



Profiles and Materials

Tekla Structures 11.0 Basic Training

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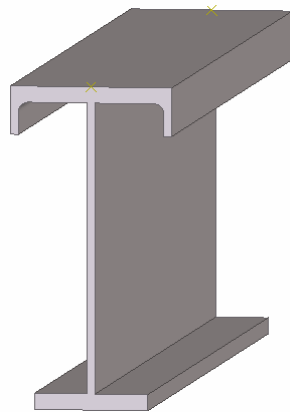
6

Profiles and Materials

In this lesson

This lesson explains how to view and modify the catalogs. You will learn how to create a new parametric profile with the sketching tool, how to add a profile to the library profiles and how to group library profiles with rules.

After updating the profile catalog we will use the new profile in the model to create the crane beams.



In this lesson you will also learn how to add a new material type and a new grade to the material catalog. We will use this new defined material for the silos in the model.

Introduction

Catalogs are databases containing detailed information about profiles, materials and bolts, which are available for use in your project. For example, the bolt catalog contains a library of standard bolts and bolt assemblies used in structural steelwork. Catalogs can also contain project or company-specific information. Catalogs can also be imported and exported.

See more in Tekla Structures [Help: System > Catalogs > Things you should know](#)

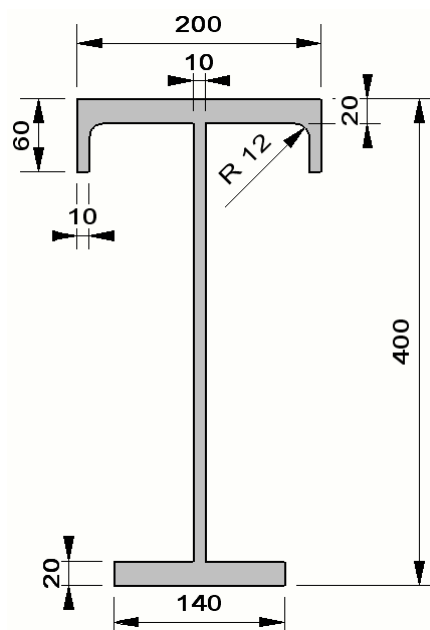
See more for profile import and export in Tekla Structures [Help: System > Catalogs > The profile catalog > Merging profile catalogs](#).

See more about material catalogs in Tekla Structures [Help: System > Catalogs > The material catalog](#).

6.1 Create Your Own Parametric Profile

In this exercise we will define a new cross section to be used for a crane beam.

We will create the crane beam as a parametric profile using the Tekla Structures cross section sketch editor.



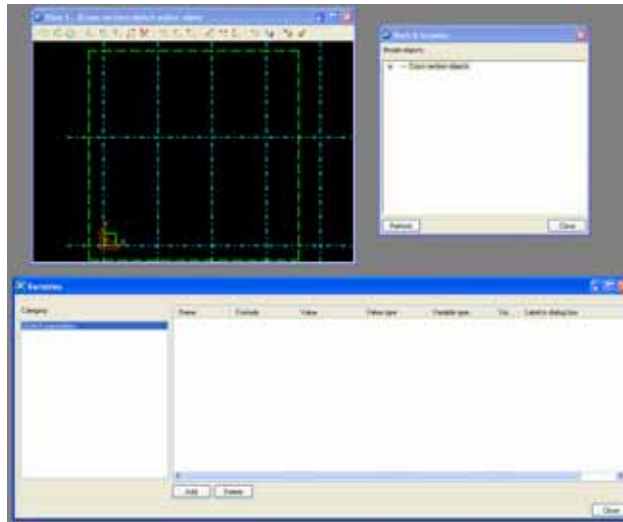
Sketch a cross section

We are going to open the Cross section sketch editor and then sketch a rough outline of the shape shown above. It doesn't matter if the lines are exactly horizontal or vertical, or if they touch at the ends. Neither the dimensions are important at this stage. We will connect the ends of the poly-line and force the lines to be horizontal or vertical later.

Open sketch editor

1. Select **Sketch parametric cross section** from **File > Catalog > Profiles > Sketch parametric cross section** to open the sketch editor.

The sketch editor opens showing the sketch editor view with toolbar, Variables dialog box and Sketch browser.

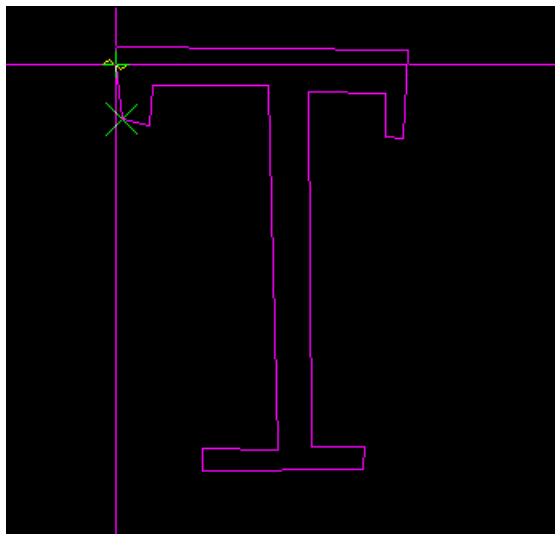


Sketch a cross section

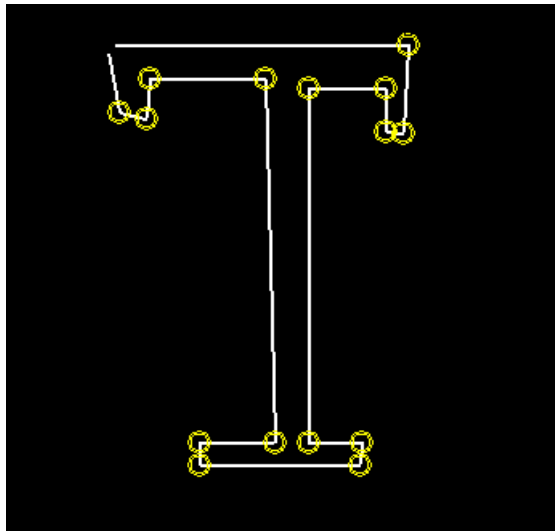
1. Click on the **Sketch polyline** icon.



2. Sketch the profile shown below and click the middle mouse button.



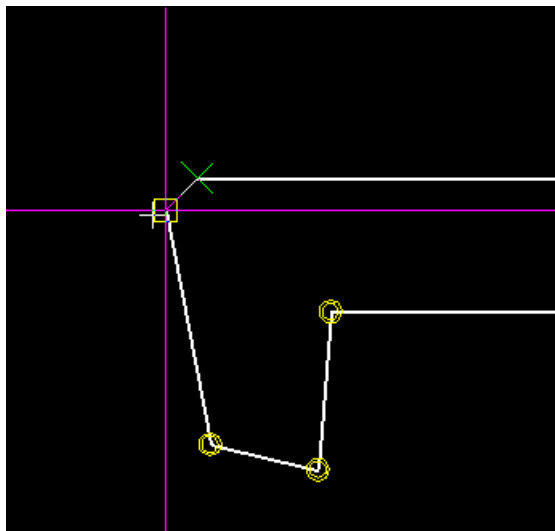
The yellow circles represent "chamfers" in the sketch editor.



