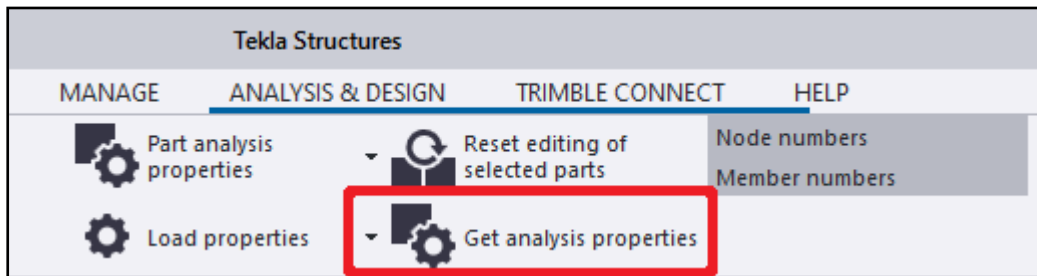


5.3.4 Analytical Bars and class settings

Analytical bars are the building blocks of the Tekla Structures analytical model. In order to build a connected analytical model, there are a number of classes available for analytical bars. These different classes will behave in slightly different ways when the analytical model is created.

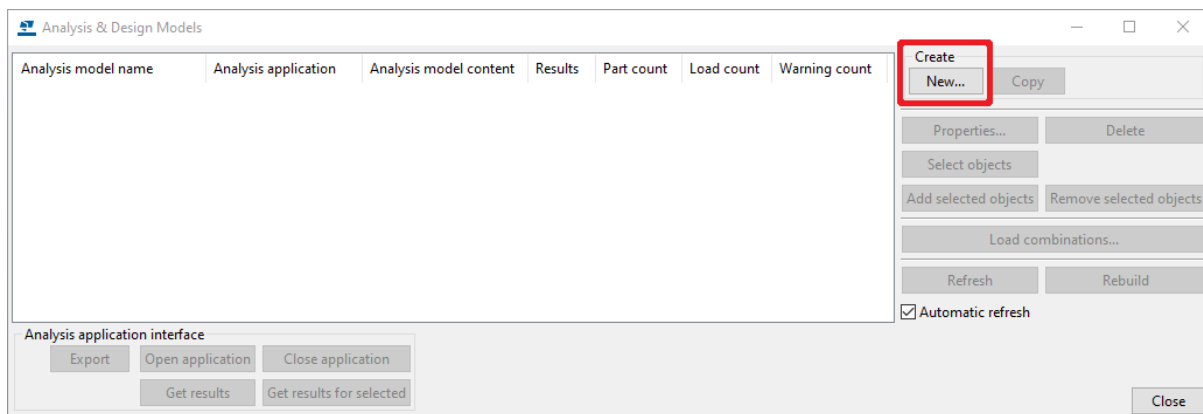
Analysis Bars		
Option	Description	Color
Beam	Line object of two nodes.	Blue
Beam - Ignore	Bar is ignored in the analysis and will not be exported to Tekla Structural Designer.	Bar not shown in the model
Column	Vertical line object of two nodes. Modeled from bottom to top.	Blue
Column - Ignore	Bar is ignored in the analysis and will not be exported to Tekla Structural Designer.	Bar not shown in the model
Bracing	For bars whose analysis class is Bracing, Keep axis position is off by default.	Green
Bracing - Ignore	Bar is ignored in the analysis and will not be exported to Tekla Structural Designer.	Bar not shown in the model
Secondary	Line object of two nodes. For bars whose analysis class is Secondary, Keep axis position is off by default. Secondary bars snap to nearest nodes instead of part end nodes.	Orange
Secondary - Ignore	Bar is ignored in the analysis and will not be exported to Tekla Structural Designer.	Bar not shown in the model
Wall - Shell		Aqua
Wall - Ignore	Bar is ignored in the analysis and will not be exported to Tekla Structural Designer.	Aqua
Slab - Shell		Aqua
Slab - Ignore	Bar is ignored in the analysis.	Bar not shown in the model

Where analysis bars are flagged as **-ignore**, the bar is no longer shown in the model. In order to change the analytical properties, select the physical part and use the **Get analysis properties** command.



5.3.5 Generating Analysis Models

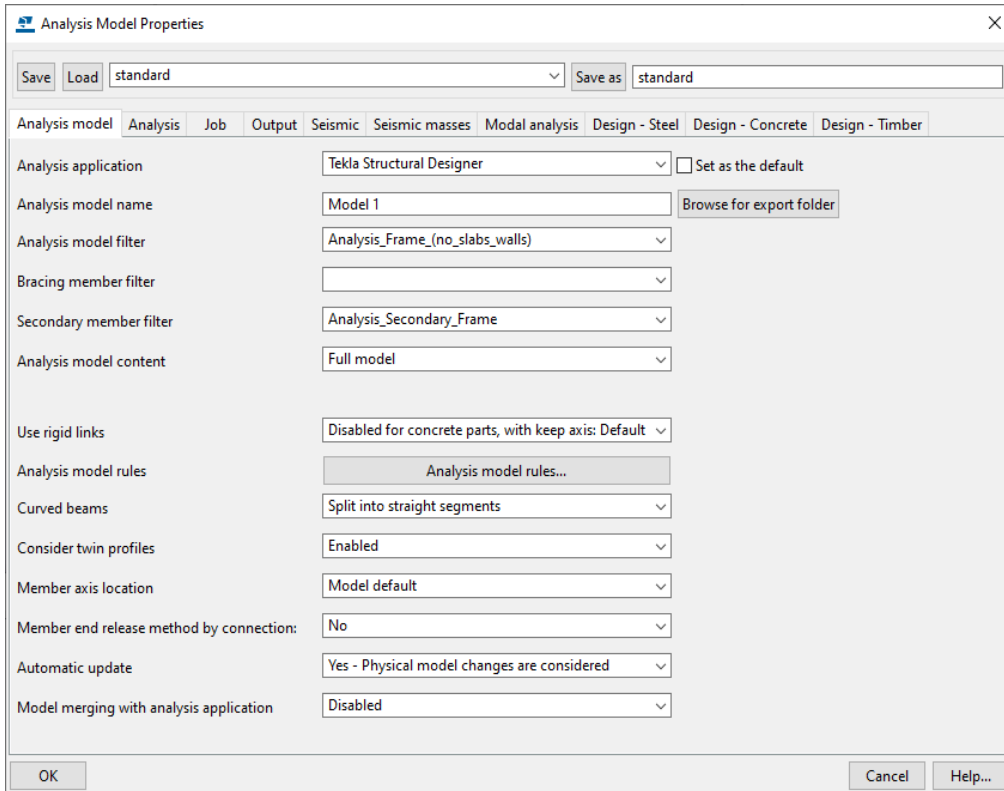
From within the **A&D models** command click on the **New** command.



This will then display the **Analysis Model Properties** dialog which contains a number of settings which need to be considered :

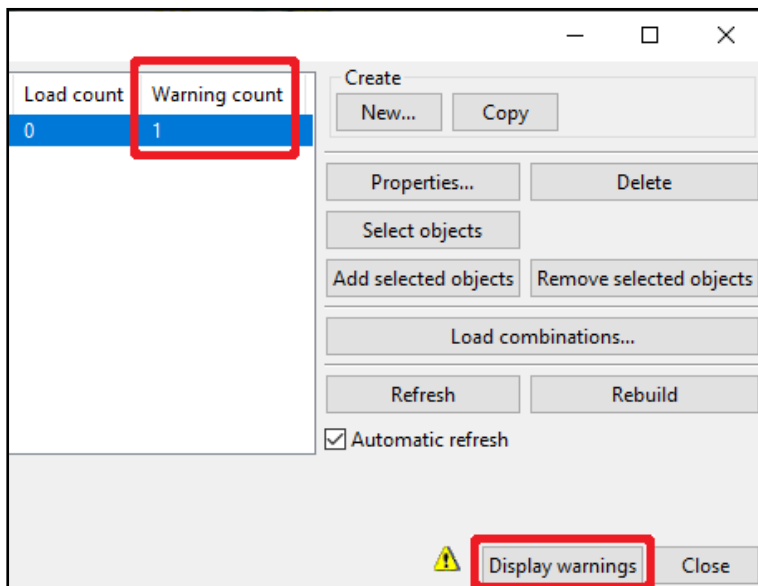
- **Analysis application**
 - The default option is to use Tekla Structural Designer. Keep this setting unchanged.
- **Analysis model name**
 - This setting defines a unique name for the analysis model. As several analysis models can be created, you can use a name that describes the portion of the physical model that you want to analyze.
 - To define the export folder for the analysis model, click **Browse** for export folder.
- **Analysis model filter**
 - Defines which objects to include in the analysis model, based on the list of available selection filters.

- **Bracing member filter**
 - Defines which of the included objects are considered to be braces. The analysis nodes of braces can move more freely than the ones of primary analysis parts when the analysis model is created.
- **Secondary member filter**
 - Defines which of the included objects are considered to be secondary analysis parts. The nodes of secondary analysis parts can move more freely than the ones of primary analysis parts when the analysis model is created.
- **Analysis model content**
 - Defines which objects are included in the analysis model. The options are:
 - **Selected parts and loads**
 - Only includes selected parts and loads, and parts created by components, when they match the analysis model filter.
 - To later add or remove parts and loads, use the **Add selected objects** or **Remove selected objects** button in the **Analysis & Design Models** dialog box.
 - **Full model**
 - Includes all main parts and loads, except for parts whose analysis class is Ignore. Tekla Structures automatically adds physical objects to the analysis model when they are created and when they match the analysis model filter.
 - **Floor model by selected parts and loads**
 - Only includes selected columns, slabs, floor beams, and loads when they match the analysis model filter. Tekla Structures replaces columns in the physical model with supports.
- **Use rigid links**
 - This option allows the use of rigid links in the analysis model. As rigid links are handled within the Tekla Structural Designer model, keep this setting as **Enabled for concrete parts**.
- **Analysis model rules**
 - Click to create rules to define how Tekla Structures handles individual parts in the analysis model, and how parts are connected with each other in the analysis.
- **Curved beams**
 - This option defines whether beams are analyzed as curved beams or as straight segments.
 - **Split into straight segments**
 - **Use curved member**
 - Use the advanced option **XS_AD_CURVED_BEAM_SPLIT_ACCURACY_MM** in the **File** menu → **Settings** → **Advanced Options** → **Analysis & Design** to define how closely straight segments follow the curved beam.
- **Consider twin profiles**
 - Defines whether twin profiles are considered as one part (Enabled) or as two parts (Disabled) in the analysis.
- **Member axis location**
 - Defines the location of each analysis part in relation to the corresponding physical part. The options are:

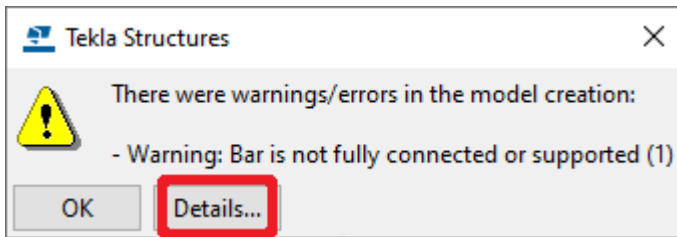


5.3.6 Checking analytical connectivity

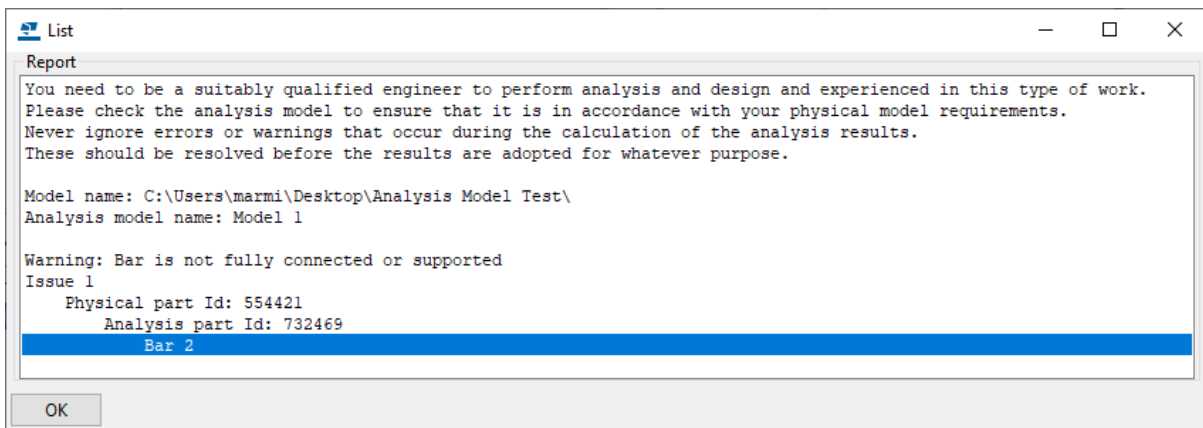
There are several ways to check the connectivity of the analytical model, firstly the **Warning count** held within the **Analysis & Design Models** dialog can be interrogated. If a positive number is shown on the **Warning count**, the **Display warnings** button can be selected to investigate the warnings further.



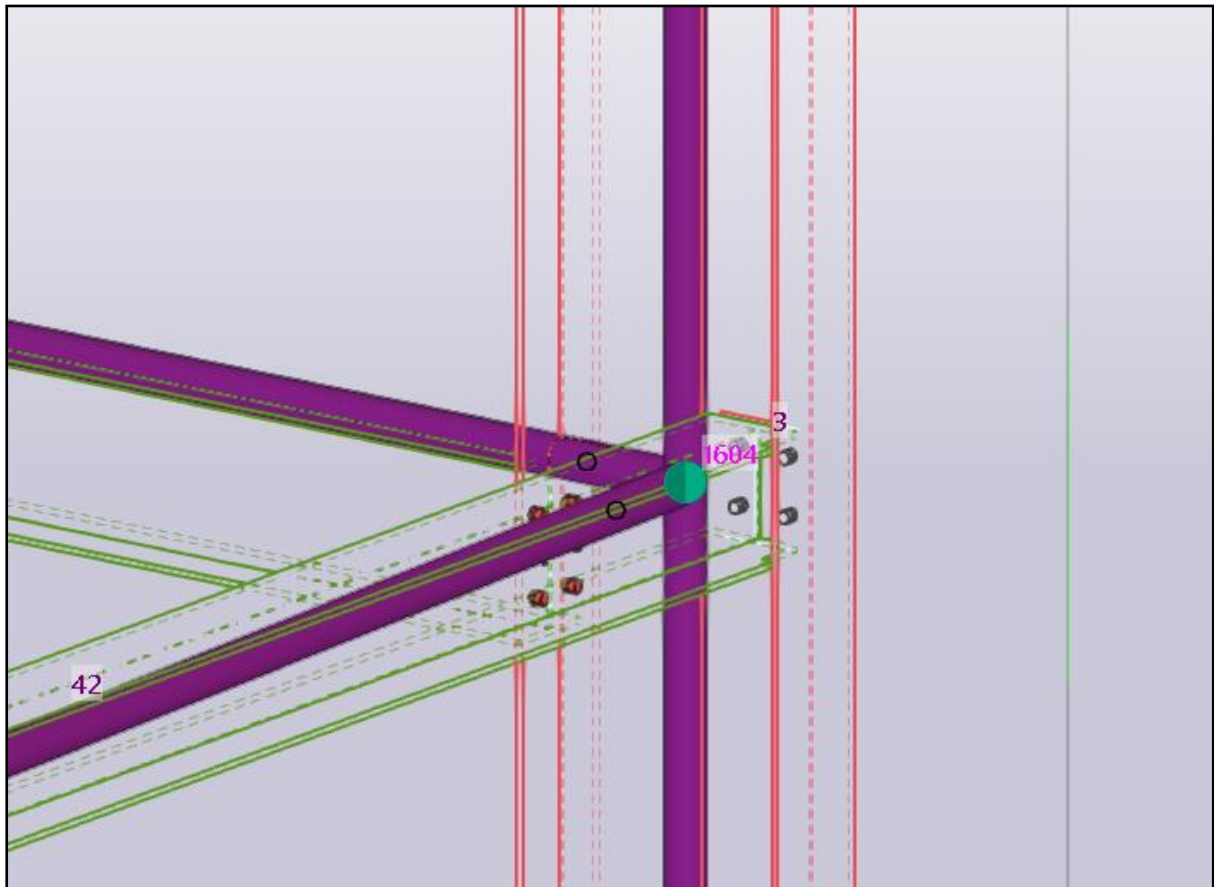
Warnings can be checked in detail by clicking on the relevant option within the dialog.



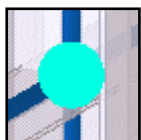
Full details of the warning will be displayed including ID references of the physical and analytical parts. Parts can also be identified within the model by clicking on the references within the dialog as this will highlight the part in the model.



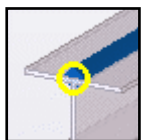
Visual checks are also available, for example clicking on the analytical nodes will also highlight the connecting analytical nodes, providing a quick check on the analytical model connectivity.



The coloring of the analytical nodes can also provide an indication of the connectivity status :



- Nodes that connect analysis parts are cyan.



- Nodes that do not connect analysis parts are yellow.



- Unconnected nodes are colored red.

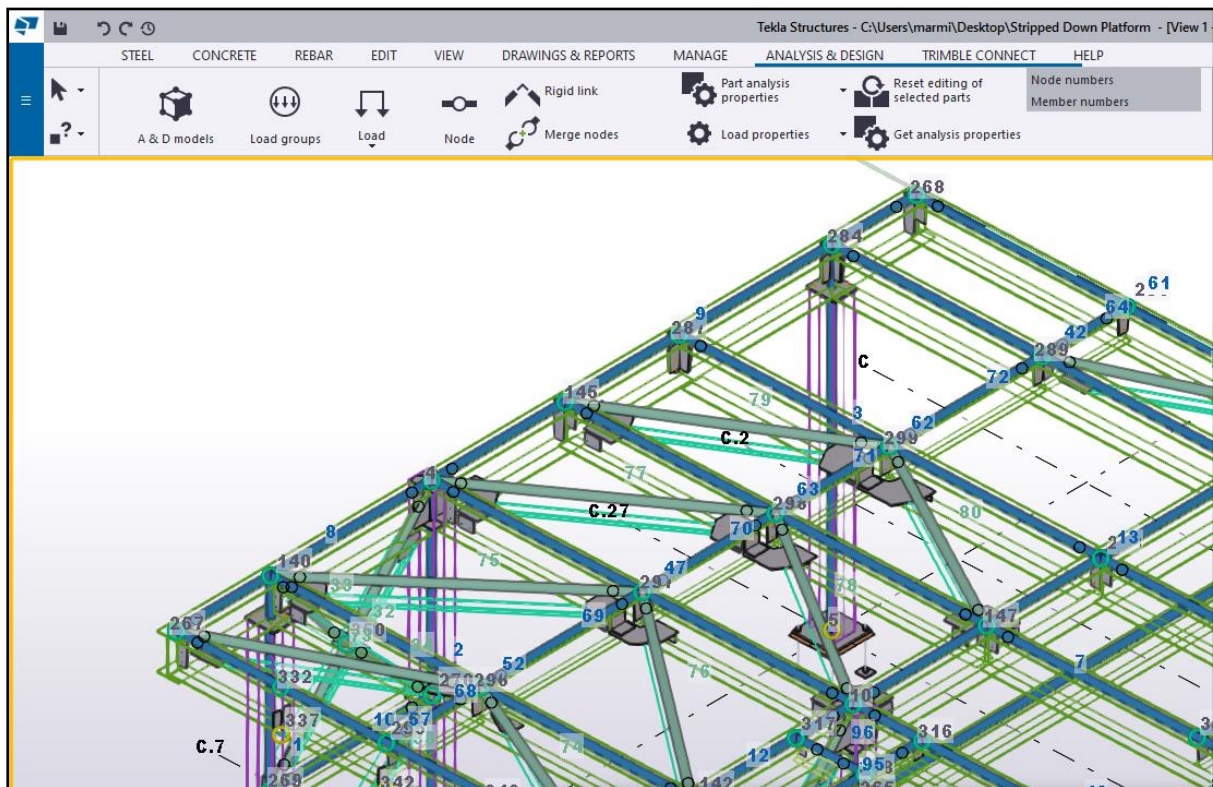
5.3.7 Correcting analysis bar positions

Analysis bars for beam, column, bracing and secondary parts can be moved in position using standard Tekla Structures commands. They can also be stretched by directly manipulating the analytical handle located at either end of the bar.

