TEKLA

Cast Unit Drawings

Tekla Structures 11.0 Basic Training

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Contents

11 Cast Unit Drawings

In this lesson we will learn how to create cast unit drawings of the concrete members of the model. We will then modify the drawings and use the finished drawings for cloning.

You will learn how to:

- Use your own select filters
- Define cast unit drawing properties
- Define Drawing Classifier settings
- Use the Drawing Classifier
- Use different drawings of the same cast unit
- Use cloning
- Use the drawing list.

11.1 Create Cast Unit Drawings

Cast unit drawings are workshop (or in-situ) drawings, in which details of a cast unit, consisting of the concrete parts, reinforcement and components, are presented for fabrication.

All of the views in the drawings are current views of the members as they are in the model. When the model contains any identical members, the drawing is a view of one of these members. The drawing, however, contains information about the quantity of all of the identical members. If the "host" member of the drawing is modified or deleted, it will get a new position mark at the next numbering. Tekla Structures will then automatically assign the original drawing to another member with the original position mark.

Tekla Structures integrates the drawings and reports with the model. This means that, for example, dimensions and marks in the drawings are always correct. Because the information in the drawings and reports comes directly from the model, you cannot delete any of the parts or bolts from the drawings. You are able to filter out parts and other objects in the drawings, or make them invisible.

You can create drawings and reports at any stage of the project. If you change the model, Tekla Structures updates the related drawings when you next carry out numbering.

Once the model is numbered it is possible to create cast unit drawings of selected parts in the model. Selecting **Cast Unit drawings** from the **Drawing** pull-down menu will generate drawings of the selected parts. However, to get the drawings appear as complete as possible, it is a good idea to create drawings of certain cast units with suitable properties predefined for them.

> ⚠️ There are two options for cast unit drawing specification. The possible options to select are **By cast unit position** or **By cast unit ID**. See more in Tekla Structures **Help: Drawing > Getting Started with Drawings > Creating drawings > Creating cast-unit drawings**.

Define cast unit drawing properties for beams

We will now define cast unit drawing properties for a beam, which has reinforcements included.

Set the common drawing properties

1. From the pull-down menu select **Properties > Cast unit drawing...**

2. Select **By cast unit position** as the cast unit definition method.

3. Type BEAM REINFORCEMENT into the **Name** field. This text will appear in the drawing list.

Set the layout properties

We will next define drawings size, layout and view projection. See more in Tekla Structures **Help: Drawing > Drawing Layout > Drawing size** and **Drawing > Drawing Layout > Scale and location of drawing views > Location of views in drawings**. Look also at lesson 10 for layouts.

4. Click on the **Layout…** button.

5. Select **Size definition mode** to be **Autosize**.

6. Select **Calculated/fixed sizes** in **Autosize > Use** option menu.
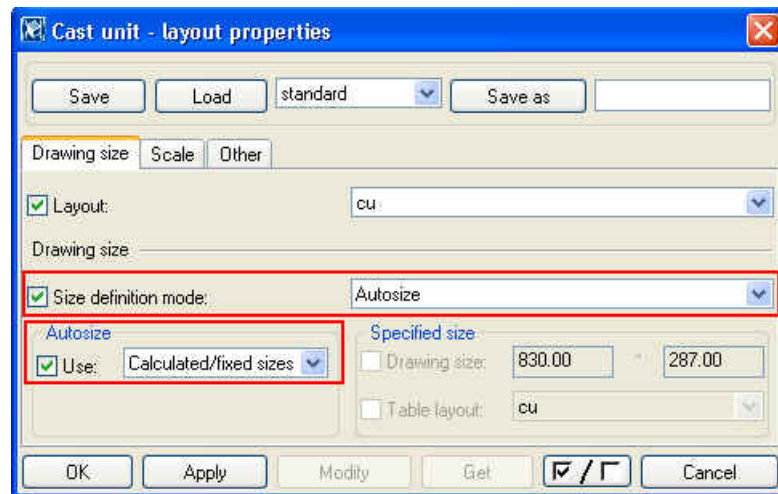
7. Select the **Scale** tab page.

8. Set **Autoscale** to **No**.

9. Select the **Other** tab page.

10. Select **Projection type** to be **First angle** (also referred to as European projection).

11. Set **Yes** to **Side views** beside main.

12. Enter the name **Beam** in the text box next to the **Save as** button, then click **Save as** to save the settings.

13. Close the dialog by clicking **OK**.

Set the view properties

Next we will define which views will be created to the drawing. See more in Tekla Structures **Help: Drawing > Drawing Properties > Drawing view properties**.