3. Click on the **Coincident** constraint icon.



4. Pick the ends of the lines one by to connect the ends



Force the lines to horizontal / vertical

1. Click on the **Horizontal** constraint icon.



2. Select all the lines you want to be horizontal.
3. Click on the **Vertical** constraint icon.

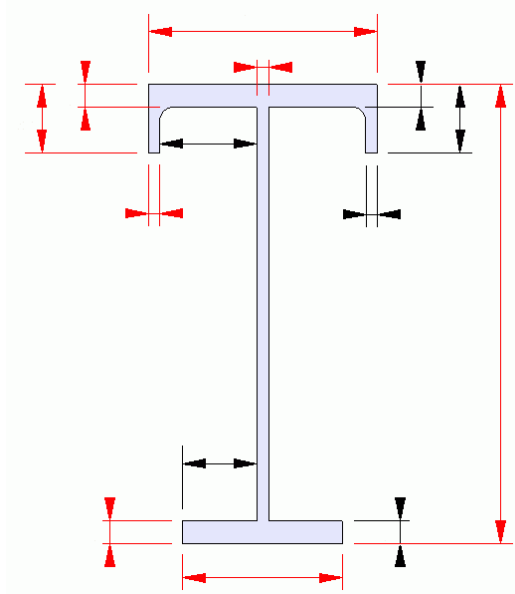


4. Select all the lines you want to be vertical.

Add dimension constraints to the cross section

We will now add the needed dimension parameters to the cross section.

Some of the dimension parameters in the parametric profile (the red ones in the figure below) will be user definable and some (the black ones) will be tied to the user definable parameters with equations.

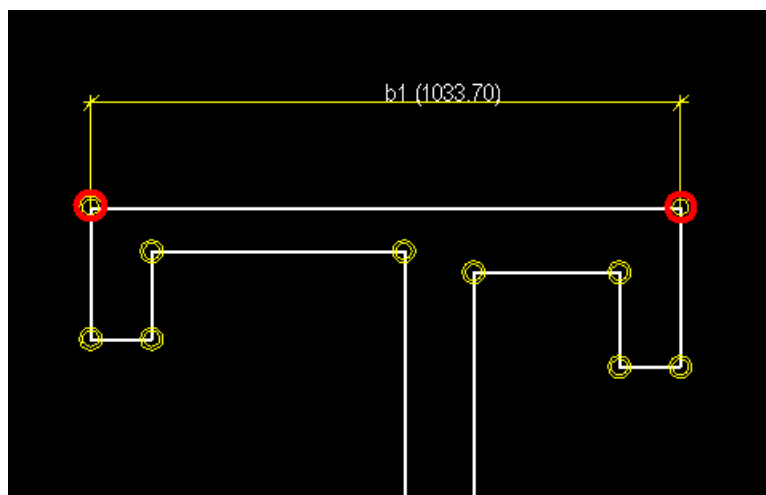


Add horizontal dimensions

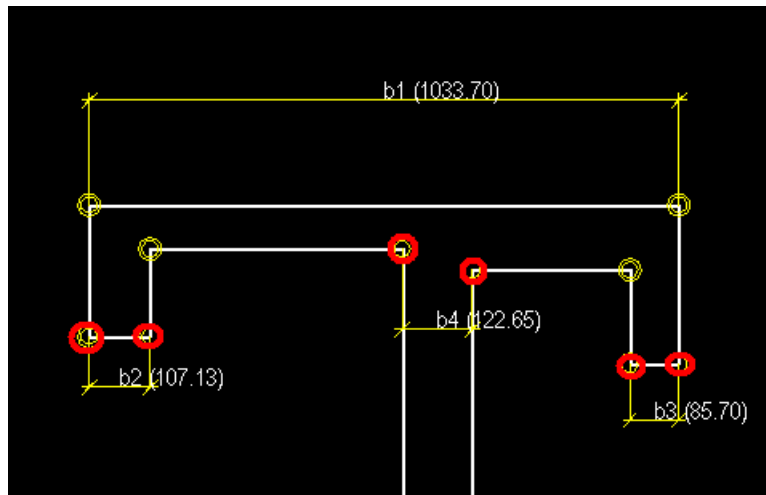
1. Click on the **Sketch horizontal distance** icon.



2. Select 2 points (shown in red) and then the dimension line position.
A dimension is then added and a variable is added to the variables table.



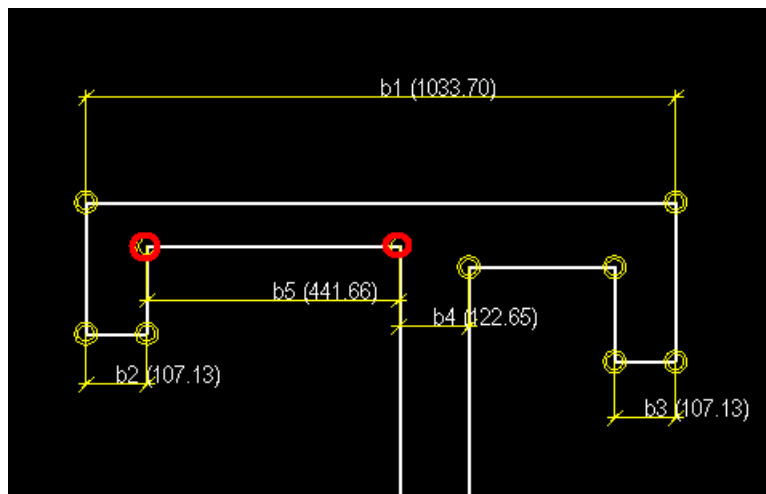
3. Repeat adding dimensions for the edge fold thicknesses (b2, b3) and the web thickness (b4).



- In the variables table, change parameter b3 to be = **b2**. B3 is then automatically hidden.

Name	Formula	Value	Value type	Variable type	Visibility	Label in dialog box
b1	1033.70	1033.70	Length	Distance	Show	Width
b2	107.13	107.13	Length	Distance	Show	Width
b3	=b2	107.13	Length	Distance	Hide	Width
b4	122.65	122.65	Length	Distance	Show	Width

- Add a dimension b5 as shown.