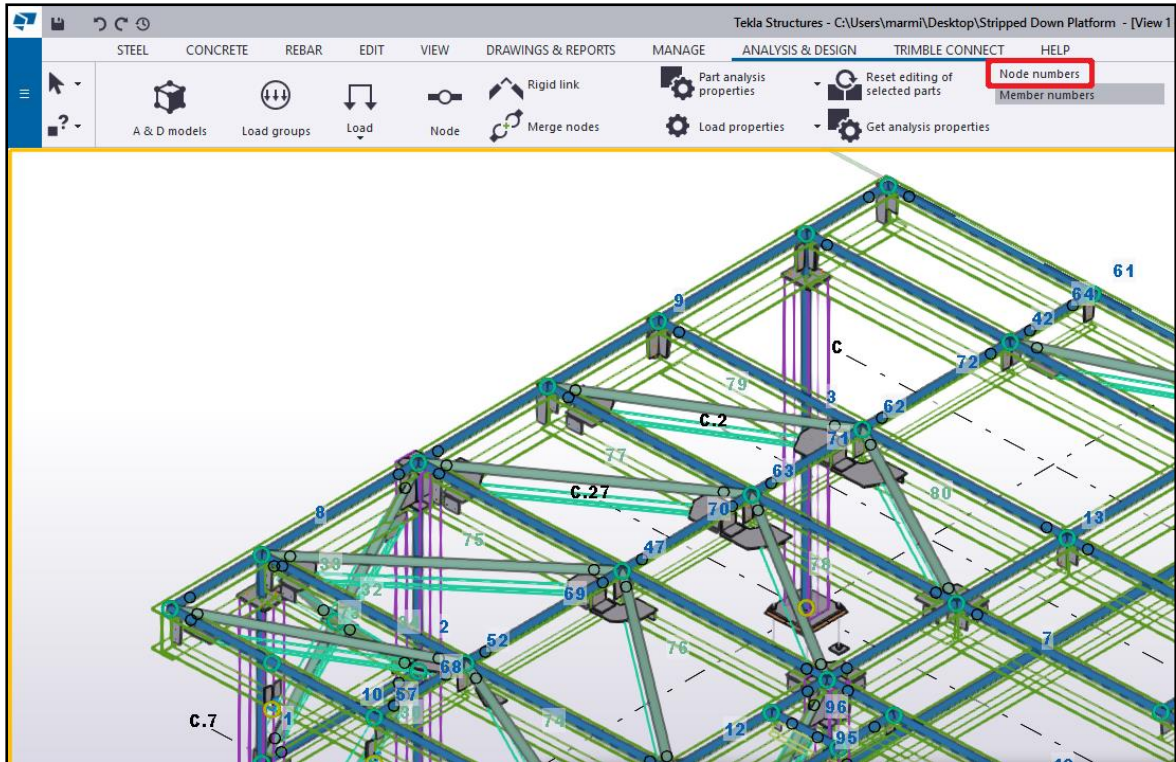
Please note that analytical bars for slabs and walls can not be altered in position. If the positions of analytical bars for these items are not correct, consider deleting them and building the items from scratch within Tekla Structural Designer.

5.3.8 Controlling the display of Node numbers and Member numbers

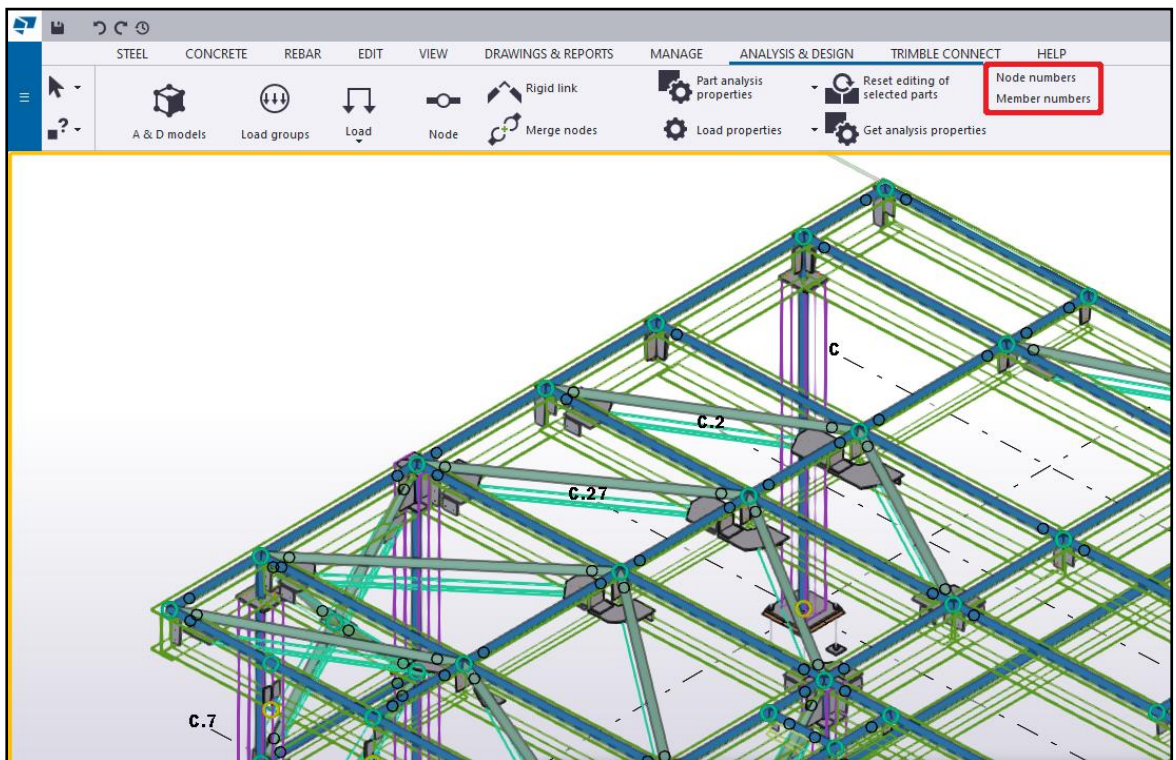
The display of both **Node numbers** and **Member numbers** can be controlled by the switches held on the **Analysis & Design** ribbon. Disabling these switches can lead to a less congested view of the analysis model at times.



- Display of analysis model with both **Node numbers** and **Member numbers** enabled.



- Display of analysis model with **Node numbers** disabled.

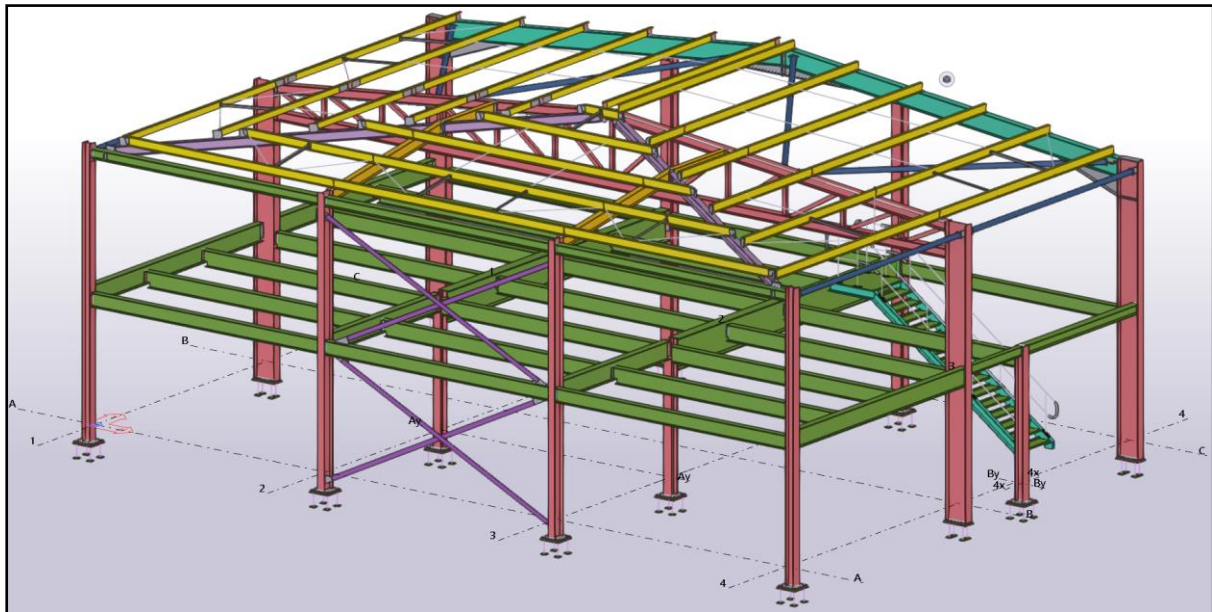


- Display of analysis model with both **Node numbers** and **Member numbers** disabled.

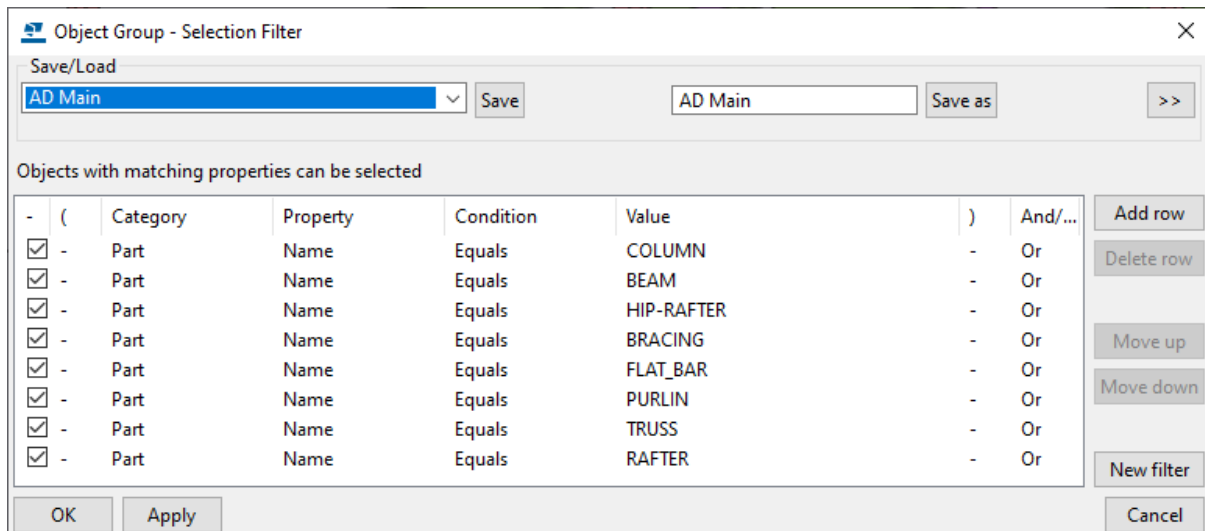
5.3.9 Creating effective models (Example)

This section covers an example of setting up an analytical model within a completed Tekla Structures model.

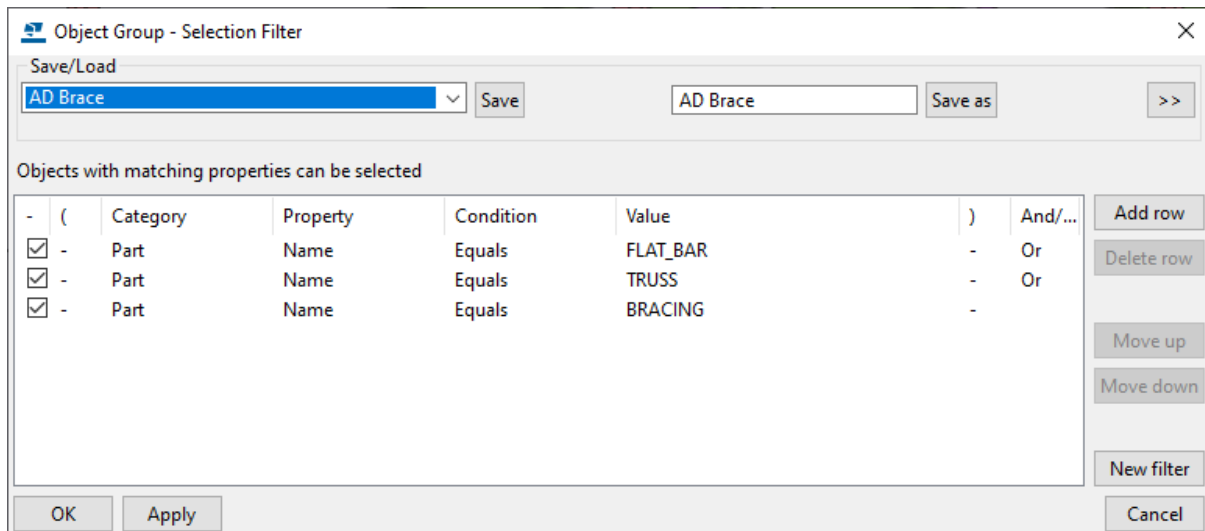
This is the physical model used as a basis of the analysis and design model. As can be seen, this model contains a number of steelwork parts with columns, beams, truss parts, bracing and cold rolled purlins present.



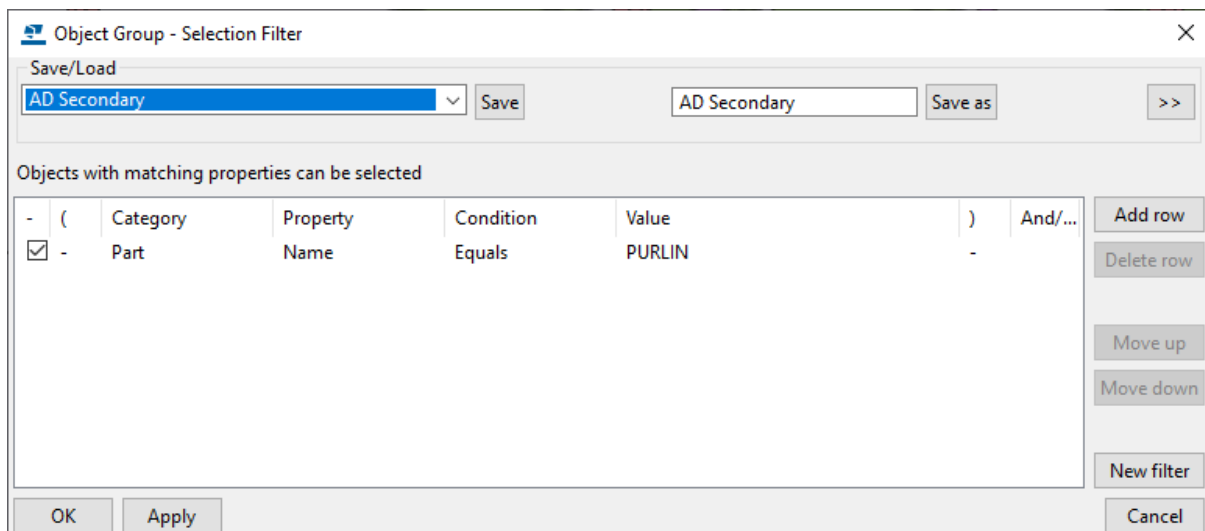
The first stage is to create 3 filters which will govern the analytical connectivity. The first filter to be created is a filter controlling the overall contents of the A&D Model.



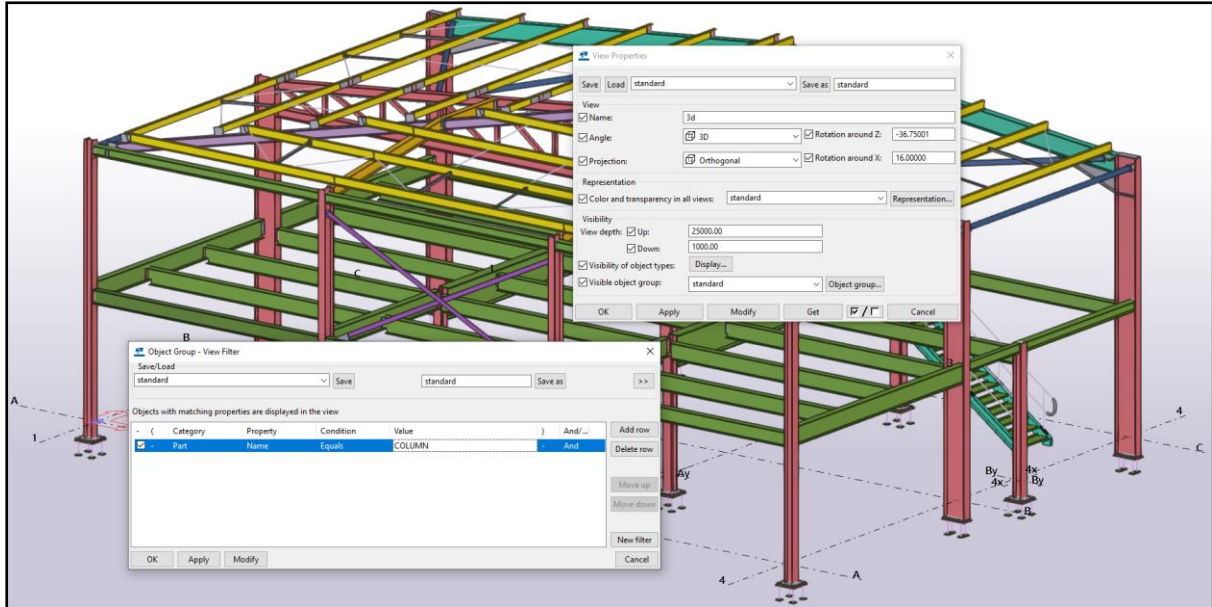
The second filter will contain parts which use bracing rules for analysis wire connectivity. As defined in section 5.3.4., bracing analysis bars are generated with the **Keep axis position** option disabled. It may be desirable to keep the truss top boom and bottom boom parts as being regular members but this can be adjusted after the model has been generated.



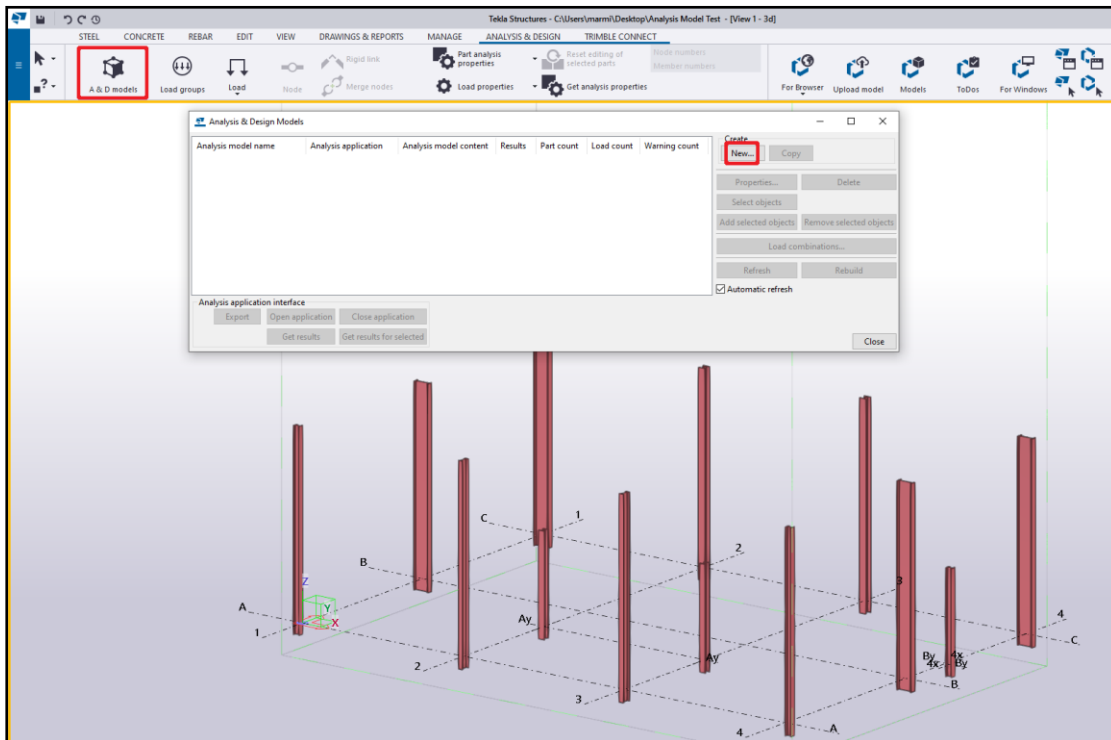
The final filter controls the secondary members, in our example this will be the purlin members. As defined earlier, bars whose analysis class is Secondary have the **Keep axis position** flagged as **off** by default. Secondary bars also snap to nearest nodes instead of part end nodes.