1. Click on the **View…** button.
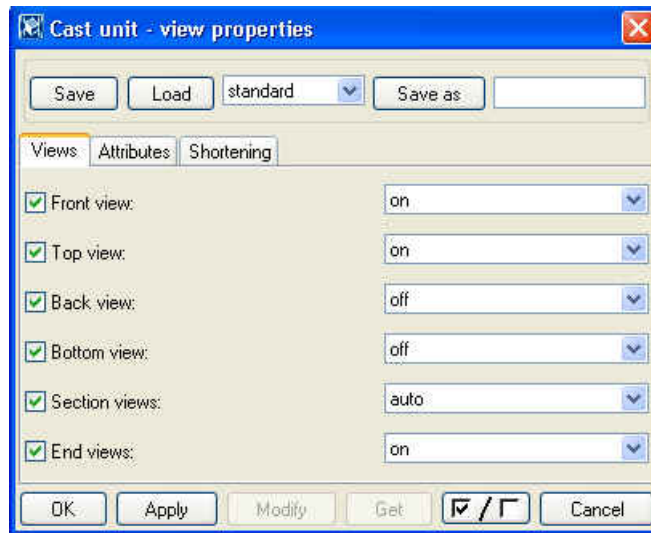
2. Turn back and bottom views off, all other views to on or auto.

3. Select the **Attributes** tab. Set **Scale** to **1:20**. All views of a view type share the same scale.

5. Set **Coordinate system** to **local**.

6. Set rotation to 0 in all directions.

7. Enter the name **Beam** in the text box next to the **Save as** button, then click **Save as** to save the settings.

8. Close the dialog by clicking **OK**.

Set the part properties

Next we will define how the parts will be presented in the drawing. See more in Tekla Structures **Help: Drawing > Drawing Properties > Drawing view properties**.