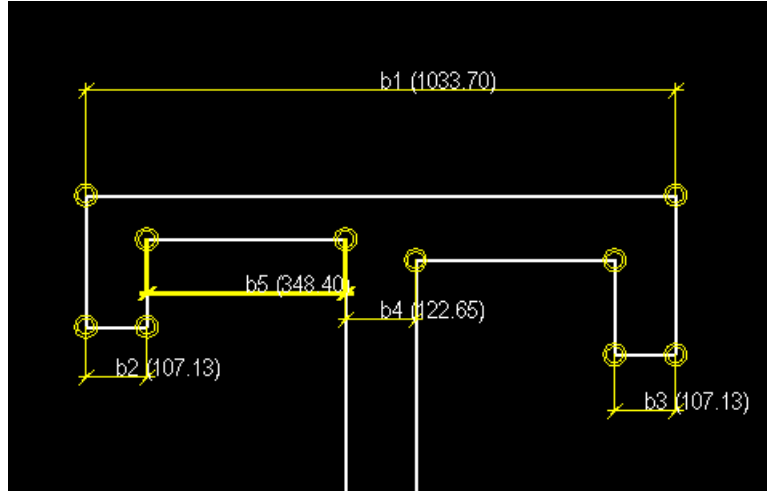
Take care not to add too many dimensions to the profile or the constraints will work against each other.

- In the variables table, change parameter b5 to be **b9**

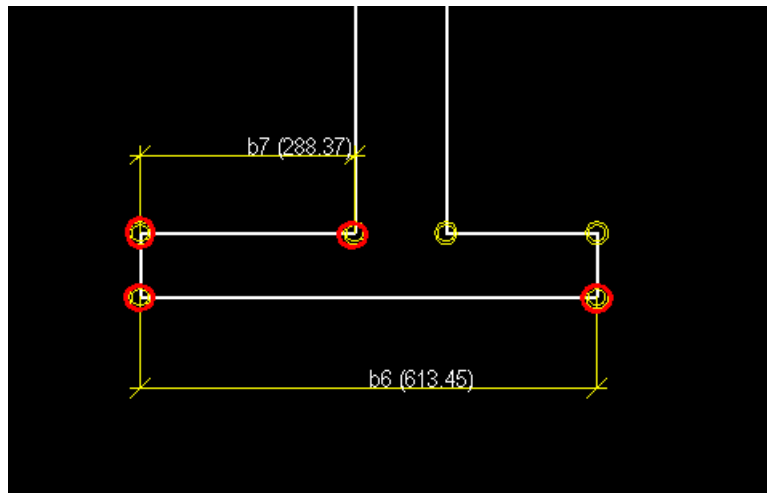
-

This will result the upper flange to be horizontally symmetrical

Name	Formula	Value	Value type	Variable type	Visibility	Label in di
b1	1033.70	1033.70	Length	Distance	Show	Width
b2	107.13	107.13	Length	Distance	Show	Width
b3	=b2	107.13	Length	Distance	Hide	Width
b4	122.65	122.65	Length	Distance	Show	Width
b5	=b1/2-b2-b4/2	348.39	Length	Distance	Hide	Width



8. Add a dimension to the lower flange width and to the left cantilever.



9. Add the equation $=(b6-b4)/2$ to the cantilever.

This will result in the left and right cantilevers being symmetrical.

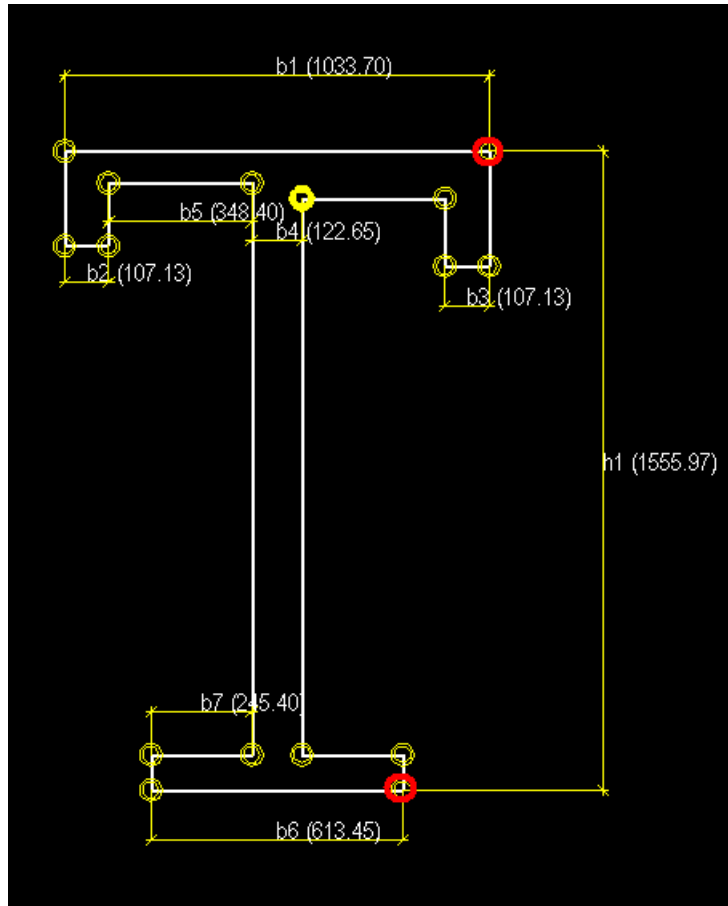
Name	Formula	Value	Value type	Variable type	Visibility	Label in di
b1	1033.70	1033.70	Length	Distance	Show	Width
b2	107.13	107.13	Length	Distance	Show	Width
b3	=b2	107.13	Length	Distance	Hide	Width
b4	122.65	122.65	Length	Distance	Show	Width
b5	=b1/2-b2-b4/2	348.39	Length	Distance	Hide	Width
b6	613.45	613.45	Length	Distance	Show	Width
b7	=(b6-b4)/2	245.40	Length	Distance	Hide	Width

Add vertical dimensions:

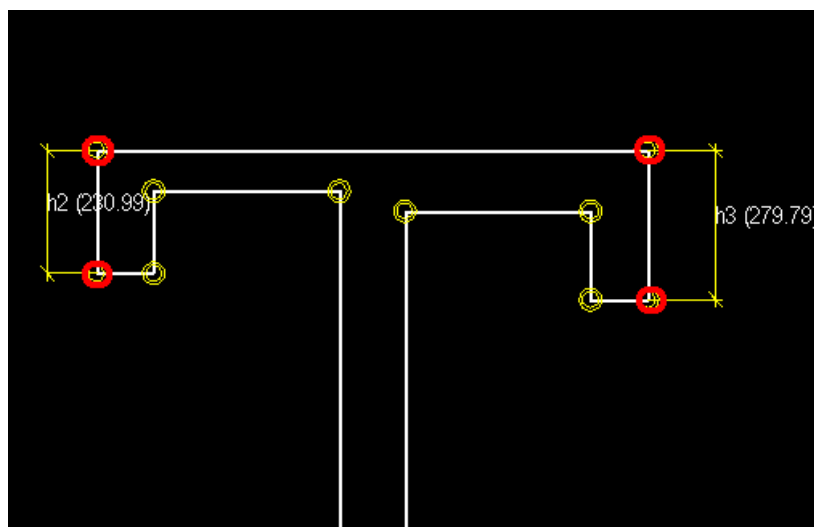
1. Click on the **Sketch vertical distance** icon.