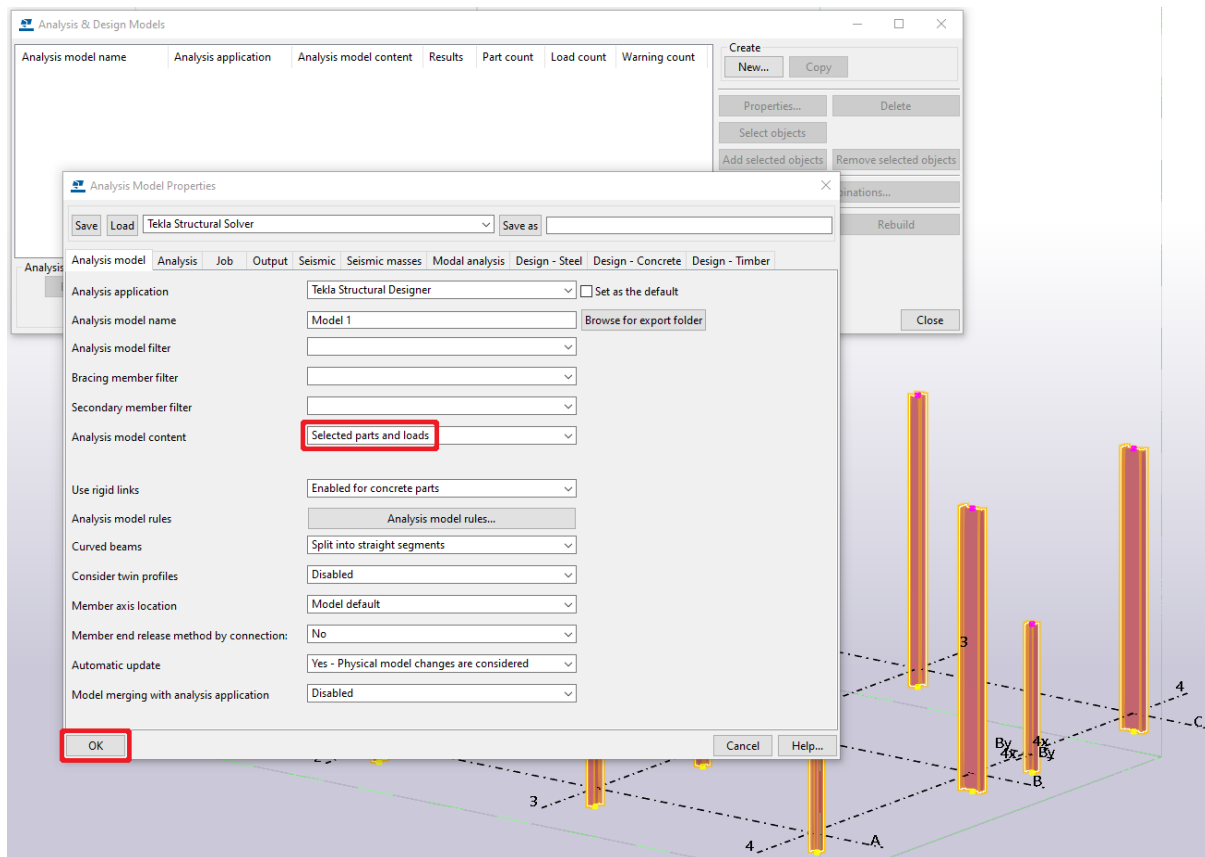
With the three **Object Group Selection Filters** created, we will generate the analysis wires for the columns initially. These can then be correctly located on grid intersections prior to the generation of the remainder of the model. We use the **View Properties** and isolate the columns using an **Object Group View Filter**.



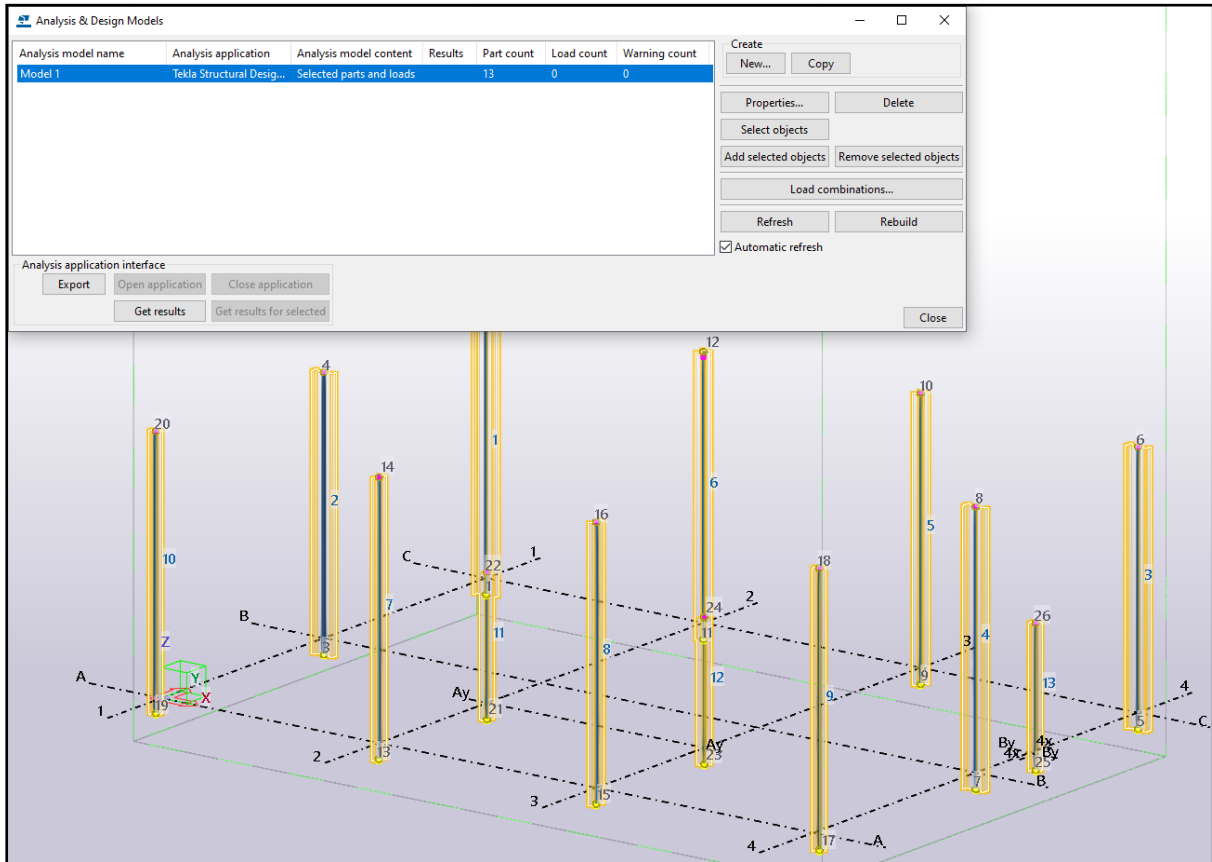
With the columns now isolated, we can launch the **A & D models** command to open the **Analysis & Design Models** command and then the **New** button to create the initial model.



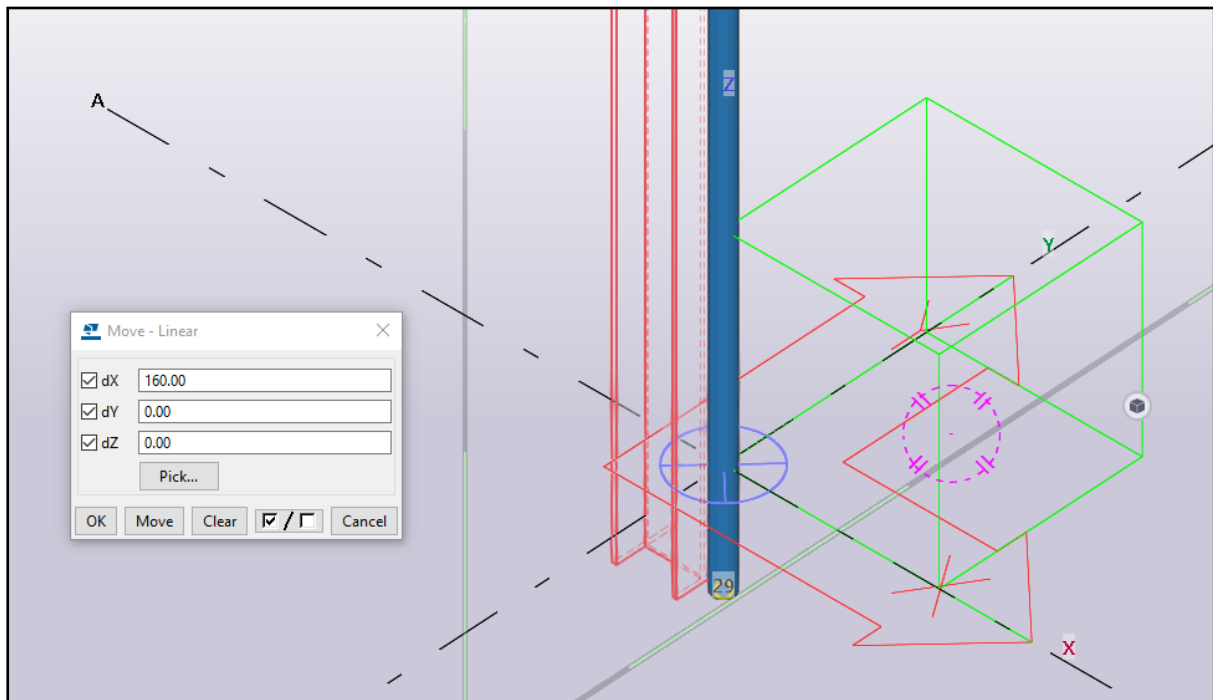
With the **Analysis Model Properties** dialog shown change the **Analysis model content** to be **Selected parts and loads**, select the content visible in the model and then click on the **OK** button.



The analysis bars for the columns are then created. The **Analysis & Design Models** dialog also shows the **Part count** and **Warning count**.

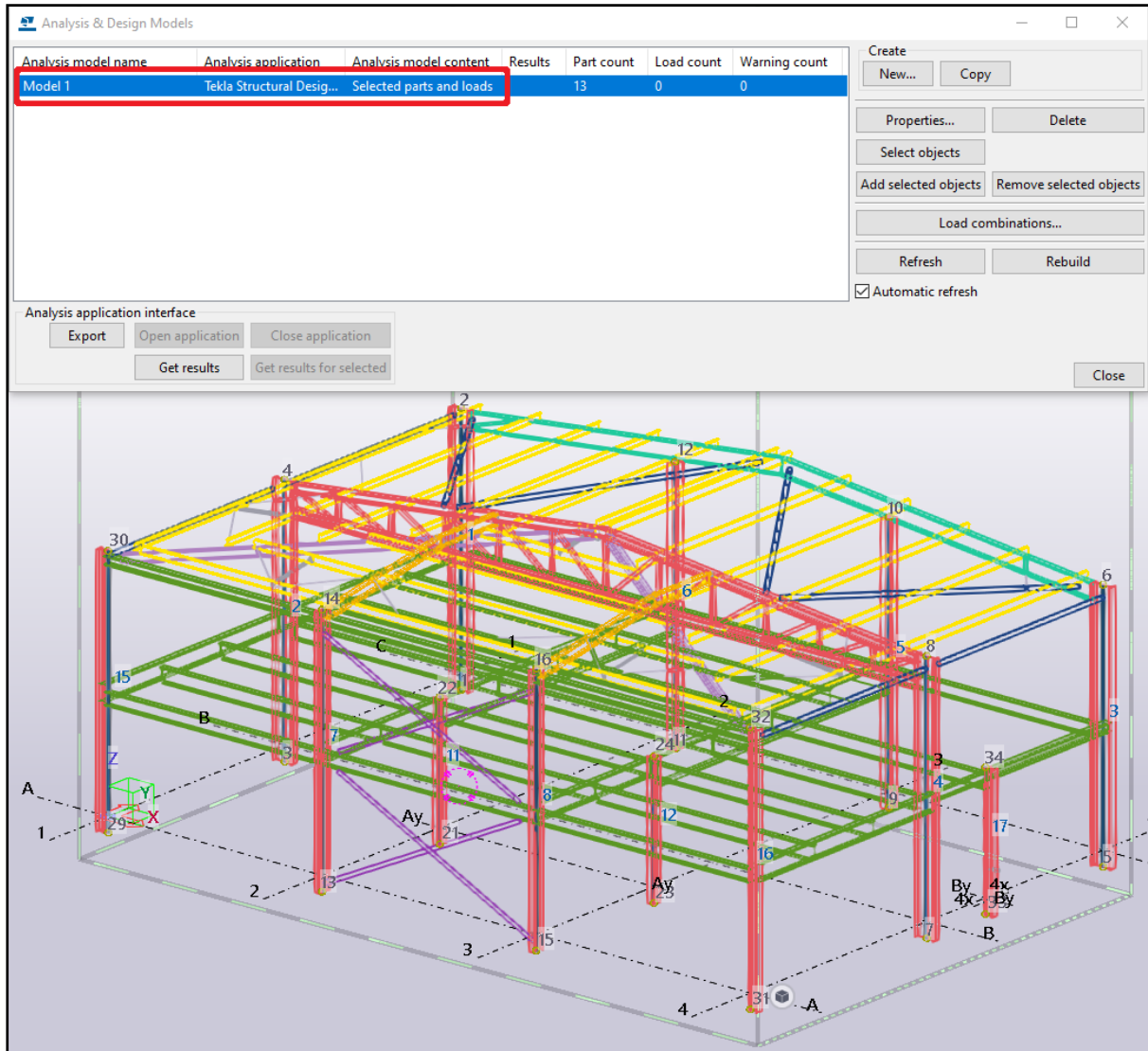


The analysis bars for the columns are all initially generated at the center of the physical part. As we would like to have the analysis bars located on grid intersections, we can move the bars to more suitable positions using **Move** and **Move special** commands.

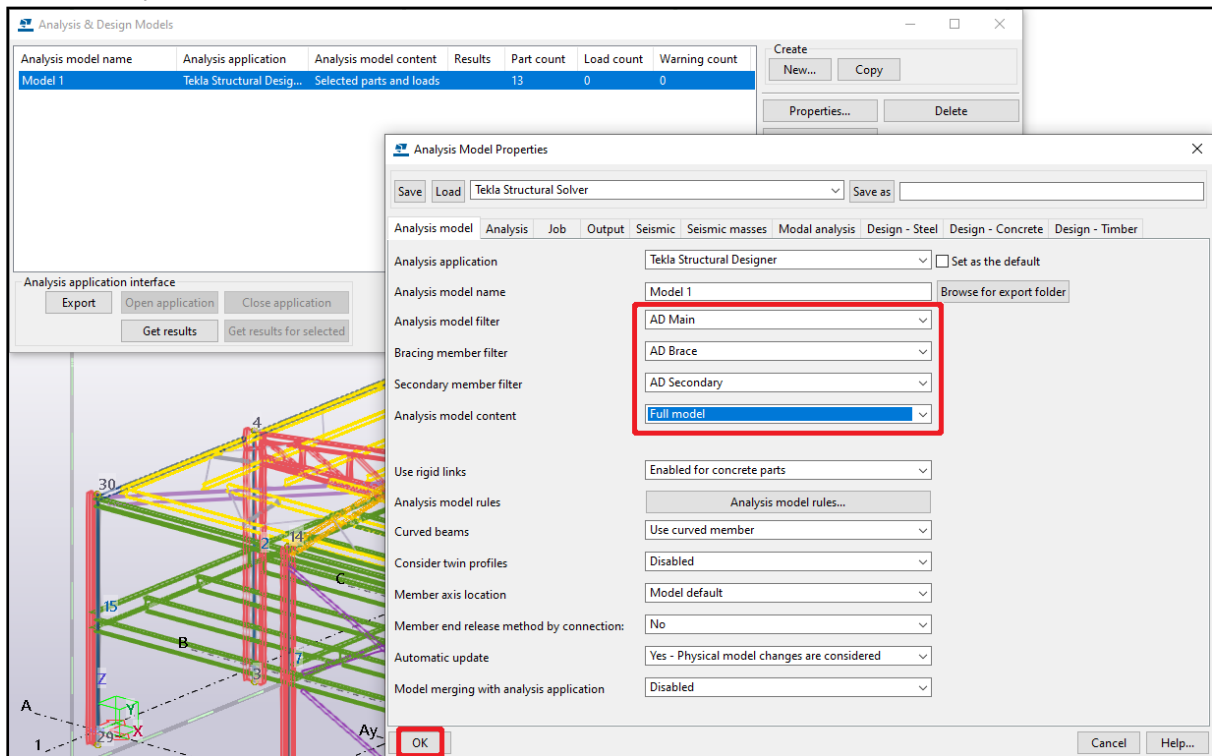


With the positions of the column analysis bars finalized, we can now look at creating the remainder of the analysis model. Firstly, the **Object Group - View Filter** settings are removed and the view regenerated to show the remainder of the model.

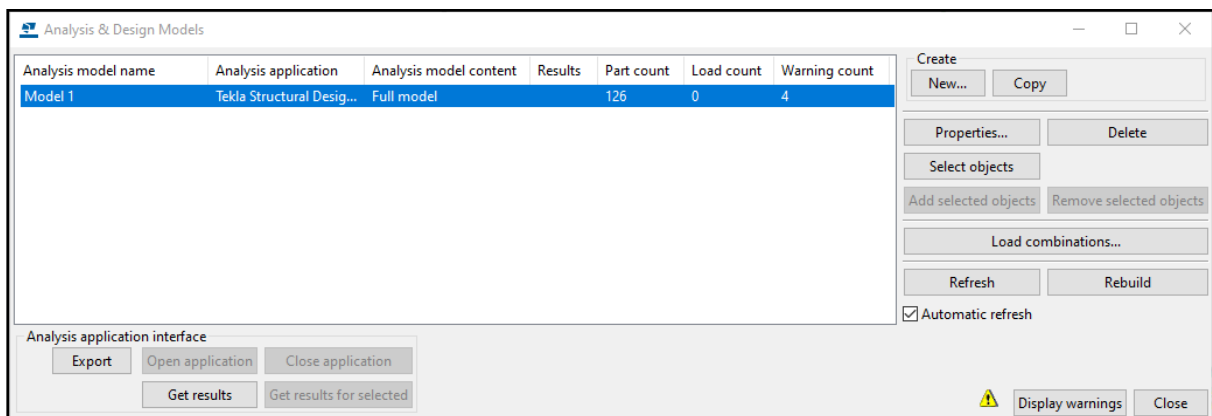
We also double click on the existing **Analysis model** to access the **Analysis Model Properties** dialog.