1. Click on the **Part…** button.

2. Set **Part representation** to **Exact**.

3. Set **Hidden lines on** and **Center line** and **Reference lines off**.

4. Select the **Appearance** tab.

5. For **Visible lines**, select color, which is weighted 0.3 mm. For all other lines, select line weight 0.1 mm.
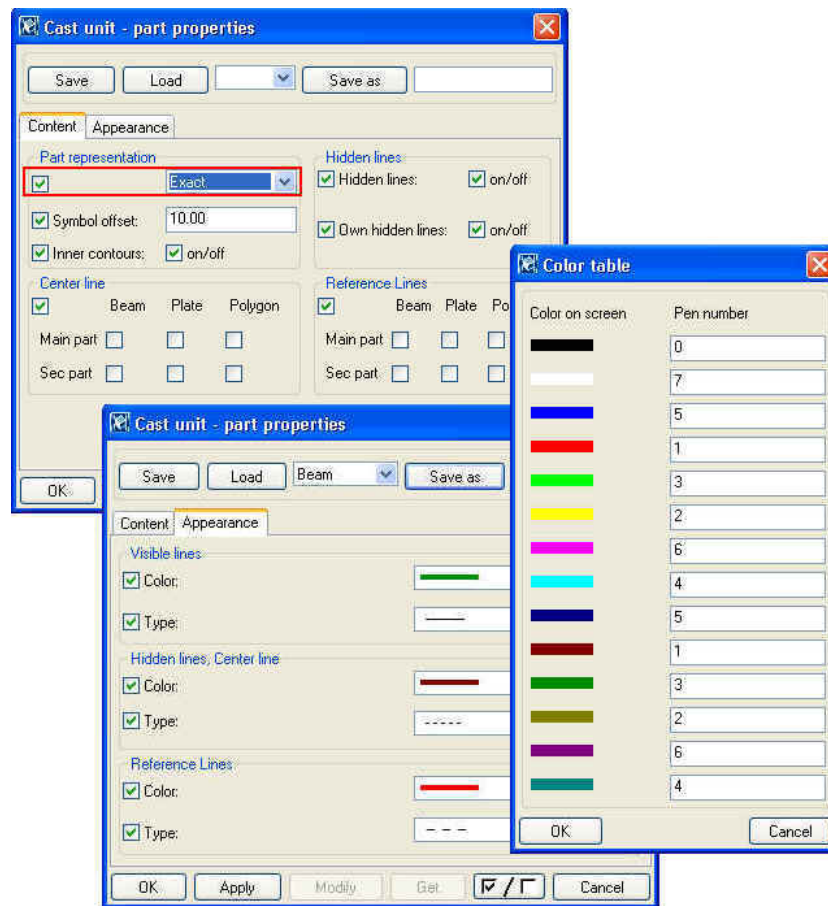
> ⚠️ Color weight is defined in plotter catalog: **File > Catalog > Plotters > Modify… > Color table...** See more in Tekla Structures **Help: Drawing > Printing > The plotter catalog > Color**.
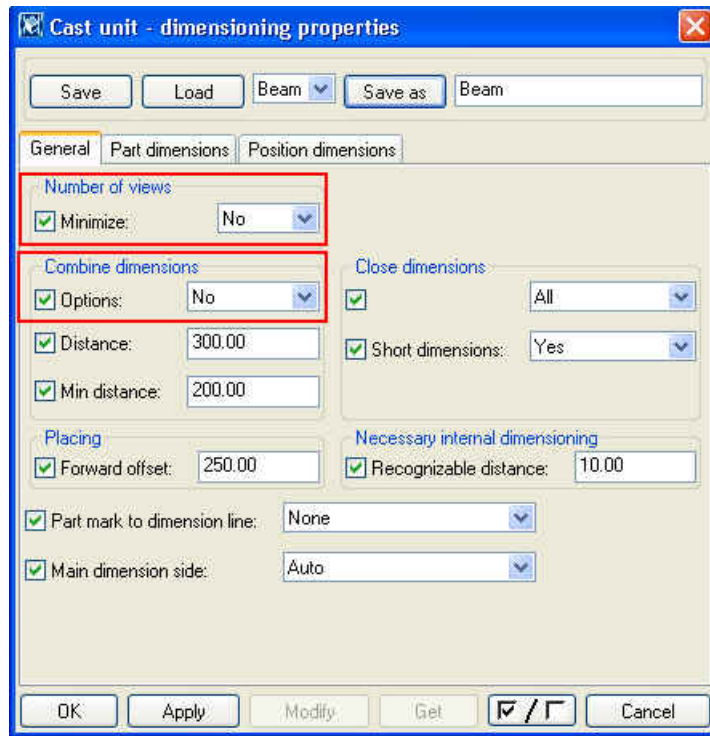
6. Enter the name **Beam** in the text box next to the **Save as** button, then click **Save as** to save the settings.

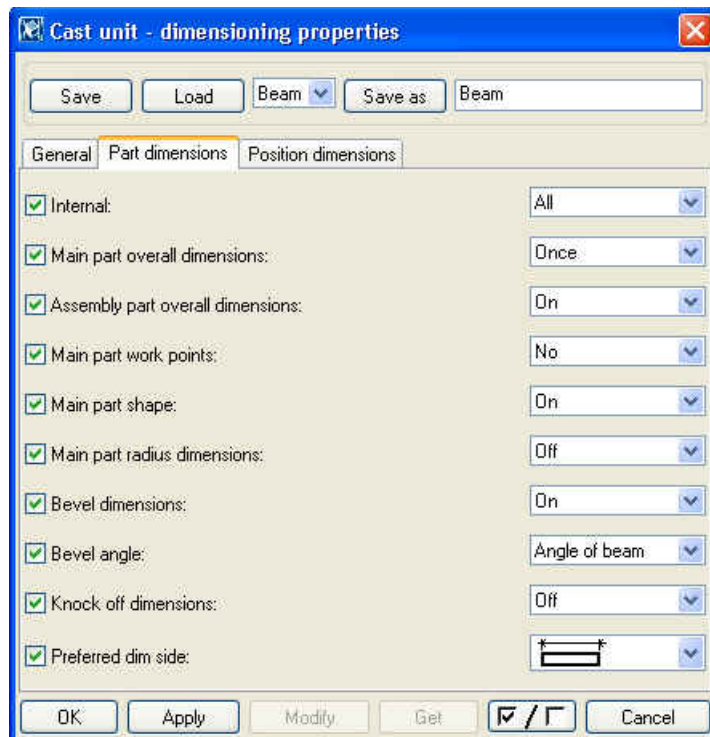7. Close the dialog by clicking **OK**.

Set the dimensioning properties

Next we will define how the parts will be dimensioned in the drawing. See more in Tekla Structures **Help: Drawing > Dimensioning**.