2. Add a dimension for the profile height.



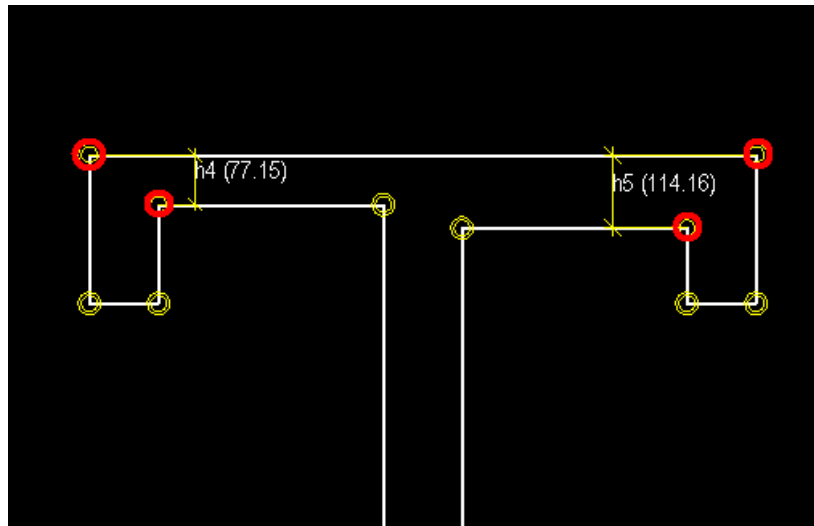
3. Add dimensions for edge fold heights.



4. Add the equation $h3 = h2$.

Name	Formula	Value	Value type	Variable type	Visibility	Label in
b1	1033.70	1033.70	Length	Distance	Show	Width
b2	107.13	107.13	Length	Distance	Show	Width
b3	=b2	107.13	Length	Distance	Hide	Width
b4	122.65	122.65	Length	Distance	Show	Width
b5	=b1/2-b2-b4/2	348.39	Length	Distance	Hide	Width
b6	613.45	613.45	Length	Distance	Show	Width
b7	=(b6-b4)/2	245.40	Length	Distance	Hide	Width
h1	1555.97	1555.97	Length	Distance	Show	Height
h2	230.99	230.99	Length	Distance	Show	Height
h3	=h2	230.99	Length	Distance	Hide	Height

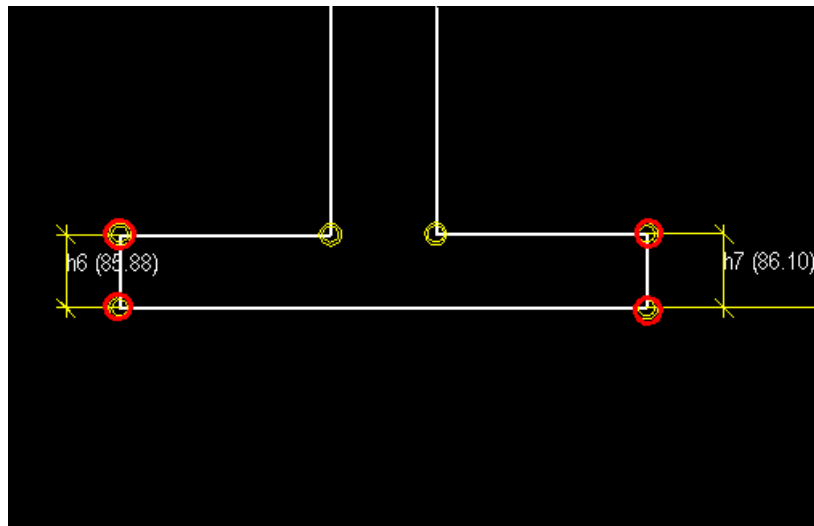
5. Add dimensions for the upper flange thicknesses.



6. Add the equation $h5 = h4$

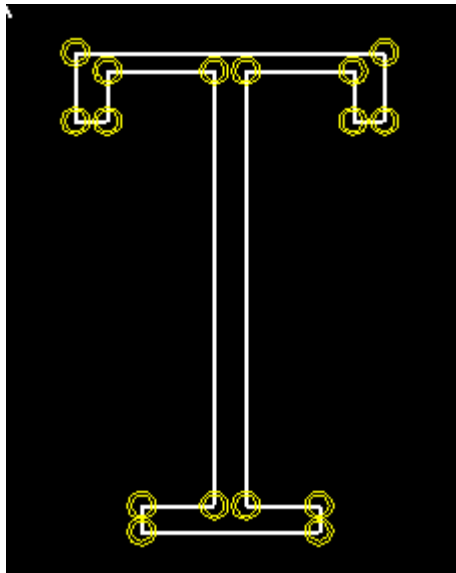
Name	Formula	Value	Value type	Variable type	Visibility	Label in
b1	1033.70	1033.70	Length	Distance	Show	Width
b2	107.13	107.13	Length	Distance	Show	Width
b3	=b2	107.13	Length	Distance	Hide	Width
b4	122.65	122.65	Length	Distance	Show	Width
b5	=b1/2-b2-b4/2	348.39	Length	Distance	Hide	Width
b6	613.45	613.45	Length	Distance	Show	Width
b7	=(b6-b4)/2	245.40	Length	Distance	Hide	Width
h1	1555.97	1555.97	Length	Distance	Show	Height
h2	230.99	230.99	Length	Distance	Show	Height
h3	=h2	230.99	Length	Distance	Hide	Height
h4	77.15	77.15	Length	Distance	Show	Height
h5	=h4	77.15	Length	Distance	Hide	Height

7. Add dimensions for the lower flange thicknesses.



8. Add equation $h8=h7$

Now the profile is symmetric.



Edit the labels

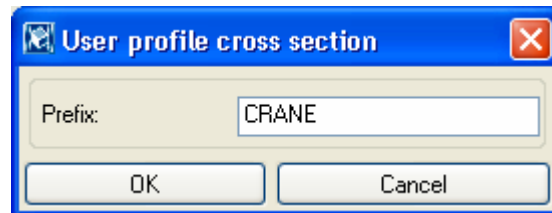
1. Select **Show** for Visibility for the variables that can be user defined. Edit the labels of the shown parameters.