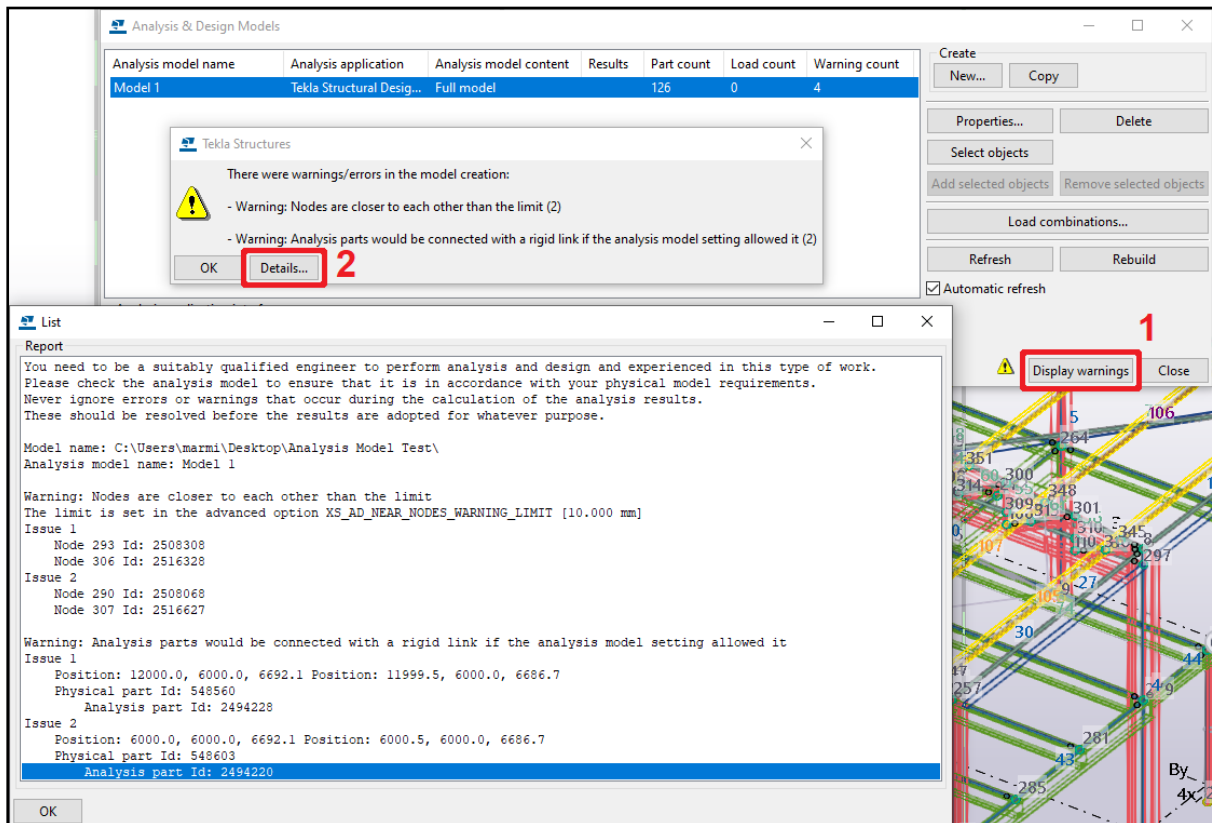
Within the dialog, we can assign our previously created object filters to the **Analysis model filter**, **Bracing member filter** and **Secondary member filter** settings. We also change the **Analysis model content** option to be **Full model** and click on **OK** to create the remainder of the analytical model.



The result of the new settings is that the **Part count** is increased to 126 and also the **Warning count** has increased to 4. We can now investigate the warning messages further.

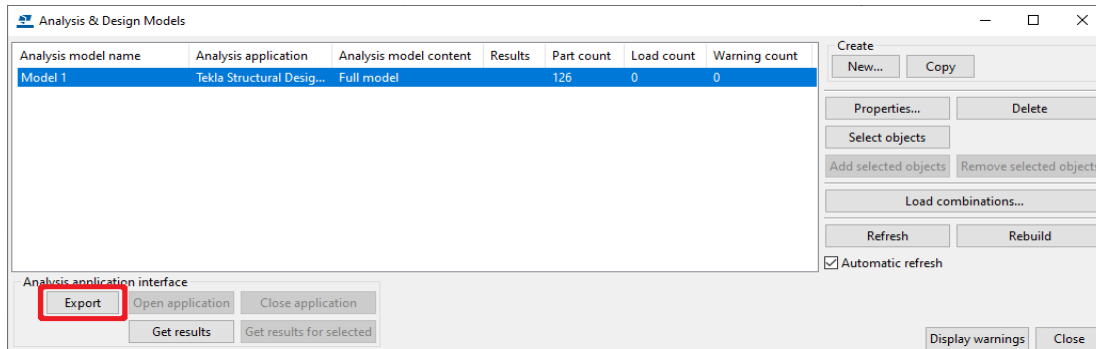


To access the warning messages, click on Display Warnings and then Details. In our example, we could investigate the warnings and try to fix the issue within Tekla Structures. You may also want to consider exporting the model to Tekla Structural Designer so that validation traps out this error and any issues can be corrected further. One issue to consider is that the analysis model updates as analysis bars are adjusted. There is a risk that correcting parts of the model can result in other areas becoming problematic. If receiving less than 5 warnings, consider transferring the model to Tekla Structural Designer and using the superior analytical tools to correct the analytical model.

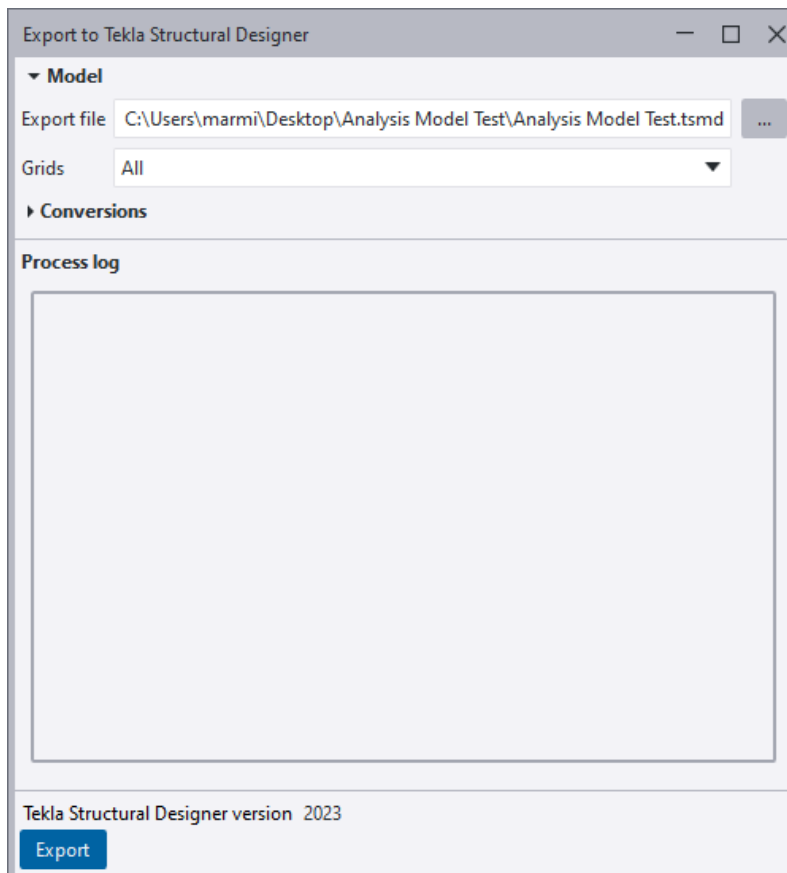


5.4 Exporting a model from Tekla Structures to Tekla Structural Designer

To export a model using the **Analysis & Design Models** command, click on the **Export** button at the bottom left of the dialog. Please note that this button will not be available until an analysis model has been generated within Tekla Structures.



After clicking on **Export**, the **Export to Tekla Structural Designer** dialog will be shown. The export process from this point is identical to the process described in section 4.7.3. The only difference is that there is no **Model objects** option - the contents of the export are already defined within the analysis model.



5.4.1 Initial Import into Tekla Structural Designer

The import process into Tekla Structural Designer is exactly the same as defined in section 4.7.4.

5.5 Returning information from Tekla Structural Designer to Tekla Structures

5.5.1 Overview

The workflow using the **Analysis & Design Models** command is more restrictive when it comes to returning information from Tekla Structural Designer.

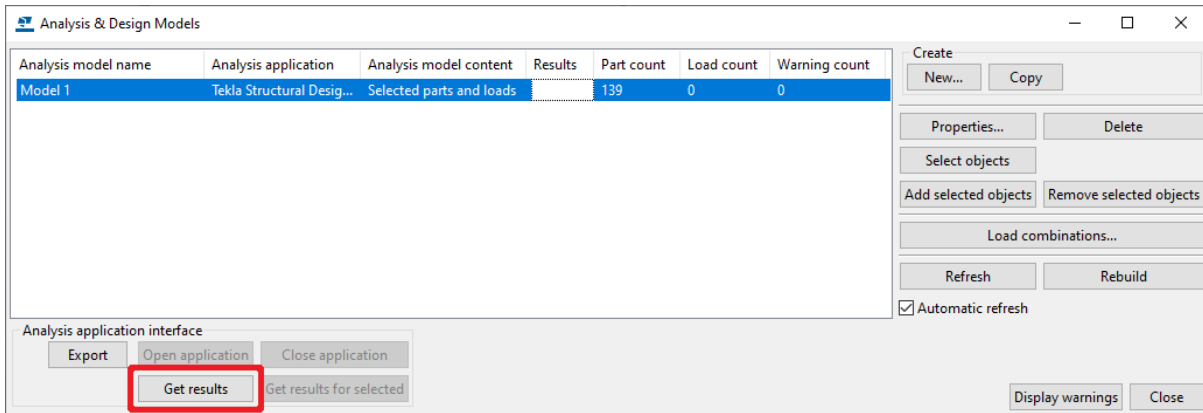
Essentially, although new parts can be created within Tekla Structural Designer and exported to the Tekla Structures model, no parts can be adjusted in position or deleted from the model.

5.5.2 Restrictions

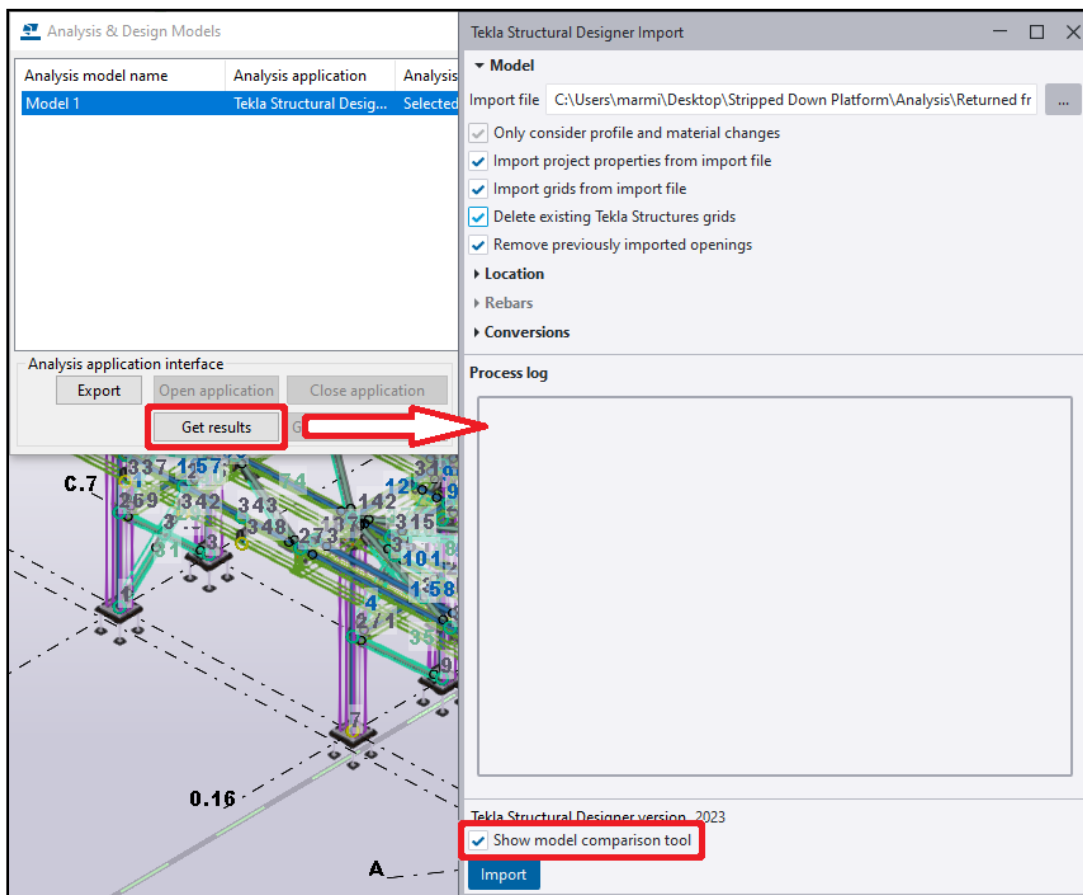
- **Grids**
 - New Grids added in Tekla Structural Designer are communicated to the Tekla Structures model.
 - Alterations to existing grids are also communicated to the Tekla Structures model, however parts located on the grids are not updated in position.
- **Beam, Column, Bracing and Secondary Parts**
 - New members created in Tekla Structural Designer are generated as new parts within Tekla Structures
 - Existing parts can be updated in profile size and material grade only. No alterations to position, rotation, offset, heights or depths are permissible.
- **Slab and Wall Parts**
 - Slab parts may not be adjusted in length or width. Any openings located within the slab may not be adjusted in size.
 - Wall parts may not be adjusted in length or height. Any openings located within the wall may not be adjusted in size.
 - New openings in slabs and walls are returned to Tekla Structures from Tekla Structural Designer, however please note that the analytical positions may not be correct due to the automated way that the analysis model is created.
- **General Rules**
 - No parts may be deleted during the integration process. Parts deleted from the Tekla Structural Designer model will be retained within the Tekla Structures model.
 - No openings may be deleted during the integration process.

5.5.3 Get results command

Updates to the existing Tekla Structures Analysis and Designer Model are made with the **Get results** button held in the **Analysis & Design models** dialog.



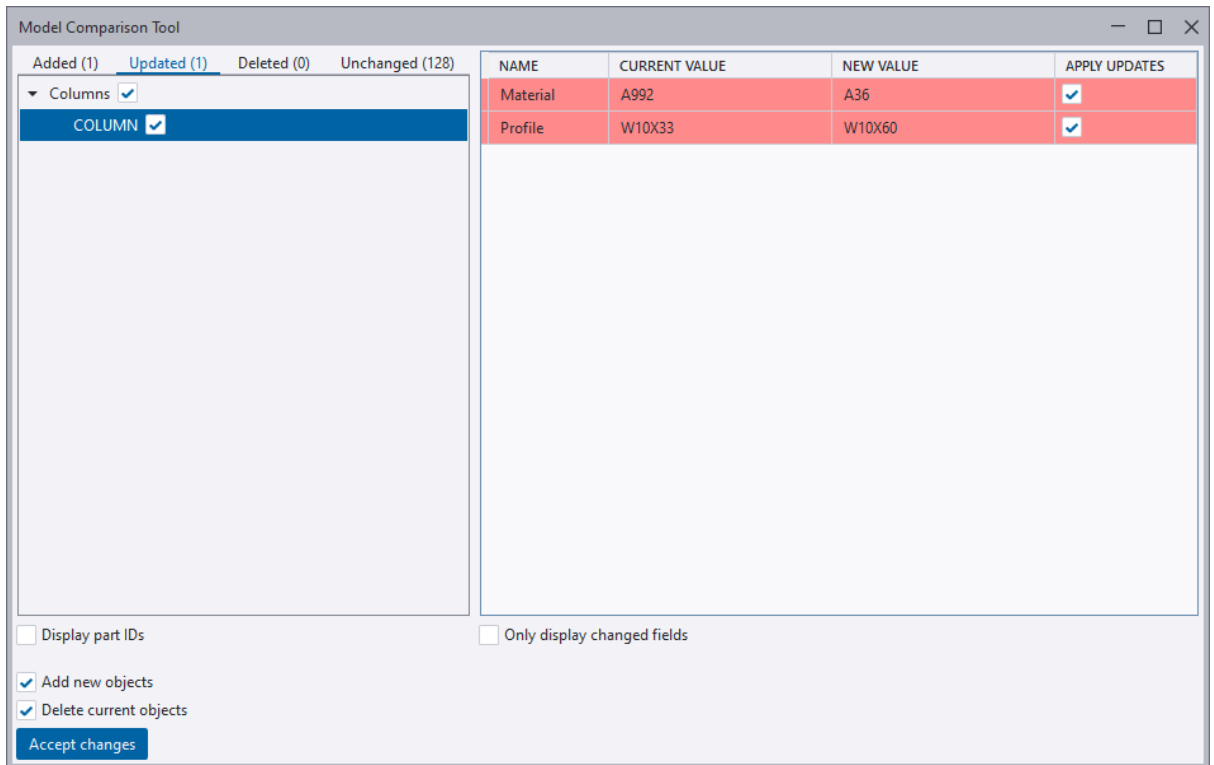
Using this command will launch the Tekla Structural Designer Import, this part of the process will run exactly as described in sections 4.4 and 4.5. Reference should be made to these sections. However, as also mentioned in section 4.8.2, the **Show model comparison tool** option should be enabled.



5.5.4 Model comparison tool

The process of using the Model comparison tool is almost identical to as described in section 4.8.3 and the associated subsections, however there are two differences with the dialog:

- **Updated tab**
 - Only data related to Material and Profile are displayed. All other alterations made to the part are ignored.



- **Deleted tab**
 - As parts cannot be deleted using the Get results command, no parts will ever be displayed on the Deleted tab. All parts flagged as being deleted within Tekla Structural Designer will be retained and listed under the Unchanged tab.

6.0 Managing the conversion process

6.1 Overview

This section covers the mapping of content between Tekla Structural Designer and Tekla Structures. It is split into three distinct categories:

- Profiles
- Material
- Rebar grades

As Tekla Structural Designer designs to specific section sizes, it is important to ensure that all content is recognized during the integration process.

The conversion process checks that all sections and grades used in the Tekla Structural Designer model have an equivalent profile or material within the Tekla Structures model - and vice-versa.

Depending on the Tekla Structural Designer region settings and the Tekla Structures environments used in the modeling process, the Conversion process may be automated and no manual intervention is required.

6.2 Preview Conversion

We would strongly recommend that the three buttons relating to checking conversions are utilized for all import and export processes. These are:

- Preview profile conversion
- Preview material conversion
- Preview rebar grade conversion*
 - *Please note that the Preview rebar grade conversion command cannot be used if a CXL file has been selected. Rebar can only be imported by choosing a TSMD format file.

▼ **Conversions**

These conversion files will be used in addition to the standard conversions.
Any duplicates will use the value specified below.

Profile conversion file ...

IMPORT NAME	TEKLA STRUCTURES NAME

Preview profile conversion

Material conversion file ...

IMPORT NAME	TEKLA STRUCTURES NAME

Preview material conversion

Rebar conversion file ...

IMPORT NAME	TEKLA STRUCTURES NAME

Preview rebar grade conversion

If conversion problems are not resolved, the following issues may arise during the import process :

6.2.1 Unrecognized Profiles

- Into Tekla Structures:
 - No part will be created during the import process.
- Into Tekla Structural Designer:
 - The part will be imported as an Analysis Element. Manual amendment will then be required to change this into a recognized section type along with manual amendment to the member section, alignment and material grade settings.

6.2.2 Unrecognized Material

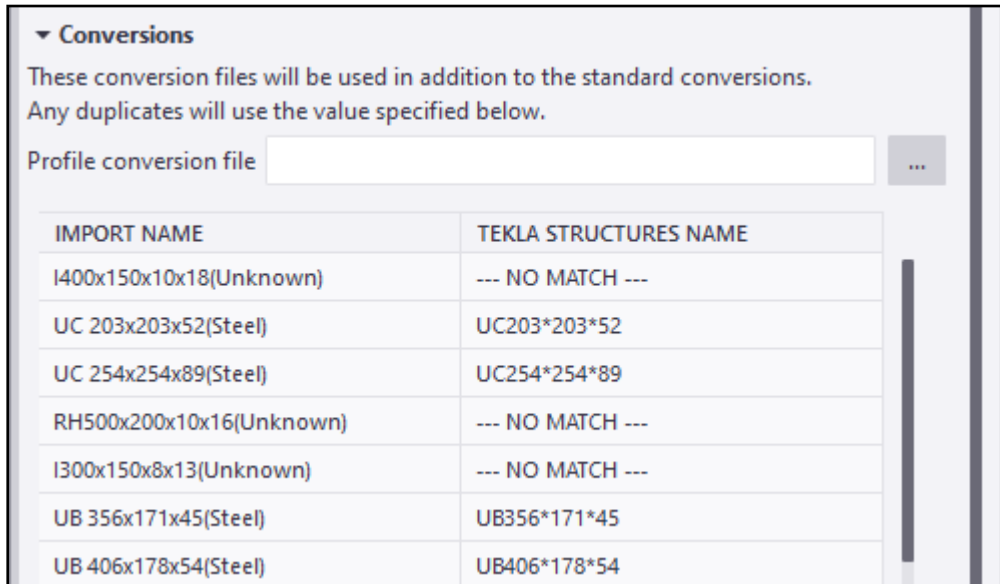
- Into Tekla Structures:
 - A part will be created but material grade highlighted as an error. This will require manual correction on the affected parts.
- Into Tekla Structural Designer:
 - The material will be isolated during the import phase. The user will need to stipulate a recognized material type and grade before the import can be completed.