1. Click on the **Dimensioning…** button.

2. Set **Number of views > Minimize** and **Combine dimensions > Options** to **No**.

3. Select the **Part dimensions** tab page.

4. Set part dimensions as below:

5. Select the **Position dimensions** tab page.

6. Set **Position to:** to **Main part**.

7. Enter the name **Beam** in the text box next to the **Save as** button, then click **Save as** to save the settings.

8. Close the dialog by clicking **OK**.

Set the reinforcing properties

Next we will define how the reinforcements will be represented in the drawing. See more in Tekla Structures **Help: Drawing > Drawing Properties > Reinforcement in drawings**.

1. Click on the **Reinforcement…** button.

2. Set the **Visibility of all reinforcing bars** to **Visible**.

3. Set the **Representation** to **single line**.

4. Set the **Visibility of reinforcing bars in group** to **all**.
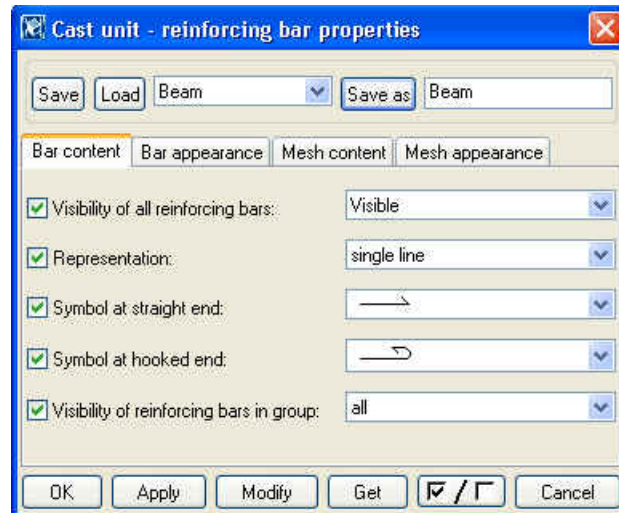
5. Select the **Bar appearance** tab page.

6. Select color, which is weighted 0.3 mm. Color weight is defined in plotter catalog: **File > Catalog > Plotters >Modify…> Color table...** See more in Tekla Structures **Help: Drawing > Printing > The plotter catalog > Color**. We will first present all reinforcements with the same color and modify it later.

7. Enter the name **Beam** in the text box next to the **Save as** button, then click **Save as** to save the settings.
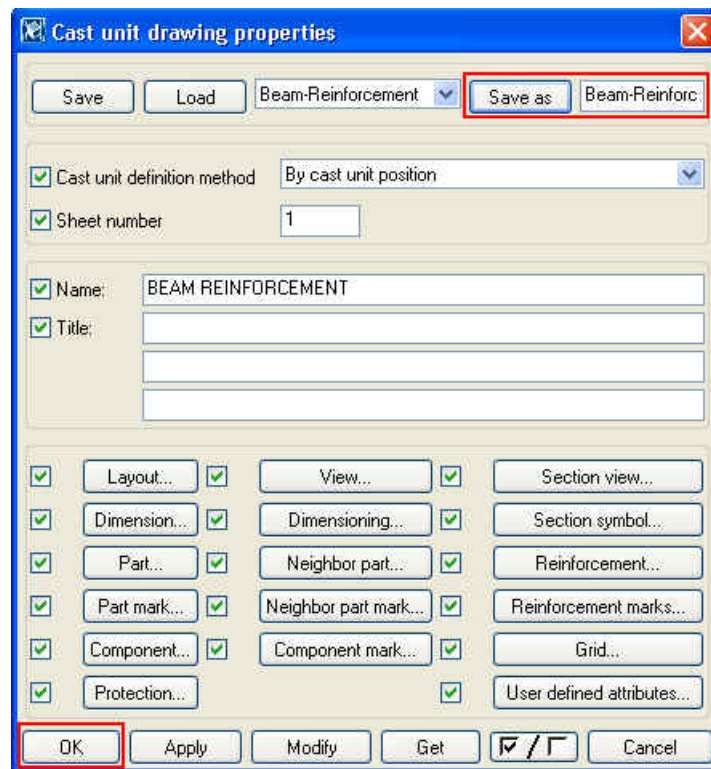
8. Close the dialog by clicking **OK**.