Name	Formula	Value	Value type	Variable type	Visibility	Label in dialog box
b1	1685.52	1685.52	Length	Distance	Show	Width
b2	172.99	172.99	Length	Distance	Show	Edge fold t
b3	=b2	172.99	Length	Distance	Hide	Width
b4	172.99	172.99	Length	Distance	Show	Web t
b5	=b1/2-b2-b4/2	583.27	Length	Distance	Hide	Width
b6	965.56	965.56	Length	Distance	Show	Lower flange width
b7	=(b6-b4)/2	396.29	Length	Distance	Hide	Width
h1	2611.80	2611.80	Length	Distance	Show	Height
h3	=h2	373.89	Length	Distance	Hide	Height
h2	373.89	373.89	Length	Distance	Show	Edge fold h
h4	100.00	100.00	Length	Distance	Show	Upper flange t
h5	=h4	100.00	Length	Distance	Hide	Height
h6	140.00	140.00	Length	Distance	Show	Lower flange t
h7	=h6	140.00	Length	Distance	Hide	Height

2. Save the profile.



3. Type the prefix "CRANE" into the **User profile cross section** dialog box.



4. Click **OK**.
5. Close the profile.

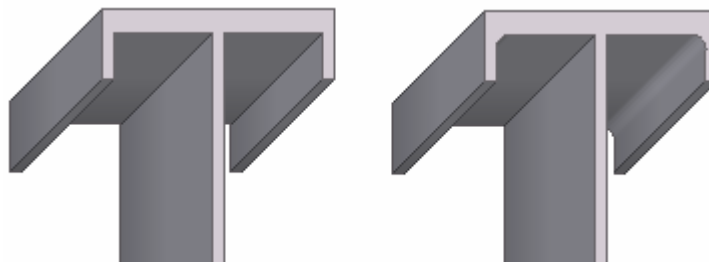


6. Reply **No** to the question about saving the sketch.

The parametric profile is now ready to be used in the profile catalog.

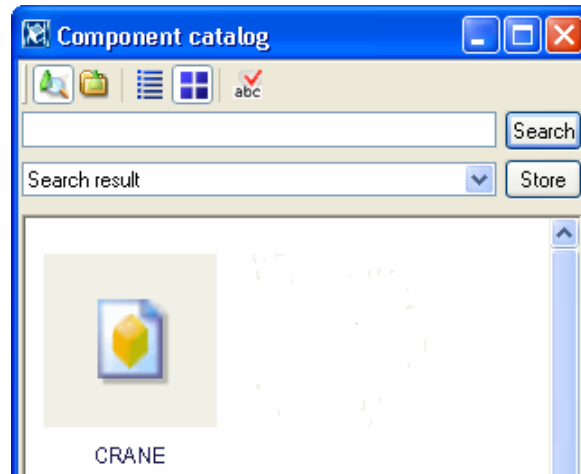
Modify the parametric profile – edit chamfers

We will next complete the cross section shape by modifying two inner corners of the crane beam profile, which require a radius.



Reopen the profile for editing

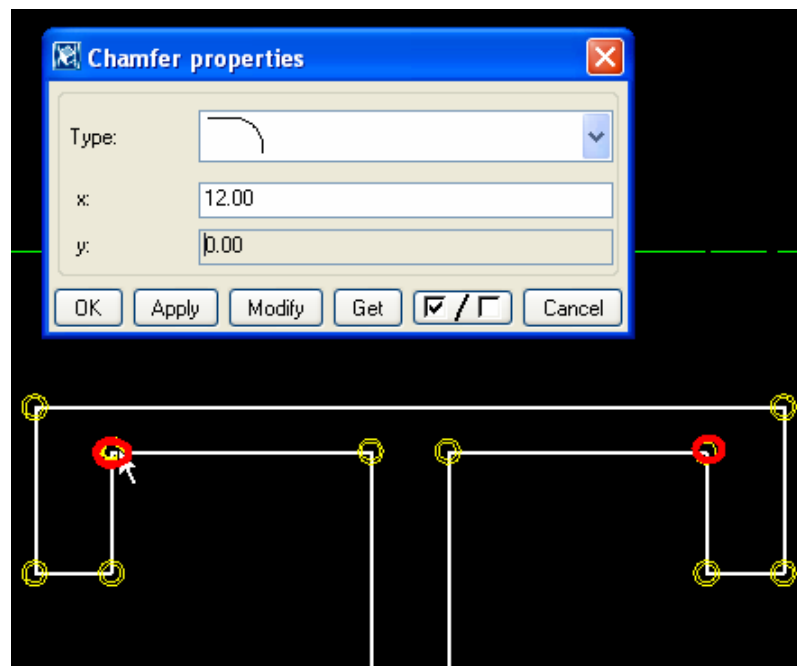
1. Open the component catalog (Ctrl + f) and select the category **Sketches** or select **File > Catalog > Profiles > Modify sketched parametric cross section** to access the profile you created in the catalog.



Add rounding to the contour plate corners

2. Double-click on the sketch CRANE that you just created.
3. Add chamfers to the profile: double-click on a circle highlighted in red, select curved chamfer type, and enter radius values as shown, **Modify**.

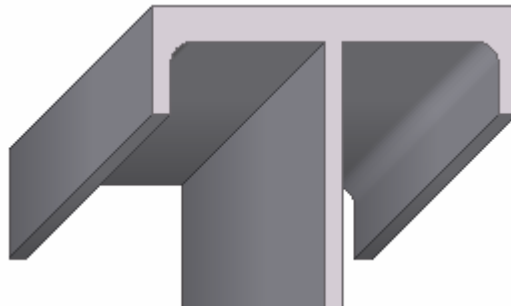
See more about chamfers in Tekla Structures [Help: Modeling > Detailing > Detailing commands > Chamfer](#).



4. Repeat editing the chamfer in the other highlighted corner.
5. Close and save the sketch.



6. Click **Yes** to update the existing profiles in the model.



Test the parametric profile

1. Double-click on the **Create beam** icon. Tekla Structures opens the **Beam properties** dialog.
2. Click on the **Select...** button on the right side of the **Profile** field. The **Select profile** dialog opens.
3. Select **Parametric profile** as the category and **User-defined, parametric** as the profile type.
4. On the **Profile subtype** list, select the CRANE profile that you just created.
5. Create a beam to the model and test the profile with different parameters.