6.2.3 Unrecognized Rebar Grades

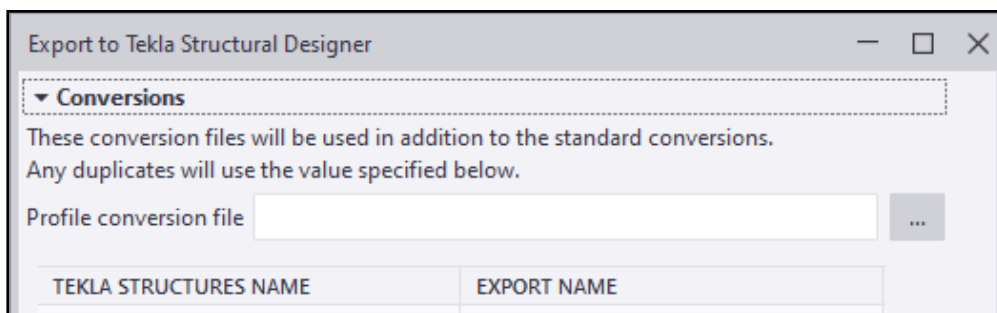
- Into Tekla Structures:
 - Rebar is created using the bar diameters held in the TSMD file. However as the grade cannot be determined, the bending radii and lapping lengths are created to a default value and will need to be manually adjusted.
 - If no equivalent rebar sizes are available, no rebar of that size will be imported.
- Into Tekla Structural Designer:
 - Not applicable. Transfer of Rebar is a one way process from Tekla Structural Designer into Tekla Structures only.

6.3 Correcting Profile Conversion

After clicking on the Preview Profile Conversion command, you will be faced with the graphical results of the process. This is split with the Tekla Structural Designer profile name on the left and the corresponding Tekla Structures name on the right.



Please note that for export processes, the Tekla Structures profile will be listed on the left and the Tekla Structural Designer name on the right. In both dialogs though, the missing conversions can be identified from the entries on the right hand column.



Entries where no conversion can take place will be marked as **--- NO MATCH ---**. The user will then need to identify the profiles which are not recognized and create a Profile Conversion file. This file should provide a recognized conversion for each of the unmatched profiles.

6.3.1 Creating a Profile Conversion file - Using .cxl format neutral

Depending on whether .cxl format neutral files or .tsmd format model files have been used for the transfer process, the format of the conversion file will differ slightly.

The main difference is the requirement of a section code in conversion files used with .cxl format neutral files.

This section covers the creation of profile conversion files when used in conjunction with .cxl format neutral files. Please refer to section 6.3.2 when using .tsmd format model files for the integration process.

- If the integration process is being run from Tekla Structural Designer to Tekla Structures and the file being integrated is a .cxl format neutral file, .cxl format conversion files must be used (see section 6.3.1).
- If the integration process is being run from Tekla Structural Designer to Tekla Structures and the file being integrated is a .tsmd format model file, .tsmd format conversion files must be used (see section 6.3.2).
- If the integration process is being run from Tekla Structures to Tekla Structural Designer and the file being integrated is a .cxl format neutral file, .cxl format conversion files must be used (see section 6.3.1).
- If the integration process is being run from Tekla Structures to Tekla Structural Designer and the file being integrated is a .tsmd format model file, .cxl format conversion files must be used (see section 6.3.1).
 - Please note that no matter what format is being transferred from Tekla Structures to Tekla Structural Designer, .cxl format conversion files must be used.

A profile conversion file can be created from a blank session of any text editor such as Notepad or Wordpad. The file simply needs to list each profile on a separate line within the file.

Each line is written in a specific format :

<TSD Export Name>#<TSD Section Code>=<TS Name>

<TSD Export Name> is the profile name contained within the Tekla Structural Designer file. Please note that the format of the profile may not be the same as the name displayed within Tekla Structural Designer itself. A file of example profile name formats is shown in **Appendix 1** of this document.

<TSD Section Code> is a 5 character code written into the Tekla Structural Designer model for all section ranges. This allows the program to differentiate sections from different regions where profile names may be duplicated but the section and mechanical properties differ. A full list of Section Codes can be found in **Appendix 1** of this document.

<TS Name> is the profile name held within Tekla Structures. A full list of profile names can be found by selecting **File** → **Catalogs** → **Profile Catalog** within the Tekla Structures software.

An example line within the conversion file could read...

- W 18x76#10101=W18X76

...and a completed file may look as follows :

```
HD 400x900#00423=HD400*900
HD 400x990#00423=HD400*990
HD 400x1086#00423=HD400*1086
HD 400x1202#00423=HD400*1202
HD 400x1299#00423=HD400*1299
CHS 114.3x3.2#00409=HFCHS114.3*3.2
CHS 114.3x4.0#00409=HFCHS114.3*4.0
CHS 114.3x5.0#00409=HFCHS114.3*5.0
CHS 114.3x6.0#00409=HFCHS114.3*6.0
CHS 114.3x6.3#00409=HFCHS114.3*6.3
CHS 139.7x10.0#00409=HFCHS139.7*10.0
```

Once all of the entries have been completed, save the file and then change the extension to be **.cnv**. The file is then available for selection during the Profile Conversion phase by using the Profile conversion file entry.

6.3.2 Creating a Profile Conversion file - Using .tsmd format model files

This section covers the creation of profile conversion files when used in conjunction with **.tsmd** format model files. Please refer to section 6.3.1 when using **.cxl** format neutral files for the integration process.

- The main difference between conversion files is the replacement of the **TSD Section Code** with the **TSD Group Name**. The **TSD Group Name** is a short description of the section profile and is required due to the API requirements within Tekla Structural Designer.
- The second amendment is the replacement of the **TSD Export Name** with the **TSD Section Name**.
- Apart from these two changes, the two file formats are similar.

A profile conversion file can be created from a blank session of any text editor such as Notepad or Wordpad. The file simply needs to list each profile on a separate line within the file.

Each line is written in a specific format :

<TSD Section Name>#<TSD Group Name>=<TS Name>

<TSD Section Name> is the section name held within Tekla Structural Designer itself. The names can be obtained directly from the Tekla Structural Designer model. However, a list of example section names formats is shown in **Appendix 2** of this document.

<**TSD Group Name**> is a multi-character description written into the Tekla Structural Designer model for all section ranges. This allows the API within Tekla Structural Designer to correctly and efficiently differentiate sections and regions.

A full list of **TSD Group Names** can be found in **Appendix 2** of this document.

<**TS Name**> is the profile name held within Tekla Structures. A full list of profile names can be found by selecting **File** → **Catalogs** → **Profile Catalog** within the Tekla Structures software.

Example lines within the conversion file could read:

- WB 700x115#AustralianSteelSectionsWeldedBeams=WB 700*115
- WC 350x197#AustralianSteelSectionsWeldedColumns=WC 350*197

or...

- UPN 80#EuropeanSteelSectionsEuropeanStandardChannels=UNP80
- UPN 100#EuropeanSteelSectionsEuropeanStandardChannels=UNP100
- UPN 120#EuropeanSteelSectionsEuropeanStandardChannels=UNP120
- UPN 140#EuropeanSteelSectionsEuropeanStandardChannels=UNP140
- UPN 160#EuropeanSteelSectionsEuropeanStandardChannels=UNP160
- UPN 180#EuropeanSteelSectionsEuropeanStandardChannels=UNP180
- UPN 200#EuropeanSteelSectionsEuropeanStandardChannels=UNP200
- UPN 220#EuropeanSteelSectionsEuropeanStandardChannels=UNP220
- UPN 240#EuropeanSteelSectionsEuropeanStandardChannels=UNP240
- UPN 260#EuropeanSteelSectionsEuropeanStandardChannels=UNP260
- UPN 280#EuropeanSteelSectionsEuropeanStandardChannels=UNP280
- UPN 300#EuropeanSteelSectionsEuropeanStandardChannels=UNP300
- UPN 320#EuropeanSteelSectionsEuropeanStandardChannels=UNP320
- UPN 350#EuropeanSteelSectionsEuropeanStandardChannels=UNP350
- UPN 380#EuropeanSteelSectionsEuropeanStandardChannels=UNP380
- UPN 400#EuropeanSteelSectionsEuropeanStandardChannels=UNP400

Once all of the entries have been completed, save the file and then change the extension to be '**.cnv**'. The file is then available for selection during the Profile Conversion phase by using the Profile conversion file entry.

6.3.3 Conversion of twin profiles

It may be noted that twin profiles such as double unequal angles are modeled differently in the separate software packages. In Tekla Structures, double angles are modeled using two separate parts whilst in Tekla Structural Designer double angles are modeled as a single element which specifies the joined legs and the gap distance.

Due to these differences, the format of the conversion file entry follows an alternative format :

<TSD Export Name>x<TSD Specified Gap>#<TSD Section Code>=<TS Name>:<TS Gap>(<TS Join Leg>)

<TSD Specified Gap> can be found in the Profile Conversion result line. Double section profiles in Tekla Structural Designer work on specific gap distances which are listed as part of the section profile name. Please note that this can be written as either millimeters or decimal inches.

<TS Gap> is the equivalent distance to suit the **<TSD Specified Gap>** value.

- Note : This entry **MUST** be written in millimeters.

<TS Join Leg> is only used for double unequal angle profiles. This should either be **LL** for double angle profiles joined on the longer leg and **SL** for angles joined on the shorter leg.

Therefore some examples of double angle conversion would be as follows:

- Double equal angle
 - 2L 3x3x0.4375x0.375#10114=L3X3X7/16:9.525
- Double unequal angle joined on long leg
 - 2L 4x3x0.25x0#10115=L4X3X1/4:0(LL)
- Double unequal angle joined on short leg
 - 2L 2.5x3.5x0.3125x0.75#10116=L3-1/2X2-1/2X5/16:19.05(SL)

Please note that the conversion of twin profiles is only supported on import processes from Tekla Structural Designer into Tekla Structures. Twin profiles cannot be returned back to Tekla Structural Designer from Tekla Structures.

6.3.4 Conversion of parametric profiles

Some profiles are automatically converted and don't require entries to be written to the profile conversion file. These profiles are :

TSD Parametric Profiles	TS Profile Shape	TS Profile Subtype
Concrete Circular Column	Circular - D	d
Concrete C-section Column	C Profiles - C	h*b*t
Concrete Elbow Column	Folded Plates - FLDPL	FLDPL.Foldplate h*b-c-a
Concrete I-section Column ¹	I profiles (concrete) - II	Conc.IBeam h*b*t1-s-b2*t2[-sft[-sfb]]
Concrete L-section Column	L-profiles - L	h*b*t
Concrete Parallelogram Column	Irregular profiles = REC_I	Beton.GSD_FugeC a-b*h
Concrete Polygon (3 sided) Column	Irregular profiles - TRI_B	Beton.GSD_FugeA a1
Concrete Polygon (Default 6 sided) Column	Variable profiles - HXGON	1Gen.Hexagon b[-tpr]
Concrete Polygon (8 sided) Column	Variable profiles - OCTGON	1Gen.Octagon b-b2
Concrete T-section Column ¹	T profiles (concrete) - TC	CS_rect1.tc h-b-t-s[-rv[-rh]]
Concrete Trapezium Column	Irregular profiles - REC_C	CS.concr1.TRPB h-b-b1[-s]
Precast and RC Rectangular Section	Plate profiles	h*b
Precast L-section Beam	L-profiles - L	h*b*t
Precast Inverted L-section Beam	L-profiles - L	h*b*t
Precast T-section Beam ¹	T profiles (concrete) - TC	CS_rect1.tc h-b-t-s[-rv[-rh]]
Steel Plated Beam	I Profiles - HI	h-s-t1*b1-t2*b2
Steel Plated Column	I Profiles - HI	h-s-t1*b1-t2*b2
Steel Fabsec Beam	I Profiles - FABA	h-s-t1*b1-t2*b2
Westok Plated Beam	I Profiles - WPB	h-s-t1*b1-t2*b2
Westok Cellular Beam ²	I profiles - WESTOK	1Gen.Westok h-b1-s1-t1*h2-b2-s2-t2

¹ For round tripping purposes no chamfer or slope factor values can be entered. Please leave these at values of 0 to ensure successful interoperability.

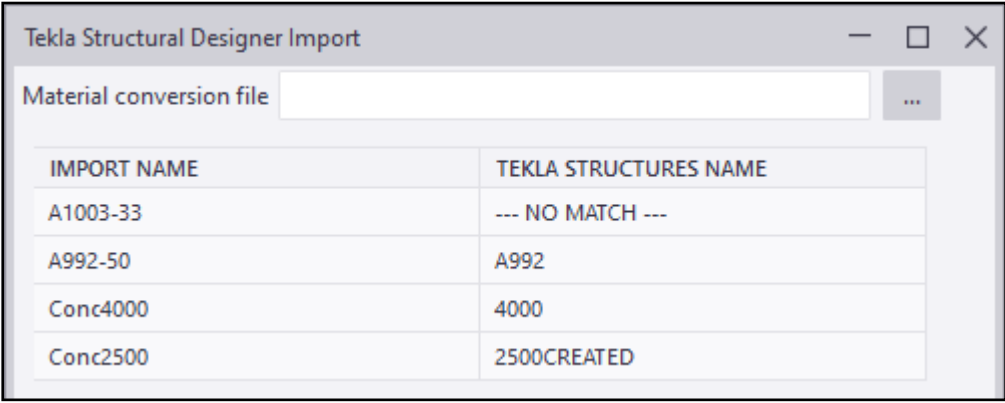
² With the exception of the Westok Cellular section (see a separate entry dealing with Westok cellular beams), all of the Tekla Structures profile shapes and subtypes listed above also return the information correctly to Tekla Structural Designer without the need of manually created conversion files.

6.4 Correcting Material Conversion

After clicking on the Preview Profile Conversion command, you will be faced with the graphical results of the process. This is split with the Tekla Structural Designer material name on the left and the corresponding Tekla Structures name on the right.

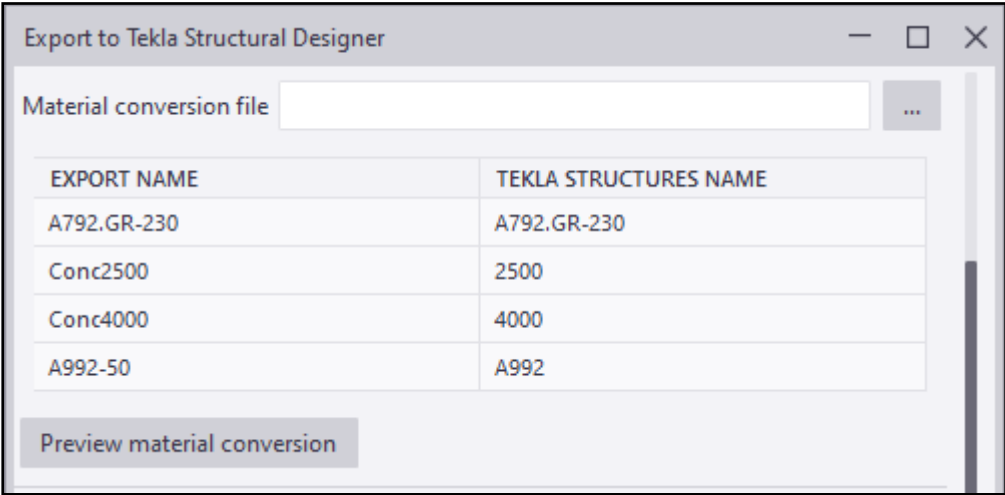
Unmatched material can be determined by viewing the entries under the **TEKLA STRUCTURES NAME** Column.

Please note that concrete material grades will be automatically generated by the import process. These can be found in the **File → Catalogs → Material catalog** dialog after the import process has been completed.



IMPORT NAME	TEKLA STRUCTURES NAME
A1003-33	--- NO MATCH ---
A992-50	A992
Conc4000	4000
Conc2500	2500CREATED

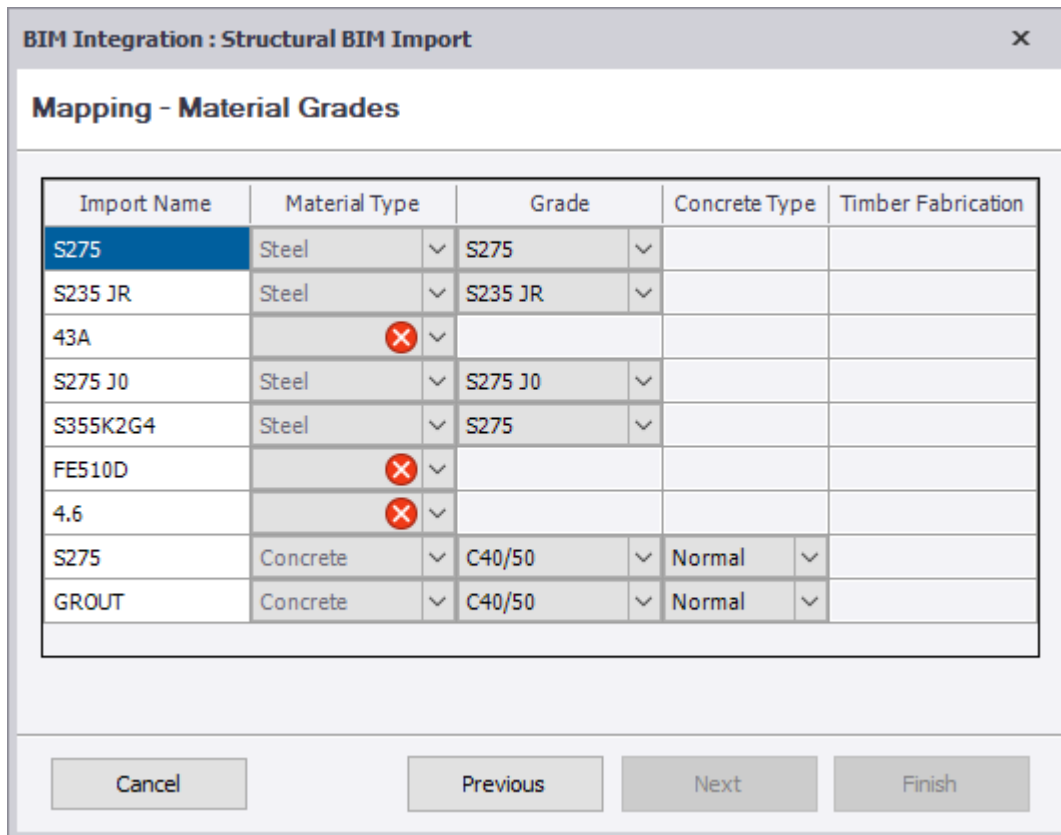
For export processes from Tekla Structures, please note that there is no conversion process as such. Material names will be directly written into the created files...



EXPORT NAME	TEKLA STRUCTURES NAME
A792.GR-230	A792.GR-230
Conc2500	2500
Conc4000	4000
A992-50	A992

Preview material conversion

...with any unrecognized material being identified during the import process in Tekla Structural Designer. The import process in Tekla Structural Designer will not complete until all material is mapped into recognized types and grades.



Please note that for export processes, the Tekla Structures profile will be listed on the left and the Tekla Structural Designer name on the right. In both dialogs though, the missing conversions can be identified from the entries on the right hand column.

Entries where no conversion can take place will be marked as **--- NO MATCH ---**. The user will then need to identify the profiles which are not recognized and create a Material Conversion file. This file should provide a recognized conversion for each of the unmatched profiles.

6.4.1 Creating a Material Conversion file

A profile conversion file can be created from a blank session of any text editor such as Notepad or Wordpad. The file simply needs to list each profile on a separate line within the file.