Select profile

Profile category: Parametric profile

General Analysis User attributes


Profile name: CRANE200*10*10*140*400*60*20*20

Profile type: User-defined, parametric

Profile subtype: CRANE b1*b2*b4*b6*h1*h2*h4*h6

Prefix: CRANE

Picture

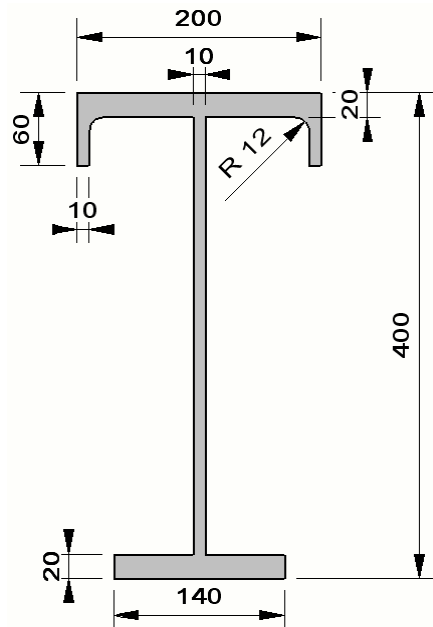


Property	Symbol	Value	Unit
Width	b1	200	mm
Edge fold t	b2	10	mm
Web t	b4	10	mm
Lower flange width	b6	140	mm
Height	h1	400	mm
Edge fold h	h2	60	mm
Upper flange t	h4	20	mm
Lower flange t	h6	20	mm

OK Apply Cancel

6.2 Manage Library Profiles

Add an instance of a parametric profile to the profile library



In case you often need to use specific size parametric profiles, it might be a good idea to add them as standard (fixed) profiles to the profile catalog. The dimensions of a library profile are fixed and can be changed only in the **Modify profile catalog** dialog box.

This makes it faster and easier to select the necessary profile and also reduces the risk of incorrect user-defined parameters.

See more information about the profile catalog in Tekla Structures help [System > Catalogs > The profile catalog](#).

Add profile

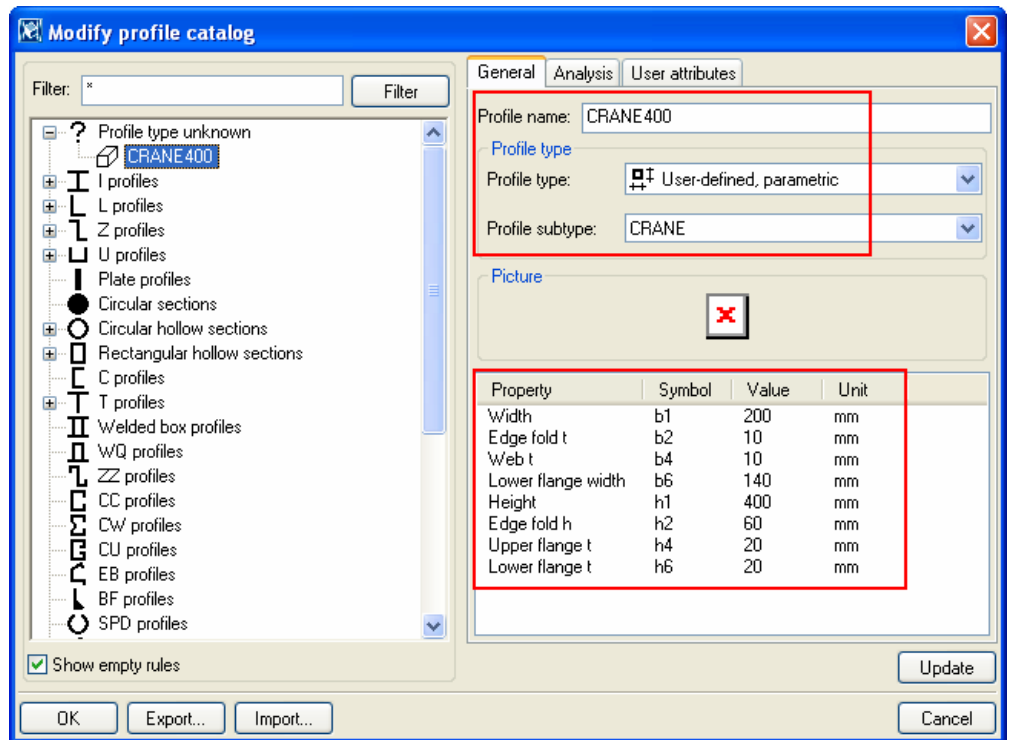
1. Select **File > Catalog > Profiles > Modify...** on the menu to open the **Modify profile catalog** dialog box.

2. Right-click in the tree structure and select **Add profile**.

A new profile will be created with the name **PROFILE** (number).

Set profile properties

3. Change the profile name to **CRANE400**.
4. Choose the **Profile type, User defined, parametric** from pull-down list and the **Profile subtype CRANE**.
5. Enter dimensions for the profile as shown below.

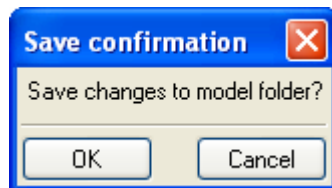


6. Click **Update** to insert the values to the profile.



You could now easily continue adding crane profiles of any other sizes (Crane 500, Crane 600, etc.) to the library.

7. Click **OK** to save the values.
8. Click **OK** to Confirm the save of the profile to the model folder



The profile can now be found among the library profiles and is ready for use.

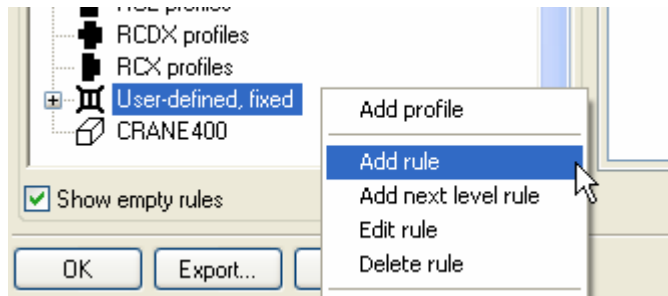
Add a rule to the profile catalog

In the profile catalog, the library profiles are grouped according to rules such as profile type (e.g. I profiles) and profile sub-type (e.g. HEA).

We will now add a rule for the CRANE profiles in the profile catalog. See more about rules in Tekla Structures [Help: System > Catalogs > The profile catalog > Working with rules](#).

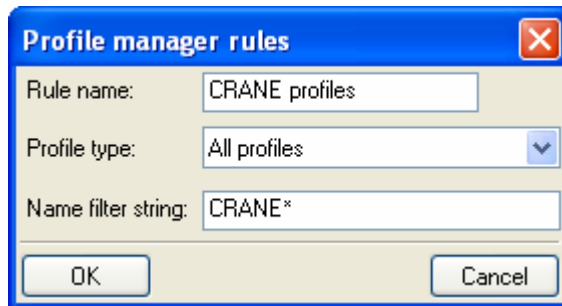
Add a rule

1. Select **File > Catalog > Profiles > Modify...** on the menu.
2. Right-click on the profile tree dialog and select **Add rule**.



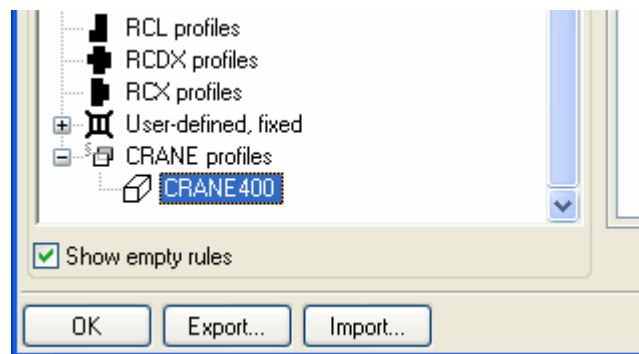
3. Type in the **Rule name: CRANE profiles**.
4. As the **Profile type**, to which the rule will be applied, select **All profiles**.
5. As the **Name filter string**, type "CRANE*".

See more about filters in Tekla Structures [System > Catalogs > Things you should know > The filter](#).



As a default, the wildcard symbol (*) is entered, meaning "all entries". To group all catalog entries with names beginning with A, enter A* as the Name filter string. To group all catalog entries with names containing 100, enter *100*. The characters * and ? can also be used in object names. If the object name you want to filter contains * or ?, enclose * or ? in square brackets. E.g., to find the profile P100*10, enter P100[*]10 in the filter field.

6. Click **OK** to save the rule and close the dialog.

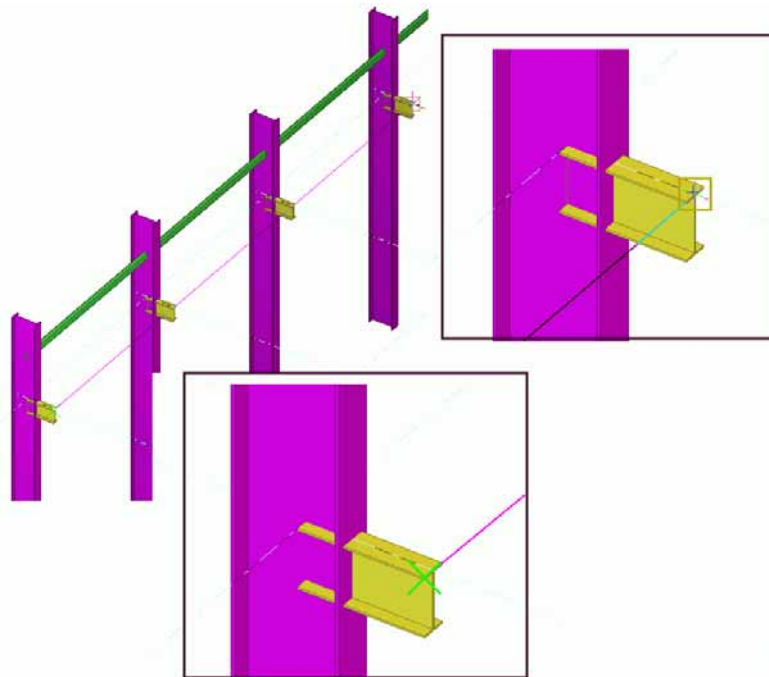


7. Confirm to save the profile to the model folder.

Use the profile in the model

Create the beams

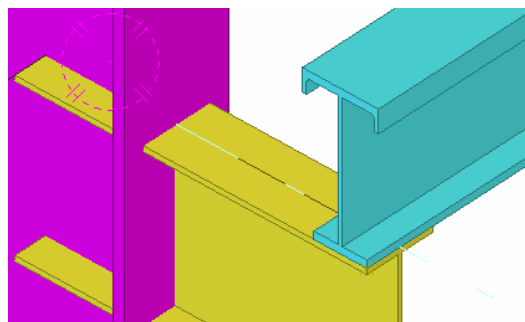
1. Double-click on the **Create beam** icon and select the profile CRANE400.
2. Create one crane beam from gridline 1 to 4. Start at the outer edge of the supporting beam on gridline 1, and end at the middle of the supporting beam on gridline 4.



3. Set the position in plane and position in depth fields to position the beam as shown.

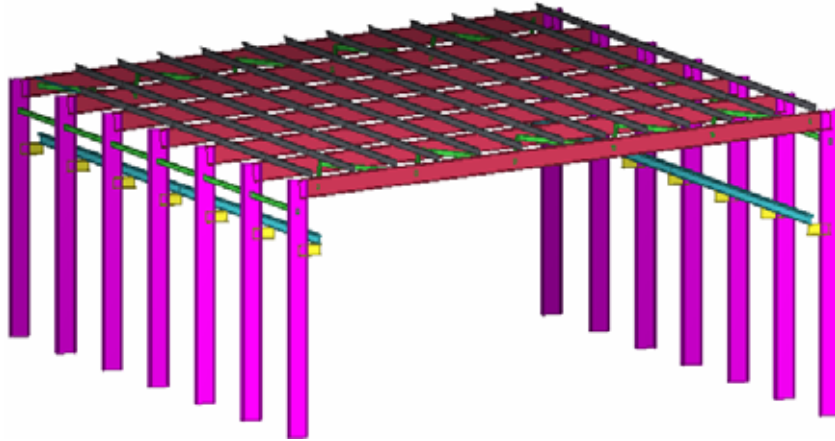


To get the right offset for the "on plane position", use the measuring tool!



4. Select the crane beam and make a copy of it to go from gridline 4 to gridline 7.
5. Select both crane beams and copy them to the other side of the building on gridline C.

We now have crane beams on both sides of the building.



6.3 Add a New Material

We will next add a new material to the Material catalog.

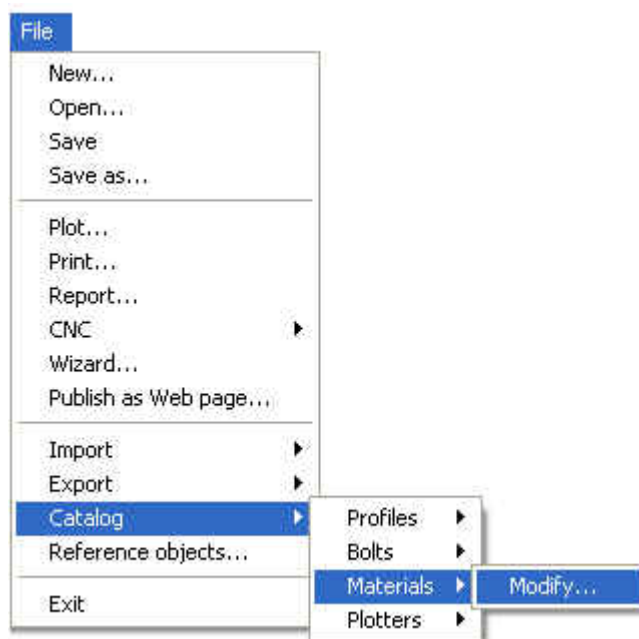
See more about the material catalog in Tekla Structures help [System > Catalogs > The material catalog](#).

Add a new material type

We will first create a new material type under which the new material will be created.