Each line is written in a specific format :

<TSD Material Name>=<TS Material Name>

<TSD Material Name> is the material name contained within the Tekla Structural Designer file. This will be displayed within the Material conversion preview.

<TS Material Name> is the material name held within Tekla Structures. A full list of material names can be found by selecting **File → Catalogs → Material catalog** within the Tekla Structures software.

An example line within the conversion file could read...

- LwConc3500=3500 LWT

Once all of the entries have been completed, save the file and then change the extension to be **.cnv**. The file is then available for selection during the Material Conversion phase by using the Material conversion file entry.

6.5 Correcting Rebar Grade Conversion

After clicking on the Review Rebar Grade Conversion command, you will be faced with the graphical results of the process. This is split with the Tekla Structural Designer rebar information in the left column and the corresponding Tekla Structures information on the right.

Each line is listed with the grade reference and then the bar size, separated with a space character.

IMPORT NAME	TEKLA STRUCTURES NAME
500 8	Undefined 8
500 20	Undefined 20
500 16	Undefined 16
500 25	Undefined 25
500 12	Undefined 12
500 32	Undefined 32

At this stage, the rebar diameter sizes will not be flagged as an error. However, please note that these sizes may not exist within the Rebar catalog held within the environment. If this is the case, the rebar will not be imported.

Available rebar grades and sizes within the Tekla Structures environment by accessing **File → Catalogs → Rebar catalog**.

6.5.1 Creating a Rebar Grade Conversion file

A rebar grade conversion file can be created from a blank session of any text editor such as Notepad or Wordpad. The file needs to be written to list the grade conversion first and then each affected bar size underneath indented with a tab character.

```
<TSD Grade Name>=<TS Grade Name>  
    <TSD Size1>=<TS Size1>  
    <TSD Size2>=<TS Size2>  
    <TSD Size3>=<TS Size3>
```

<TSD Grade Name> is the rebar grade name contained within the Tekla Structural Designer file. This will be displayed within the Rebar grade conversion preview.

<TS Grade Name> is the rebar grade name held within Tekla Structures. A full list of rebar grade names can be found by selecting **File → Catalogs → Rebar catalog** within the Tekla Structures software.

<TSD Size> is the rebar diameter related to the grade contained within the Tekla Structural Designer file. This will be displayed within the Rebar grade conversion preview.

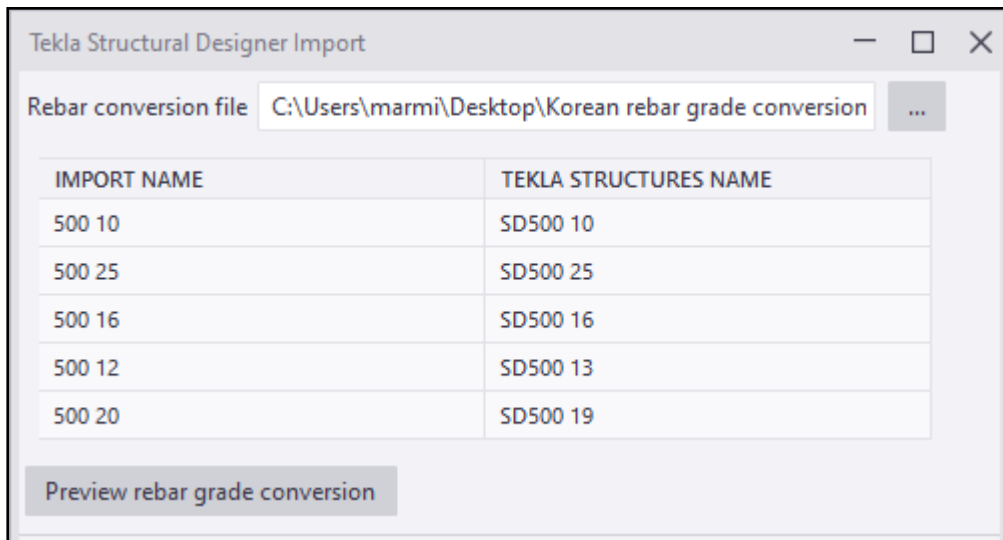
<TS Size> is the rebar diameter held within Tekla Structures. A full list of rebar diameters related to the grade can be found by selecting **File → Catalogs → Rebar catalog** within the Tekla Structures software.

Please note that size conversion is only required when there is no direct equivalent existing within the Tekla Structures Rebar catalog.

Therefore, a sample conversion file could read :

- 500=SD500
 12=13
 20=19

...and this would give the following results in the Rebar grade conversion :



The top line in the conversion file converts the Tekla Structural Designer grade of 500 to the Tekla Structures rebar grade SD500. The following lines convert the rebar sizes of 12mm and 20mm to 13mm and 19mm respectively.

Please note that lines converting the 10mm, 25mm and 16mm bars are not required as direct equivalent sizes exist in the Rebar catalog under the SD500 grade category (see following image).

	STAR	CODE	GRADE	SIZE	USAGE
★ Starred					
↳ 1860MPa	★	AIK	SD500	10	main
↳ La-SD300	★	AIK	SD500	10	tie/stirrup
↳ SD300	★	AIK	SD500	13	main
↳ SD350	★	AIK	SD500	13	tie/stirrup
↳ SD400	★	AIK	SD500	16	main
↳ SD500	★	AIK	SD500	16	tie/stirrup
↳ SD600	★	AIK	SD500	19	main
↳ SD700	★	AIK	SD500	19	tie/stirrup
↳ Undefined	★	AIK	SD500	22	main
↳ Undefined_strand	★	AIK	SD500	22	tie/stirrup
↳ WFP	★	AIK	SD500	25	tie/stirrup

Once all of the entries have been completed, save the file and then change the extension to be '.cnv'. The file is then available for selection during the Rebar Grade Conversion phase by using the Rebar grade conversion file entry.

Appendix 1 - Section Code References

(for use with .cxl format neutral file integration processes)

USA Imperial

Section Code	Catalog	TSD Example Name
10101	W & M	W 4x13 M 3x2.9
10103	S	S 3x5.7
10104	HP	HP 8x36
10105	Channels	C 3x3.5
10106	Misc Channels	MC 3x7.1
10107	Rectangular HSS	HSS 2x1x0.125
10107	Rectangular HSS A1085	A1085 HSS 2x1x0.1875
10108	Square HSS	HSS 16x16x0.625
10108	Square HSS A1085	A1085 HSS 2x2x0.1875
10109	Pipes	Pipe STD x1/2 Pipe XS x1-1/4 Pipe XXS x2-1/2
10110	WT, MT & ST	WT 2.5x8 MT 2x3 ST 1.5x2.85
10111	Round HSS	HSS 3.500x0.188
10111	Round HSS A1085	A1085 HSS 1.9x0.188
10112	Angles	L 2x2x0.125
10114	Double Angles (Equal)	2L 2x2x0.125x0.375
10115	Double Angles (long leg back to back)	2L 2.5x2x0.25x0.75
10116	Double Angles (short leg back to back)	2L 6x8x1x0
10117	Flats	Flat 0.125x1.5
10118	Bars	Bar 0.500x0.500
10119	Rods	Rod 0.5000
IBGJ	BG Joist Girder	120BG
IDLHJ	DLH Series Joists	72DLH19
IGJ	G Joist Girder	16G
IKCSJ	KCS Series Joists	30KCS5
IKJA	K Series Joists (angle)	10K1
IKJR	K Series Joists (rod)	30K12
ILHJ	LH Series Joists	18LH02

IVGJ	VG Joist Girder	120VG
10177	Standard Dressed Sawn Lumber	Dressed Sawn Lumber 5x5
10178	Western Species Glued Laminated Timber	Western Glulam 2.5x6
10179	Southern Pine Glued Laminated Timber	Southern Glulam 2.5x5.5
10180	Microllam LVL 2.0E	Microllam LVL 2.0E 1.75x7.5
10181	Parallam PSL 1.8E	Parallam PSL 1.8E 3.5x3.5
10182	Parallam PSL 2.0E	Parallam PSL 2.0E 3.5x9.25
10183	TimberStrand LSL 1.3E	TimberStrand LSL 1.3E 3.5x3.5
10184	TimberStrand LSL 1.55E	TimberStrand LSL 1.55E 1.75x9.25
10185	West Fraser LVL 1.7E	West Fraser LVL 1.7E 1.75x5.5
10186	West Fraser LVL 1.8E	West Fraser LVL 1.8E 1.5x5.5
10187	West Fraser LVL 1.9E	West Fraser LVL 1.9E 1.75x5.5
10188	West Fraser LVL 2.0E	West Fraser LVL 2.0E 1.75x5.5

USA Metric

Section Code	Catalog	TSD Example Name
00101	W & M	W 100x19.3 M 100x4.3
00103	S	S 75x8.5
00104	HP	HP 200x53
00105	Channels	C 75x5.2
00106	Misc Channels	MC 75x10.6
00107	Rectangular HSS	HSS 50.8x25.4x3.2
00108	Square HSS	HSS 50.8x50.8x3.2
00109	Pipes	Pipe STD x13 Pipe XS x13 Pipe XXS x51
00110	WT, MT & ST	WT 50x9.65 MT 50x4.45 ST 37.5x4.25
00111	Round HSS	HSS 42.2x3.6
00112	Angles	L 51x51x3.2
00114	Double Angles (Equal)	2L 51x51x3.2x19
00115	Double Angles (long leg back to back)	2L 64x51x4.8x9
00116	Double Angles (short leg back to back)	2L 51x64x4.8x0
00117	Flats	Flat 3.2x38.1
00118	Bars	Bar 12.7x12.7
00119	Rods	Rod 81.0
00177	Standard Dressed Sawn Lumber	Dressed Sawn Lumber 25.4x76.2
00178	Western Species Glued Laminated Timber	Western Glulam 63.5x152.4
00179	Southern Pine Glued Laminated Timber	Southern Glulam 63.5x139.7
MBGJ	BG Joist Girder	120BG
MDLHJ	DLH Series Joists	72DLH19
MGJ	G Joist Girder	16G
MKCSJ	KCS Series Joists	30KCS5
MKJA	K Series Joists (angle)	10K1
MKJR	K Series Joists (rod)	30K12
MLHJ	LH Series Joists	18LH02
MVGJ	VG Joist Girder	120VG
00180	Microllam LVL 2.0E	Microllam LVL 2.0E 45x140
00181	Parallam PSL 1.8E	Parallam PSL 1.8E 89x89

00182	Parallam PSL 2.0E	Parallam PSL 2.0E 89x235
00183	TimberStrand LSL 1.3E	TimberStrand LSL 1.3E 89x89
00184	TimberStrand LSL 1.55E	TimberStrand LSL 1.55E 45x235
00185	West Fraser LVL 1.7E	West Fraser LVL 1.7E 45x140
00186	West Fraser LVL 1.8E	West Fraser LVL 1.8E 38x140
00187	West Fraser LVL 1.9E	West Fraser LVL 1.9E 45x140
00188	West Fraser LVL 2.0E	West Fraser LVL 2.0E 45x140

UK Metric

Section Code	Catalog	TSD Example Name
00601	Universal Beams	UB 127x76x13
00602	Universal Columns	UC 152x152x23
00603	Rolled Steel Joists	RSJ 76x76x13
00604	Asymmetric Beams	280 ASBx74
00605	Rolled Steel Channels	RSC 76x38x7
00606	Rolled Steel Channels (Parallel)	PFC 125x65x15
00607	Cold Formed RHS	RHS 40x20x2.0
00607	Rectangular Hollow Sections	RHS 50x30x2.5
00608	Cold Formed SHS	SHS 20x20x2.0
00608	Square Hollow Sections	SHS 20x20x2.0
00609	Cold Formed CHS	CHS 21.3x2.0
00609	Circular Hollow Sections	CHS 21.3x2.6
00610	Structural Tee from UB	STB 76x64x7
00611	Structural Tee from UC	STC 152x76x12
00612	Equal Angles	RSA 20x20x3
00613	Unequal Angles	RSA 30x20x3
00614	2 Equal Angles (back to back)	2xRSA 60x60x4
00615	2 Unequal Angles (long leg back to back)	2xRSA(LL) 60x30x5
00616	2 Unequal Angles (short leg back to back)	2xRSA(SL) 30x60x5
00617	Flat Bars	Flat 6x40
00621	UBP-Universal Bearing Pile	H Pile 203x203x45
00622	Strongbox 235 SHS	Strongbox 235 SHS 25x25x2.0
00623	Strongbox 235 RHS	Strongbox 235 RHS 50x25x2.0
00624	Strongbox 235 CHS	Strongbox 235 CHS 26.9x2.0
00630	Tegral Eaves Beams	EB 160x2.0x5
00631	Tegral Z Sections	Z/ 125x1.3
00632	Tegral Zeta Sections	1/ 125x1.3
00633	Tegral Zeta2 Sections	2/ 225x1.4
00634	Tegral C Sections	C 90x2.5
00635	Slimflor Fabricated Beams	152 SFB 23x15

00641	Cold Formed CHS	CF CHS 21.3x2.0
00642	Cold Formed RHS	CF RHS 40x20x2.0
00643	Cold Formed SHS	CF SHS 20x20x2.0
00645	Hybox 355 SHS	Hybox 355 SHS 25x25x2.0
00646	Hybox 355 RHS	Hybox 355 RHS 50x25x2.0
00647	Hybox 355 CHS	Hybox 355 CHS 26.9x2.0
00650	Steadmans Eaves Beams	E 200x1.6x-2
00652	Steadmans C Sections	C 140x1.4
00653	Steadmans Z Sections	Z 140x1.4
00657	Albion Sigma Sections	ASB 200x1.2
00658	Albion C Sections	C 125x1.5
00659	Albion Z Sections	Z 125x1.5
00660	Albion Eaves Beams	EB 200x1.8x0
00661	Metsec Z Sections	Z 142x1.3
00662	Metsec C Sections	C 142x1.3
00663	Metsec Eaves Beams	E 170x2.0x5
00664	Kingspan MultiBeam Sections	M 145x1.2
00665	Kingspan MultiChannel Sections	L 145x1.2
00666	Kingspan Eaves Beams	E 185x1.4x3
00667	Hi-Span C Sections	C 127x1.6
00669	Hi-Span Eaves Beams	E 170x2.0x0
00670	Hi-Span Z Sections	Z 156x1.4
00671	Sawn Softwood	2x38x75
00672	Planed all Round Softwood	(Constructional Timber) 33x72
00673	Regularised Softwood	36x72
00674	Surfaced Softwood	(North American Origin) 38x38
00675	Sawn Hardwood	38x75
00676	Surfaced Hardwood	(Constructional timber) 35x72
00677	Structural Sections UltraBeam Sections	C 145x1.2
00678	Structural Sections Eaves Beams	200x1.8x2
00679	Structural Sections UltraZed Sections	145x1.2
00680	Ayrshire Eaves Beams	EB 160x2.0x5
00681	Ayrshire Z Sections	Z/ 125x1.3

00682	Ayrshire Zeta Sections	1/ 125x1.3
00683	Ayrshire Zeta2 Sections	2/ 225x1.4
00684	Ayrshire Swage Beams	SB 220x1.2
00685	Ayrshire Steel Framing - C Sections	CS 70x1.2
00686	Ayrshire C Sections	C 90x2.5 C 100x2.0
00694	Advance UKB	UKB 127x76x13
00695	Advance UKC	UKC 152x152x23
00696	Advance UKPFC	UKPFC 430x100x64
00629	Glulam	Glulam 65x135
00636	Kerto-S LVL	Kerto-S LVL 39x200
00637	Parallam PSL 2.0E	Parallam PSL 2.0E 89x89
00638	TimberStrand LSL 1.3E	TimberStrand LSL 1.3E 89x89
00639	TimberStrand LSL 1.5E	TimberStrand LSL 1.5E 45x184
00640	Versa-Lam LVL	Versa-Lam LVL 45x140

European Metric

Section Code	Catalog	TSD Example Name
00405	European Standard Channels	UPN 80
00406	European Parallel Flange Channels	UAP 300
00407	European Rectangular Hollow Sections	Euro RHS 50x25x2.5
00408	European Square Hollow Sections	Euro SHS 20x20x2.0
00409	European Circular Hollow Sections	Euro CHS 21.3x2.3
00412	European Equal Angles	Euro A 20x20x3
00413	European Unequal Angles	Euro A 30x20x3
00414	European 2 Equal Angles (back to back)	Euro 2xA 60x60x5
00415	European 2 Unequal Angles (long leg back to back)	Euro 2xA(LL) 60x30x5
00416	European 2 Unequal Angles (short leg back to back)	Euro 2xA(SL) 30x60x5
00421	Parallel Faced Flange Beams	IPE 80 A IPE 200 O IPE 750 x 173
00422	Wide/Very Wide Flange Beams	HE 100 AA HE 1000 M HE 1000 x 393 HL 920 x 342
00423	Wide Flanged Columns	HD 260x54.1
00424	European Standard Beams	IPN 80

Singapore / Malaysia

Section Code	Catalog	TSD Example Name
00701	I Sections (Perwaja)	I 200x100x26
00702	H Sections (Perwaja)	H 150x150x31
00705	C Sections (Perwaja)	C 150x75x18
00712	A Sections (Perwaja)	A 125x125x10
00901	UB Sections (Continental)	I 100x50x9.3
00902	UC Sections (Continental)	I 100x100x14.8
00905	Rolled Steel Channels (Continental)	RSC 50x25x3.86
00906	Rolled Steel Channels (Parallel) (Continental)	PFC 100x50x10.2
00907	Rectangular Hollow Sections (Continental)	RHS 50x25x2.5
00908	Square Hollow Sections (Continental)	SHS 20x20x2.0
00909	Circular Hollow Sections (Continental)	CHS 21.3x2.3
00910	Structural Tee from metric UB (Continental)	STB 75x75x7
00911	Structural Tee from metric UC (Continental)	STC 50x100x8.5
00912	Equal Angles (Continental)	RSA 20x20x3.0
00913	Unequal Angles (Continental)	RSA 63x38x4.5
00917	Flat Bars (Continental)	Flat 3.0x12
00918	Bars (Continental)	Bar 9x9
00919	Rods (Continental)	Rod 6
10910	Structural Tee from imperial UB (Continental)	STB 75x75x7
10911	Structural Tee from imperial UC (Continental)	STC 50x100x8.5

Australian Metric

Section Code	Catalog	TSD Example Name
00201	Universal Beams	UB 150x14
00202	Universal Columns	UC 100x14.8
00203	Tapered Flange Beams	TFB 100
00205	Taper Flange Channels	TFC 75
00206	Parallel Flange Channels	PFC 75
00207	Rectangular Hollow Sections C350	RHS 50x20x1.6
00208	Square Hollow Sections C350	SHS 13x13x1.8
00209	Circular Hollow Sections C250	CHS 13.5x2.3
00210	Tee from Universal Beams	BT 75x7.0
00211	Tee from Universal Columns	CT 50x7.4
00212	Equal Angles	EA 25x25x3
00213	Unequal Angles	UA 65x50x5
00214	2 Equal Angles (back to back)	2xEA 55x55x5
00215	2 Unequal Angles (long leg back to back)	2xUEA(LL) 65x50x5
00216	2 Unequal Angles (short leg back to back)	2xUEA(SL) 50x65x5
00217	Flat Bars	Flat 3x16
00241	Circular Hollow Sections C350	CHS 21.3x2
00242	Rectangular Hollow Sections C450	RHS 50x20x1.6
00243	Square Hollow Sections C450	SHS 13x13x1.8
00251	Welded Beams	WB 700x115
00252	Welded Columns	WC 350x197
00260	Bluescope Lysaght Eaves Beams	FP 230x19x-6
00261	Bluescope Lysaght Z Sections	Z 100x10
00262	Bluescope Lysaght C Sections	C 100x10

South Africa Metric

Section Code	Catalog	TSD Example Name
01001	Universal Beams	UB 203x133x25
01002	Universal Columns	UC 152x152x23
01005	Channels (Taper Flange)	TFC 76x38
01006	Channels (Parallel Flange)	PFC 100x50
01007	Rectangular Hollow Sections	RHS 50x25x2.5
01008	Square Hollow Sections	SHS 38x38x2.5
01009	Circular Hollow Sections	CHS 48.4x2.5
01012	Equal Angles	RSA 25x25x3
01013	Unequal Angles	RSA 65x50x6
01014	2 Equal Angles (back to back)	2xRSA 60x60x4
01015	2 Unequal Angles (long leg back to back)	2xRSA(LL) 65x50x6
01016	2 Unequal Angles (short leg back to back)	2xRSA(SL) 50x65x6
01021	Parallel Flange Beams	IPE 100