Open the material catalog

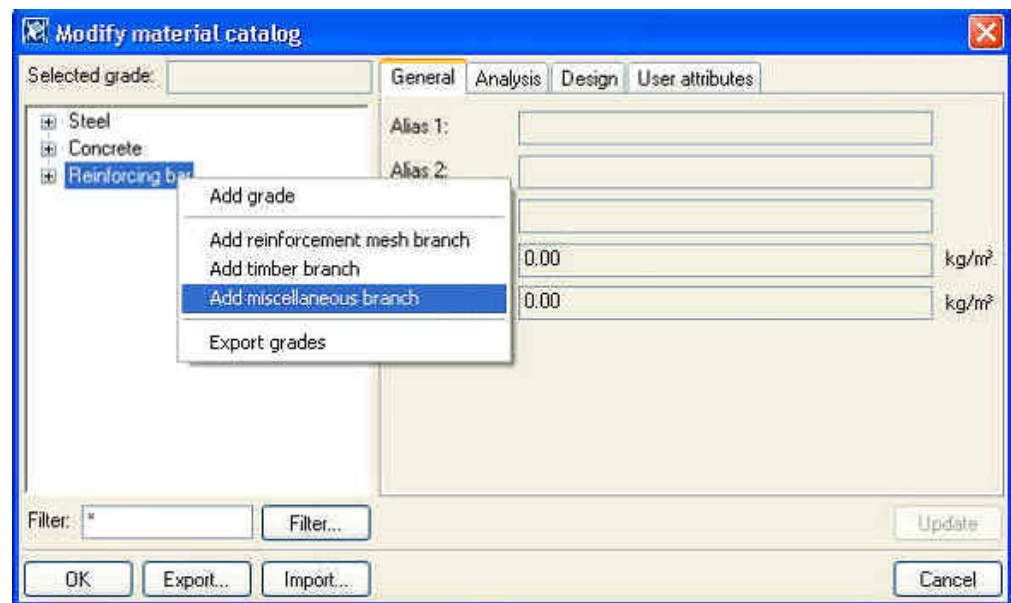
Select **File > Catalog > Materials > Modify...** on the menu to open the **Modify material catalog** dialog.



Create a new material type

If the material type you need is missing from the tree, you can create a new one.

1. Right-click on a material branch in the tree and select **Add miscellaneous branch**.

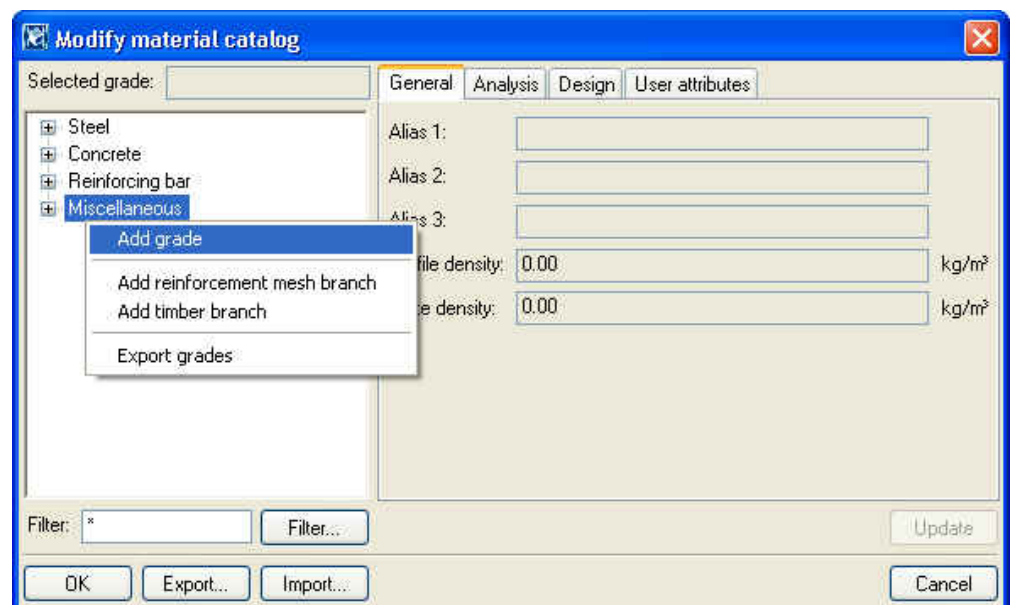


Add a new material

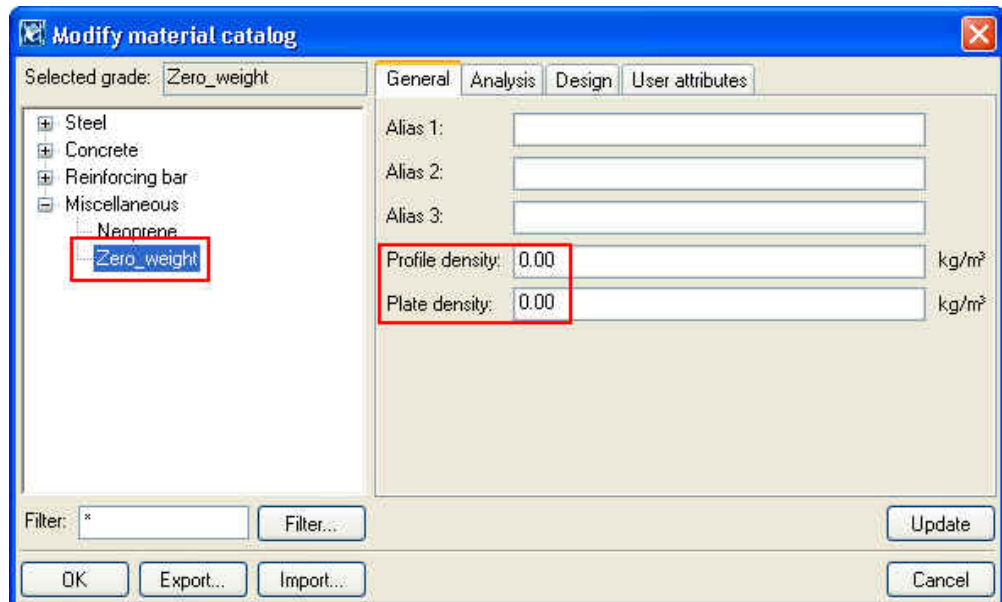
We will next add a zero-weight material under the miscellaneous branch and use it for the silos in the model.

Create a new material grade

2. Right-click on the **Miscellaneous branch** in the tree and select **Add grade**.



3. Type **Zero_weight** for the material name in the tree.



4. Add the material's **density** 0.00 for profiles and plates.
5. Save the new material type and grade by clicking **OK**.

We will next use the new zero-weight material for the silos in order to exclude the silos from the total weight of the model.

Change material of the silos

Select the two silos in the model and double-click on one of them while holding the **Shift** button down to open the properties dialog.

1. Select **Zero_weight** material from **Select material** list.
2. Close **Select material** dialog by clicking **OK**.
3. Click on the **Modify** button in the **Column properties** dialog to change the material of the silos.