Indian Metric

Section Code	Catalog	TSD Example Name
01101	ISMB Sections	MB 100
01102	ISJB Sections	JB 150
01103	ISLB Sections	LB 75
01104	ISWB Sections	WB 600x134
01105	ISSC Sections	SC 100
01106	ISHB Sections	HB 150+x30.6
01107	ISMC Sections	MC 250+x34.2
01108	ISJC Sections	JC 100
01109	ISLC Sections	LC 75
01110	ISMCP (Parallel)	MCP 75
01111	ISC (back to back)	2B LC 75x0
01112	ISC (face to face)	2 F to F LC 75
01113	IS Tee Bar	HT 75
01114	Rectangular Hollow Sections	RHS 50.0x25.0x2.9
01115	Square Hollow Sections	SHS 25.0x25.0x2.6
01116	Circular Hollow Sections	15L
01117	Equal Angles	ISA 20x20x3
01118	Unequal Angles	ISA 40x20x3
01119	2 Equal Angles (back to back)	2L 20x20x3x0
01120	2 Unequal Angles (long leg back to back)	2L 65x45x5x0
01121	2 Unequal Angles (short leg back to back)	2S 45x65x5x0
01122	ISMB and ISWB Sections with top and bottom flange plates	HB 150x27.1 TBFP

Canadian Metric

Section Code	Catalog	TSD Example Name
00301	W	W 100x19
00302	M	M 100x8.9
00303	S	S 75x8
00304	HP	HP 200x54
00305	Channels	C 75x5
00306	Misc Channels	MC 150x17.9
00307	Rectangular Tubes	HSS 51x25x3.2
00308	Square Tubes	HSS 38x38x3.2
00309	Pipes	HSS 48x3.2
00310	Tee from Wide Flange Shapes	WT 50x9.5
00312	Angles	L 19x19x3.2
00314	Double Angles (Equal)	2L 19x19x3.2x0
00315	Double Angles (Long leg back to back)	2L 51x38x3.2x20
00316	Double Angles (short leg back to back)	2L 38x51x3.2x8
00322	Super Light Beams	SLB 55x6.4
00321	Wide Flange Shapes	WWF 350x137
00311	WWT Shapes	WWT 175x68.5
00323	Rectangular ASTM Tubes	HA 51x25x3.2
00324	Square ASTM Tubes	HA 38x38x3.2
00325	ASTM Pipes	HA 48x3.2

Japanese Metric

Section Code	Catalog	TSD Example Name
00501	Universal Beams	UB 100x50x9.3
00502	Universal Columns	UC 100x100x17.2
00503	Rolled Steel Joists	RSJ 100x75x12.9
00505	Rolled Steel Channels	RSC 75x40x6.92
00507	Rect Hollow Sections	RHS 50x20x1.6
00508	Square Hollow Sections	SHS 40x40x1.6
00509	Circ Hollow Sections	CHS 21.7x2
00512	Equal Angles	EA 25x25x3
00513	Unequal Angles	UEA 90x75x9

Chinese Metric

Section Code	Catalog	TSD Example Name
00801	I Sections	I 148x100x21.4
00802	H Sections	H 100x100x17.2
00803	Joist Sections	I 100x68x11.26
00805	Channel Sections	C 50x37x5.44
00807	Rectangular Hollow Sections	RHS 50x30x2.5
00808	Square Hollow Sections	SHS 25x25x1.5
00812	Equal Angles	RSA 40x40x4
00813	Unequal Angles	RSA 63x40x5

Hyundai

Section Code	Catalog	TSD Example Name
01401	Hyundai M (Korean, Japanese '90 sections)	M 100x100x17.2
01402	Hyundai M (Japanese '94, '08 sections)	M 100x100x16.9
01403	Hyundai ASTM (US sections)	ASTM W 4x4x13
01404	Hyundai HE (European sections)	HE 100A
01405	Hyundai IPE (European sections)	IPE 120A
01406	Hyundai HD (European sections)	HD 260x68.2
01407	Hyundai HP (European sections)	HP 200x53.5
01408	Hyundai UB (BS sections)	BS UB 203x102x23
01409	Hyundai UC (BS sections)	BS UC 152x152x23
01410	Hyundai UBP (BS sections)	BS UBP 203x203x54
01411	Hyundai UB (AS/NZS sections)	AS/NZS UB 150x14
01412	Hyundai UC (AS/NZS sections)	AS/NZS UC 100x15
01413	Hyundai HP (Korean sections)	KS HP 200x200x56.2
01414	Hyundai ASTM HP (US sections)	ASTM HP 8x8x36
01415	Hyundai Junior Beams (Korean sections)	JB 150x75x9.01
01416	Hyundai I-Beams (Korean sections)	IB 100x75x12.9
01417	Hyundai Equal Angles (Korean and Japanese sections)	L 25x25x3
01418	Hyundai Equal Angles (European)	L 25x25x3
01419	Hyundai Unequal Angles (Korean and Japanese sections)	UA 100x75x7
01420	Hyundai Channels (Korean and Japanese sections)	CN 75x40x6.92
01421	Hyundai ASTM Channels (US sections)	ASTM C 8x11.5
01422	Hyundai Channels (European sections)	UPN 200
01423	Hyundai Parallel Flange Channels (Korean, BS and AS/NZ sections)	KS PFC 150x75

Nippon

Section Code	Catalog	TSD Example Name
01201	Nippon ASTM (USA sections)	ASTM W 6x6x15
01202	Nippon UB (BS sections)	BS UB 203x102x23
01203	Nippon UC (BS sections)	BS UC 152x152x23
01204	Nippon HE (European sections)	HE 320 x 71
01205	Nippon IPE (European sections)	IPE 400 x 56
01206	Nippon UB (JIS sections)	JIS UB 150x75x14
01207	Nippon UC (JIS sections)	JIS UC 100x100x17
01208	Nippon HC400/NSTWH	HC400/NSTWH 398x412x25x20
01209	Nippon UB (AS/NZS sections)	AS/NZS UB 150x14
01210	Nippon UC (AS/NZS sections)	AS/NZS UC 100x14.8
01211	Nippon KS (Korean sections)	KS 125x125x23.8
01212	Nippon NSHYPER Beam	HY400x200x9x12

Korean

Section Code	Catalog	TSD Example Name
1601	Korean Channel Sections	C 75x40x5x7
1602	Korean Circular Hollow Sections	PD 10.5x2.4
1603	Korean Equal Angles	L 25x25x3
1604	Korean H Sections	H 100x50x5x7
1605	Korean I Sections	I 100x75x5x8
1606	Korean LH Sections	LH 100x60x2.3x4.5
1607	Korean Square and Rectangular Hollow Sections	TS 75x45x4
1608	Korean T Sections	CT 97x150x6x9
1609	Korean Unequal Angles	L 100x75x7

Taiwan

Section Code	Catalog	TSD Example Name
01501	I Sections	I100x75x5x8
01502	RH Sections	RH100x50x5x7
01505	Channels	U75x40x5x7
01506	Parallel Flange Channels	HE 100A
01507	Tube (rectangular)	IPE 120A
01508	Tube (square)	HD 260x68.2
01509	Pipe (circular)	HP 200x53.5
01510	Structural Tee	BS UB 203x102x23
01512	Equal-Legged	BS UC 152x152x23
01513	Unequal-Legged	BS UBP 203x203x54
01514	DL (Equal-Legged)	AS/NZS UB 150x14
01515	DL (Unequal-Legged) (Long-side connected)	AS/NZS UC 100x15
01516	DL (Unequal-Legged) (Short-side connected)	KS HP 200x200x56.2
01551	BH Sections	ASTM HP 8x8x36

Thailand

Section Code	Catalog	TSD Example Name
01701	I Sections	I100x75x12.9
01702	H Sections	H100x100x17.2
01705	Channels	C125x65x13.4
01707	Rectangular Tubes	RHS75x40x3.0
01708	Square Tubes	SHS38x38x2.0
01709	Pipe Sections	Pipe60.5x3.0
01712	Equal Angles	Eq65x65x5

Appendix 2 - Group Name References

(for use with .tsmd format model file integration processes)

USA Imperial

TSD Group Name	TSD Section Name	TS Name
UsSteelSectionsUsAngles	L 2-1/2x1-1/2x3/16	L2-1/2X1-1/2X3/16
UsSteelSectionsUsChannels	C 10x15.3	C10X15.3
UsSteelSectionsUsDoubleAnglesEqual	2L 2x2x1/8x0	L2X2X1/8:0
UsSteelSectionsUsDoubleAnglesLongLegBackToBack	2L 2-1/2x2x3/16x0	L2-1/2X2X3/16:0(LL)
UsSteelSectionsUsDoubleAnglesShortLegBackToBack	2L 2x2-1/2x3/16x0	L2-1/2X2X3/16:0(SL)
UsSteelSectionsUsHp	HP 10x42	HP10X42
UsSteelSectionsUsMiscChannels	MC 10x22	MC10X22
UsSteelSectionsUsPipes	Pipe STD 1/2	PIPE1/2STD
UsSteelSectionsUsRectangularHss	HSS 10x2x1/8	HSS10X2X1/8
UsSteelSectionsUsRoundHss	HSS 1.66x0.140	HSS1.660X0.140
UsSteelSectionsUsS	S 10x25.4	S10X25.4
UsSteelSectionsUsSquareHss	HSS 10x10x3/16	HSS10X10X3/16
UsSteelSectionsUsWAndM	W 10x100	W10X100
UsSteelSectionsUsWtMtSt	WT 10.5x100.5	WT10.5X100.5
SteelJoistsDlhSeriesJoists	52DLH10 52DLH10SP	52DLH10 52DLH10
SteelJoistsKSeriesJoistsAngle	10K1	10K1
SteelJoistsKcsSeriesJoists	10KCS1	10KCS1
SteelJoistsLhSeriesJoists	18LH02	18LH02

USA Metric

TSD Group Name	TSD Section Name	TS Name
UsSteelSectionsSiAngles	L 102x102x11.1	L102X102X11.1
UsSteelSectionsSiChannels	C 100x10.8	C100X10.8
UsSteelSectionsSiDoubleAnglesEqual	2L 102x102x11.1x0	L102X102X11.1:0
UsSteelSectionsSiDoubleAnglesLongLegBackToBack	2L 102x76x12.7x0	L102X76X12.7:0(LL)
UsSteelSectionsSiDoubleAnglesShortLegBackToBack	2L 102x152x11.1x0	L152X102X11.1:0(SL)
UsSteelSectionsSiHp	HP 200x53	HP200X53
UsSteelSectionsSiMiscChannels	MC 75x10.6	MC75X10.6
UsSteelSectionsSiPipes	Pipe STD 15	PIPE15STD
UsSteelSectionsSiRectangularHss	HSS 101.6x50.8x3.2	HSS101.6X50.8X3.2
UsSteelSectionsSiRoundHss	HSS 101.6x3.2	HSS101.6X3.2
UsSteelSectionsSiS	S 100x11.5	S100X11.5
UsSteelSectionsSiSquareHss	HSS 101.6x101.6x3.2	HSS101.6X101.6X3.2
UsSteelSectionsSiWAndM	W 1000x222	W1000X222
UsSteelSectionsSiWtMtSt	ST 100x13.7	ST100X13.7

UK Metric

TSD Group Name	TSD Section Name	TS Name
UkColdFormedSectionsColdFormedChs	CF CHS 21.3x2.0	CF-CHS21.3*2.0
UkColdFormedSectionsColdFormedRhs	CF RHS 40x20x2.0	CF-RHS40*20*2.0
UkColdFormedSectionsColdFormedShs	CF SHS 20x20x2.0	CF-SHS20*20*2.0
UkColdRolledSectionsAlbionCSections	C 125x1.5	ALB-C12515
UkColdRolledSectionsAlbionEavesBeams	EB 200x1.8x0	ALB-EB20018+00
UkColdRolledSectionsAlbionSigmaSections	ASB 200x1.2	ALB-SIGMA-20012
UkColdRolledSectionsAlbionZSections	Z 125x1.5	ALB-ZED-12515
UkColdRolledSectionsAyrshireCSections	C 90x2.5	AYR-C9025
UkColdRolledSectionsAyrshireEavesBeams	EB 160x2.0x0	AYR-EB16020+00
UkColdRolledSectionsAyrshireSteelFramingCSections	CS 70x1.2	AYR-CS7012
UkColdRolledSectionsAyrshireSwageBeam	SB 220x1.2	AYR-SWAGE-SB22012
UkColdRolledSectionsAyrshireZSections	Z/ 125x1.3	AYR-ZED-12513
UkColdRolledSectionsAyrshireZeta2Sections	2/ 225x14	AYR-ZETAII-22514
UkColdRolledSectionsAyrshireZetaSections	1/ 125x1.3	AYR-ZETA-12513
UkColdRolledSectionsHiSpanCSections	C 127x1.5 C 156x1.3	HIS-MC12715 HIS- CC15613
UkColdRolledSectionsHiSpanEavesBeams	E 170x2.0x0	HIS-EB17020+00
UkColdRolledSectionsHiSpanZSections	Z 156x1.3	HIS-ZED-15613
UkColdRolledSectionsKingspanEavesBeams	E 185x1.4x-10	KINGSPAN-E185140-10
UkColdRolledSectionsKingspanMultiBeamSections	M 145x1.2	KINGSPAN-M145065120
UkColdRolledSectionsKingspanMultiChannelSections	L 145x1.2	KINGSPAN-L145070120
UkColdRolledSectionsMetsecCSections	C 142x1.3	MET-2-142C13
UkColdRolledSectionsMetsecEavesBeams	E 170x2.0x0	MET-2-EB170E20+0
UkColdRolledSectionsMetsecZSections	Z 142x1.3	MET-2-142Z13
UkColdRolledSectionsSteadmansCSections	C 300x3.0	STEAD-C-30030
UkColdRolledSectionsSteadmansEavesBeams	E 200x1.6x0	STEAD-EB20016+0
UkColdRolledSectionsSteadmansZSections	Z 140x1.4	STEAD-Z-14014
UkColdRolledSectionsStructuralSectionsEavesBeams	200x1.8x0	ULT-EBM-2009018+00
UkColdRolledSectionsStructuralSectionsUltraBeamSections	C 145x1.2	ULT-RBM-1456312
UkColdRolledSectionsStructuralSectionsUltraZedSections	145x1.2	ULT-ZED-145120
UkSteelSections2EqualAnglesBackToBack	2xRSA 100x100x10	RSA100*100*10:8
UkSteelSections2UnequalAnglesLongLegBackToBack	2xRSA(LL) 100x50x10	L100*50*10:8(LL)
UkSteelSections2UnequalAnglesShortLegBackToBack	2xRSA(SL) 50x100x10	L100*50*10:8(SL)
UkSteelSectionsAdvanceUkb	UKB 1016x305x222	UKB1016*305*222
UkSteelSectionsAdvanceUkc	UKC 356x368x129	UKC356*368*129
UkSteelSectionsAdvanceUkpf	UKPFC 100x50x10	UKPFC-100*50*10
UkSteelSectionsAsymmetricBeams	280 ASB 100	ASB280*100
UkSteelSectionsCircularHollowSections	CHS 21.3x2.6	CHS21.3*2.6
UkSteelSectionsEqualAngles	RSA 20x20x3	RSA20*20*3
UkSteelSectionsFlatBars	Flat 10x100	FLT100*10
UkSteelSectionsRectangularHollowSections	RHS 50x30x2.5	RHS50*30*2.5
UkSteelSectionsRolledSteelChannels	RSC 102x51x10	C102*51*10
UkSteelSectionsRolledSteelChannelsParallel	PFC 100x50x10	PFC-100*50*10

UkSteelSectionsRolledSteelJoists	RSJ 76x76x13	RSJ76*76*12.65
UkSteelSectionsSquareHollowSections	SHS 20x20x2.0	SHS20*20*2.0
UkSteelSectionsStructuralTeeFromUb	STB 76x64x7	TEE76*64*7
UkSteelSectionsStructuralTeeFromUc	STC 152x76x12	TEE152*76*12
UkSteelSectionsUnequalAngles	RSA 30x20x3	RSA30*20*3
UkSteelSectionsUniversalBeams	UB 1016x305x222	UB1016*305*222
UkSteelSectionsUniversalColumns	UC 152x152x23	UC152*152*23
UkTimberSectionsPlanedAllRoundSoftwood	(Constructional Timber) 33x72	72*33
UkTimberSectionsRegularisedSoftwood	36x72	72*36
UkTimberSectionsSawnHardwood	38x75	75*38
UkTimberSectionsSawnSoftwood	2x38x75	75*76
UkTimberSectionsSurfacedHardwood	(Constructional timber) 35x72	72*35
UkTimberSectionsSurfacedSoftwood	(North American Origin) 38x38	38*38

European Metric

TSD Group Name	TSD Section Name	TS Name
EuropeanSteelSectionsEuropean2EqualAnglesBackToBack	Euro 2xA 60x60x5	L60*5:8
EuropeanSteelSectionsEuropean2UnequalAnglesLongLegBackToBack	Euro 2xA(LL) 60x30x5	L60*30*5:8(LL)
EuropeanSteelSectionsEuropean2UnequalAnglesShortLegBackToBack	Euro 2xA(SL) 30x60x5	L60*30*5:8(SL)
EuropeanSteelSectionsEuropeanCircularHollowSections	Euro CHS 21.3x2.3	HFCHS21.3*2.3
EuropeanSteelSectionsEuropeanEqualAngles	Euro A 20x20x3	L20*3
EuropeanSteelSectionsEuropeanParallelFlangeChannels	UAP 80	UPE80
EuropeanSteelSectionsEuropeanRectangularHollowSections	Euro RHS 50x25x2.5	HFRHS50*25*2.5
EuropeanSteelSectionsEuropeanSquareHollowSections	Euro SHS 20x20x2.0	HFSHS20*20*2.0
EuropeanSteelSectionsEuropeanStandardBeams	IPN 80	INP80
EuropeanSteelSectionsEuropeanStandardChannels	UPN 80	UPN80
EuropeanSteelSectionsEuropeanUnequalAngles	Euro A 30x20x3	L30*20*3
EuropeanSteelSectionsParallelFacedFlangeBeams	IPE 80 AA	IPEAA80
EuropeanSteelSectionsWideFlangedColumns	HD 260x54.1	HD260*54,1
EuropeanSteelSectionsWideVeryWideFlangedBeams	HE 100 AA HL 920 x 342	HEAA100 HL920*342

Singapore / Malaysia

TSD Group Name	TSD Section Name	TS Name
PerwajaSteelSectionsASectionsPerwaja	A 125x125x10	A 125X125X10
PerwajaSteelSectionsBarsContinental	Bar 9x9	PLT9*9
PerwajaSteelSectionsCSectionsPerwaja	C 150x75x18	C 150X75X18
PerwajaSteelSectionsCircularHollowSectionsContinental	CHS 21.3x2.3	CHS 21.3X2.3
PerwajaSteelSectionsEqualAnglesContinental	RSA 20x20x3.0	RSA 20X20X3.0
PerwajaSteelSectionsFlatBarsContinental	Flat 3.0x12	PLT3.0*12
PerwajaSteelSectionsHSectionsPerwaja	H 150x150x31	H 150X150X31
PerwajaSteelSectionsISectionsPerwaja	I 200x100x26	I 200X100X26
PerwajaSteelSectionsRectangularHollowSectionsContinental	RHS 50x25x2.5	RHS 50X25X2.5
PerwajaSteelSectionsRodsContinental	Rod 6	ROD6
PerwajaSteelSectionsRolledSteelChannelsContinental	RSC 50x25x3.86	RSC 50X25X3.86
PerwajaSteelSectionsRolledSteelChannelsParallelContinental	PFC 100x50x10.2	PFC 100X50X10.2
PerwajaSteelSectionsSquareHollowSectionsContinental	SHS 20x20x2.0	SHS 20X20X2.0
PerwajaSteelSectionsStructuralTeeFromMetricUbContinental	STB 75x75x7	STB 75X75X7
PerwajaSteelSectionsStructuralTeeFromMetricUcContinental	STB 457x508x222	STB 457X508X222
PerwajaSteelSectionsUbSectionsContinental	I 100x50x9.3	I 100X50X9.3
PerwajaSteelSectionsUcSectionsContinental	I 100x100x14.8	I 100X100X14.8
PerwajaSteelSectionsUnequalAnglesContinental	RSA 63x38x4.5	RSA 63X38X4.5

Australian Metric

TSD Group Name	TSD Section Name	TS Name
AustralianColdRolledSectionsBluescopeLysaghtCSections	C 100x10	BS-C10010
AustralianColdRolledSectionsBluescopeLysaghtEavesBeams	FP 230x19x-6	BS-FP23019-6
AustralianColdRolledSectionsBluescopeLysaghtZSections	Z 100x10	BS-Z10010
AustralianHollowSteelSectionsCircularHollowSectionsC250	CF CHS 21.3x2.6	CHS21.3*2.6
AustralianHollowSteelSectionsCircularHollowSectionsC350	CF CHS 21.3x2	CHS21.3*2.0
AustralianHollowSteelSectionsRectangularHollowSectionsC350	CF RHS 50x20x1.6	RHS50*20*1.6
AustralianHollowSteelSectionsRectangularHollowSectionsC450	CF RHS 50x20x1.6	RHS50*20*1.6
AustralianHollowSteelSectionsSquareHollowSectionsC350	CF SHS 13x13x1.8	SHS13*13*1.8
AustralianHollowSteelSectionsSquareHollowSectionsC450	CF SHS 13x13x1.8	SHS13*13*1.8
AustralianSteelSections2EqualAnglesBackToBack	2xEA 55x55x5	EA55*55*5:8
AustralianSteelSections2UnequalAnglesLongLegBackToBack	2xUEA(LL) 65x50x5	UA65*50*5:8(LL)
AustralianSteelSections2UnequalAnglesShortLegBackToBack	2xUEA(SL)50x65x5	UA65*50*5:8(SL)
AustralianSteelSectionsEqualAngles	EA 25x25x3	EA25*25*3
AustralianSteelSectionsFlatBars	Flat 3x16	FLT3*16
AustralianSteelSectionsParallelFlangeChannels	PFC 75	PFC75*40
AustralianSteelSectionsTaperFlangeChannels	TFC 125	TFC125*65
AustralianSteelSectionsTaperedFlangeBeams	TFB 100	TFB100*7
AustralianSteelSectionsTeeFromUniversalBeams	BT 75x7.0	BT75*7
AustralianSteelSectionsTeeFromUniversalColumns	CT 50x7.4	CT50*7
AustralianSteelSectionsUnequalAngles	UA 65x50x5	UA65*50*5
AustralianSteelSectionsUniversalBeams	UB 150x14	
AustralianSteelSectionsUniversalColumns	UC 100x14.8	UC100*15

South Africa Metric

TSD Group Name	TSD Section Name	TS Name
SouthAfricanSteelSections2EqualAnglesBackToBack	2xRSA 60x60x4	L60*60*4:8
SouthAfricanSteelSectionsCircularHollowSections	CHS 60.3x2.5	CHS60.3*2.5
SouthAfricanSteelSectionsEqualAngles	RSA 25x25x3	L25*25*3
SouthAfricanSteelSectionsParallelFlangeBeams	IPE AA 100	IPEAA100
SouthAfricanSteelSectionsRectangularHollowSections	RHS 50x25x2.5	RHS50*25*2.5
SouthAfricanSteelSectionsSquareHollowSections	SHS 38x38x2.5	SHS38*38*2.5
SouthAfricanSteelSectionsUnequalAngles	RSA 65x50x6	L65*50*6
SouthAfricanSteelSectionsUniversalBeams	UB 203x133x25	UB203*133*25
SouthAfricanSteelSectionsUniversalColumns	UC 152x152x23	UC152*152*23

Indian Metric

TSD Group Name	TSD Section Name	TS Name
IndianStructuralSections2EqualAnglesBackToBack	2L 50x50x3x0	ISA50X50X3:0
IndianStructuralSections2UnequalAnglesLongLegBackToBack	2L 65x45x5x0	ISA65X45X5:0(LL)
IndianStructuralSections2UnequalAnglesShortLegBackToBack	2S 45x65x5x0	ISA65X45X5:0(SL)
IndianStructuralSectionsCircularHollowSections	15H	15H
IndianStructuralSectionsEqualAngles	ISA 20x20x3	ISA20X20X3
IndianStructuralSectionsIsTeeBar	HT 75	ISHT75
IndianStructuralSectionsIshbSections	HB 150	ISHB150
IndianStructuralSectionsIsjbSections	JB 150	ISJB150
IndianStructuralSectionsIsjcSections	JC 100	ISJC100
IndianStructuralSectionsIslbSections	LB 75	ISLB75
IndianStructuralSectionsIslcSections	LC 75	ISLC75
IndianStructuralSectionsIsmbSections	MB 100	ISMB100
IndianStructuralSectionsismcSections	MC 75	ISMC75
IndianStructuralSectionsismcpParallel	MCP 75	ISMCP75
IndianStructuralSectionsIsscSections	SC 100	ISSC100
IndianStructuralSectionsIswbSections	WB 150	ISWB150
IndianStructuralSectionsRectangularHollowSections	RHS 50.0x25.0x3.2	TSR50X25X3.2
IndianStructuralSectionsSquareHollowSections	SHS 25.0x25.0x2.6	TSS25X2.6
IndianStructuralSectionsUnequalAngles	ISA 70x45x5	ISA70X45X5

Canadian Metric

TSD Group Name	TSD Section Name	TS Name
CanadianSteelSectionsAngles	L 19x19x3.2	L19X19X3.2
CanadianSteelSectionsChannels	C 75x5	C75X5
CanadianSteelSectionsDoubleAnglesEqual	2L 19x19x3.2x0	L19X19X3.2:0
CanadianSteelSectionsDoubleAnglesLongLegBackToBack	2L 51x38x3.2x0	L51X38X3.2:0(LL)
CanadianSteelSectionsDoubleAnglesShortLegBackToBack	2L 38x51x3.2x0	L51X38X3.2:0(SL)
CanadianSteelSectionsHp	HP 200x54	HP200X54
CanadianSteelSectionsM	M 100x8.9	M100X8.9
CanadianSteelSectionsMiscChannels	MC 150x17.9	MC150X17.9
CanadianSteelSectionsPipes	HSS 48x3.2	HSS48X3.2
CanadianSteelSectionsRectangularTubes	HSS 51x25x3.2	HSS51X25X3.2
CanadianSteelSectionsS	S 75x8	S75X8.5
CanadianSteelSectionsSquareAstmTubes	HA 38x38x3.2	HSS38X38X3.2
CanadianSteelSectionsSquareTubes	HSS 64x64x3.2	HSS64X3.2
CanadianSteelSectionsW	W 100x19	W100X19.3

Japanese Metric

TSD Group Name	TSD Section Name	TS Name
JapaneseSteelSectionsCircularHollowSections	CHS 21.7x2	21.7*2
JapaneseSteelSectionsEqualAngles	EA 25x25x3	L25*25*3
JapaneseSteelSectionsRectangularHollowSections	RHS 50x20x1.6	STKR50*20*1.6
JapaneseSteelSectionsRolledSteelJoists	RSJ 100x75x12.9	I-100X75X5X8
JapaneseSteelSectionsSquareHollowSections	SHS 40x40x1.6	STKR40*40*1.6
JapaneseSteelSectionsUnequalAngles	UEA 90x75x9	L90*75*9
JapaneseSteelSectionsUniversalBeams	UB 100x50x9.3	H100*50*5*7
JapaneseSteelSectionsUniversalColumns	UC 100x100x17.2	H100*100*6*8

Chinese Metric

TSD Group Name	TSD Section Name	TS Name
ChineseSteelSectionsChannelSections	RSC 50x37x5.44	C5
ChineseSteelSectionsEqualAngles	RSA 40x40x4	L40*4
ChineseSteelSectionsHSections	H 100x100x17.2	H100*100*6*8
ChineseSteelSectionsISections	I 148x100x21.4	H148*100*6*9
ChineseSteelSectionsJoistSections	RSJ 100x68x11.26	I10
ChineseSteelSectionsRectangularHollowSections	RHS 50x30x2.5	F50X30X2.5
ChineseSteelSectionsSquareHollowSections	SHS 25x25x2.0	F25X25X2
ChineseSteelSectionsUnequalAngles	RSA 63x40x6	L63*40*6

Appendix 3 - List of created parameters

Analysis Result Parameters

Parameter Name	Description	Notes
TSD_AxialMax	Maximum Axial Force	Applicable to Bracing parts when analysis results imported
TSD_MajorMomentMax	Maximum Moment in Major Axis	Populated by Column parts when analysis results imported
TSD_MajorMomentMin	Minimum Moment in Major Axis	Populated by Column parts when analysis results imported
TSD_MajorShearMax	Maximum Shear in Major Axis	Populated by Column parts when analysis results imported
TSD_MajorShearMin	Minimum Shear in Major Axis	Populated by Column parts when analysis results imported
TSD_MinorMomentMax	Maximum Moment in Minor Axis	Populated by Column parts when analysis results imported
TSD_MinorMomentMin	Minimum Moment in Minor Axis	Populated by Column parts when analysis results imported
TSD_MinorShearMax	Maximum Shear in Minor Axis	Populated by Column parts when analysis results imported
TSD_MinorShearMin	Minimum Shear in Minor Axis	Populated by Column parts when analysis results imported
TSD_VShearMax	Maximum Vertical Shear	Populated by Column parts when analysis results imported
TSD_VShearMin	Minimum Vertical Shear	Populated by Column parts when analysis results imported
TSD_EndAxialMax	Maximum Positive Axial on Beam End	Populated by Beam parts without pinned ends when analysis results imported
TSD_EndAxialMaxNeg	Maximum Negative Axial on Beam End	Populated by Beam parts without pinned ends when analysis results imported

TSD_EndMomentMax	Maximum Positive Moment on Beam End	Populated by Beam parts without pinned ends when analysis results imported
TSD_EndMomentMaxNeg	Maximum Negative Moment on Beam End	Populated by Beam parts without pinned ends when analysis results imported
TSD_EndVShearMax	Maximum Positive Shear on Beam End	Populated by Beam parts when analysis results imported
TSD_EndVShearMaxNeg	Maximum Negative Shear on Beam End	Populated by Beam parts without pinned ends when analysis results imported
TSD_StartAxialMax	Maximum Positive Axial on Beam Start	Populated by Beam parts without pinned ends when analysis results imported
TSD_StartAxialMaxNeg	Maximum Negative Axial on Beam Start	Populated by Beam parts without pinned ends when analysis results imported
TSD_StartMomentMax	Maximum Positive Moment on Beam Start	Populated by Beam parts without pinned ends when analysis results imported
TSD_StartMomentMaxNeg	Maximum Negative Moment on Beam Start	Populated by Beam parts without pinned ends when analysis results imported
TSD_StartVShearMax	Maximum Positive Shear on Beam Start	Populated by Beam parts when analysis results imported
TSD_StartVShearMaxNeg	Maximum Negative Shear on Beam Start	Populated by Beam parts without pinned ends when analysis results imported
axial1	Maximum Negative Axial on part start	Populates the UDA Tension, Nc : Start
axial2	Maximum Negative Axial on part end	Populates the UDA Tension, Nc : End
axialcomp1	Maximum Positive Axial on part start	Populates the UDA Compression, Nc : Start

axialcomp2	Maximum Positive Axial on part end	Populates the UDA Compression, Nc : End
moment1	Maximum major axis moment on part start	Populates the UDA Moment, Mz (major) : Start
moment2	Maximum major axis moment on part end	Populates the UDA Moment, Mz (major) : End
momentY1	Maximum minor axis Moment on part start	Populates the UDA Moment, My (minor) : Start
momentY2	Maximum minor axis Moment on part end	Populates the UDA Moment, My (minor) : End
shear1	Maximum major axis Shear on part start	Populates the UDA Shear, Vy (major) : Start
shear2	Maximum major axis Shear on part end	Populates the UDA Shear, Vy (major) : End
shearZ1	Maximum minor axis Shear on part start	Populates the UDA Shear, Vz (minor) : Start
shearZ2	Maximum minor axis Shear on part end	Populates the UDA Shear, Vz (minor) : End
torsion1	Maximum Torsion on part start	Populates the UDA Torsion, Mx : Start
torsion2	Maximum Torsion on part end	Populates the UDA Torsion, Mx : End

Reinforced Concrete Specific Parameters

Parameter Name	Description	Notes
TSD_RC_BARS	Designed rebar requirement in column	Populated by Concrete Column parts
TSD_RC_BOTTOM	Designed rebar requirement in bottom of beam	Populated by Concrete Beam parts
TSD_RC_COVER	Designed rebar cover requirement	Populated by Concrete Column and Beam parts
TSD_RC_LINKS	Designed rebar link requirement	Populated by Concrete Column and Beam parts - TSD English UK language
TSD_RC_SIDE	Designed rebar requirement in side of beam	Populated by Concrete Beam parts where applicable.
TSD_RC_SPAN_LINKS	Designed rebar link requirement	Populated by Concrete Beam parts, only if option 'Separate Support and Span Regions' has been enabled - TSD English UK language
TSD_RC_SPAN_STIRRUPS	Designed rebar stirrup requirement	Populated by Concrete Beam parts, only if option 'Separate Support and Span Regions' has been enabled. TSD English US language
TSD_RC_STIRRUPS	Designed rebar stirrup requirement	Populated by Concrete Column and Beam parts - TSD English US language
TSD_RC_SUPP_LINKS	Designed rebar link requirement	Populated by Concrete Beam parts, only if option 'Separate Support and Span Regions' has been enabled - TSD English UK language
TSD_RC_SUPP_REGION	Description of the Support Region extents	Populated by Concrete Beam parts, only if option 'Separate Support and Span Regions' has been enabled.
TSD_RC_SUPP_STIRRUPS	Designed rebar stirrup requirement	Populated by Concrete Beam parts, only if option 'Separate Support and Span Regions' has been enabled. TSD English US language
TSD_RC_TOP	Designed rebar requirement in top of beam	Populated by Concrete Beam parts only

General Parameters

Parameter Name	Description	Notes
Camber	Precamber required for the beam	Populated for applicable Beam parts. Renamed from TSD_CAMBER
Class	Default settings are A,B or C	Populated from TSD User Defined Attribute
File	Path and filename string	Populated from TSD User Defined Attribute
Finish	User defined text content	Populated from TSD User Defined Attribute
Integration Status	Integration Status of Object	Populated by all objects - New / Updated / Unchanged settings available. Renamed from TSD_INTEGRATION_STATUS
Mark	Part mark assigned within TSD	Populated by all objects. Renamed from parameter TSD_PART_MARK
Name	User defined text content	Populated from TSD User Defined Attribute
Note	User defined text content	Populated from TSD User Defined Attribute
Number of Studs	Total number of studs carried by beam	Populated by composite beam parts. Renamed from TSD_TOTAL_STUDS
Phase	Default settings are 1, 2 or 3	Populated from TSD User Defined Attribute
Transverse Rebar	Transverse Reinforcement Requirements	Populated by compositely designed Beam parts only. Renamed from TSD_TRANS_REINF
TSD_CONCRETE_FILL	Is the part a concrete filled steel hollow section?	Populated when concrete filled hollow section columns are integrated - Yes/No answer
TSD_DECK_GAUGE	Steel decking profile gauge	Populated by Composite Slab parts
TSD_DECK_MANUF	Steel decking profile manufacturer	Populated by Composite Slab parts
TSD_DECK_REF	Steel decking profile name	Populated by Composite Slab parts
TSD_DESIGN_GRP	Design Group assigned in TSD	Populated by all objects when used in TSD
TSD_DETAIL_GRP	Detail Group assigned in TSD	Populated by Concrete Beam and Column parts

TSD_EMBODIED_CARBON	Represents the embodied carbon plus the associated object.	Populated by all objects
TSD_END_CONN	Connection type on end of member	Populated by Beam parts. Settings of Cantilever, Fixed, Moment, Pinned and Unknown
TSD_GUID	GUID reference assigned to the object within TSD	Populated by all objects
TSD Member Type	Part type within TSD. See Appendix 4 for all values.	Populated by all Beam, Column and Bracing parts. Renamed from parameter TSD_MBR_TYPE.
TSD_PROFILE_NAME	Profile name assigned in TSD	Populated by all parts
TSD Slab Type	Slab type within TSD. See Appendix 4 for all values.	Populated by all Slab parts. Renamed from parameter TSD_SLAB_TYPE.
TSD_SPAN_DIR	Slab span direction in degrees	Populated by slabs objects. Set as 0 deg for 2-way spanning slabs.
TSD_START_CONN	Connection type on start of member	Populated by Beam parts. Settings of Cantilever, Fixed, Moment, Pinned and Unknown
TSD Wall Type	Wall type within TSD. See Appendix 4 for all values.	Populated by all Wall parts. Renamed from parameter TSD_WALL_TYPE.

Appendix 4 - Object Types

Members (Parameter : TSD Member Type (TSD_MBR_TYPE))

Columns

Reference	Description
SIMPLE_COLUMN	Column with the simple design option checked
GENERAL_COLUMN	Column with the simple design option unchecked
GABLE_POST	Gable post member
PILE	Pile column member

Beams and Braces

Reference	Description
COMP_BEAM	Composite beam - No edge conditions set
EDGE_COMPOSITE_BEAM	Edge condition composite beam
INT_COMPOSITE_BEAM	Internal condition composite beam
GENERAL_BEAM	Beam member
BRACE	Bracing member
JOIST	USA Joist member
SB_CANTILEVER_A	Cantilevered beam; free at start end
SB_CANTILEVER_B	Cantilevered beam; free at finish end
GB_FREE_END_A	General beam; free at start end
GB_FREE_END_B	General beam; free at finish end
GB_FREE_BOTH_ENDS	Multi-span general beam member
WSTK_WESTOK	Ribbon cut Westok beam
WSTK_CANTILEVER_A	Cantilevered Westok member; free at start end
WSTK_CANTILEVER_B	Cantilevered Westok member; free at finish end
STEEL_JOIST	USA Joist member
ANALYSIS	Analysis element
EAVES_BEAM	Eaves beam member
RAIL	Sheeting rail member
PURLIN	Purlin member
TIE	Tie member

Truss members

Reference	Description
INT_TRUSS	Internal truss member
SIDE_TRUSS	Side truss member
TOP_TRUSS	Top chord of truss
BOT_TRUSS	Bottom chord of truss

Portal sections

- Portal sections are imported into Tekla Structures from Tekla Structural Designer. They cannot be exported from Tekla Structures into Tekla Structural Designer.

Reference	Description
PORTAL_COLUMN	Portal frame stanchion (Export from Tekla Structural Designer only)
PORTAL_RAFTER	Portal frame rafter (Export from Tekla Structural Designer only)
PORTAL_TIE	Portal frame tie member (Export from Tekla Structural Designer only)
PARAPET_POST	Portal frame parapet post (Export from Tekla Structural Designer only)

Slabs (Parameter: TSD Slab Type (TSD_SLAB_TYPE))

Reference	Description
OVERHANG	Slab with overhanging edge
RC_SLAB	Slab on beams (2 way spanning)
RC_SLAB_1WAY	Slab on beams (1 way spanning)
COMP_SLAB	Composite slab
FLAT_SLAB	Flat slab
CAST_SLAB	Precast slab
STEEL_DECK	Steel deck slab (2 way spanning)
STEEL_DECK_1WAY	Steel deck slab (1 way spanning)
TIMBER_DECK	Timber deck slab
AREA_PAD	Foundation mat with or without piles
STRIP_BASE	Isolated foundation under wall
PAD_BASE	Isolated foundation under column
PILE_CAP	Isolated foundation under column with piles
COLUMN_DROP	Column drop head panel

Walls (Parameter: TSD Wall Type (TSD_WALL_TYPE))

Reference	Description
MESHED	Reinforced concrete wall using mesh analysis method
MID_PIER	Reinforced concrete wall using mid-pier theory
SHEAR_ONLY	Shear Only Wall
GENERAL_WALL	Unreinforced general wall using mesh analysis method