9. All other object can use standard settings. Now save these settings. Enter the name **Beam-Reinforcement** in the text box next to the **Save as** button, then click **Save as** to save the settings. Apply all settings and close the dialog by clicking **OK**.
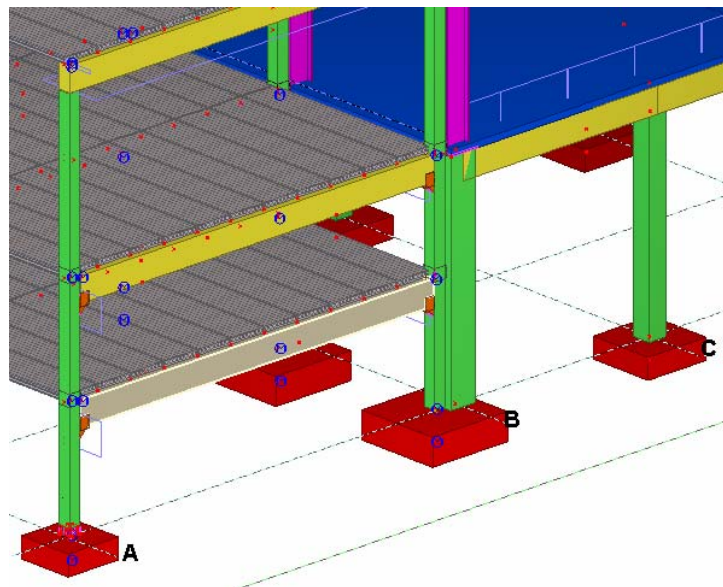
Create a cast unit drawing for a beam

We will first create one cast unit drawing for a beam, which contains reinforcements, using the predefined attribute values. Then we will edit the settings and use them in new drawings for other beams with the help of Drawing Classifier.
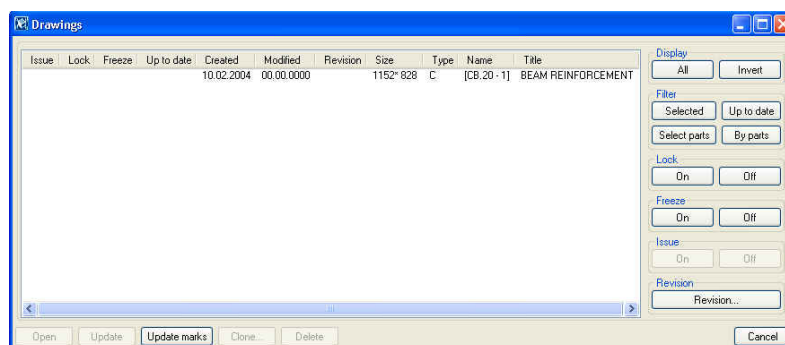
Create a cast unit drawing

1. Select a beam on gridline 7, between lines A and C.

2. Select **Drawing > Cast unit drawing** from the drop-down menu. A cast unit drawing is created of the selected beam using the predefined attribute values and it appears in the drawing list, which can be opened from **Drawing > List…** See

more about the drawing list in Tekla Structures **Help: Drawing > Getting Started with Drawings > Opening drawings > Drawing list** and Lesson 10.

Open the cast unit drawing for editing

Select the drawing from the list and click on the **Open** button. Tekla Structures opens the Beam reinforcement drawing for editing. You can edit drawings in the Drawing Editor on three levels:

- Drawing properties

- View properties

- Object properties

For more information about the drawing properties and different drawing levels, see Tekla Structures help:

Help: Drawing > Introduction to drawings > Three levels of editing drawings

Help: Drawing > Drawing Properties and Lesson 10.

Drawing Classifier in beam cast unit drawings

Define Drawing Classifier settings

We will use **Drawing Classifier** to represent the different reinforcements with different line settings. By default, all reinforcements use the same line settings and for clearer representation it is good to show different reinforcement with different line styles and weights.

The Classifier makes use of the Drawing and View Filter, the Drawing and View Properties and Property Attribute sub-dialogs. See more in Tekla Structures **Help: Drawing > Drawing Properties > The Drawing Classifier > Using the classifier**.

To change properties of a single view of a multiple view drawing, edit and save **View properties** rather than Drawing properties. Once the properties have been set up and saved they can be applied in automatic drawing creation in normal ways.

Create view filters

We will first define the filter settings for different reinforcements. Tekla Structures uses filters for selecting objects in drawing views with certain criteria.

1. Double-click on any view border to open the **View properties** dialog.

2. Click the **Filter...** button to open the **View filter properties** dialog box.

3. Select the **Reinforcing bars** tab page.

4. Type **BOTTOM_BAR TOP_BAR** in the **Reinforcing bar Name** field. Note that there is an empty space between the names to separate them.
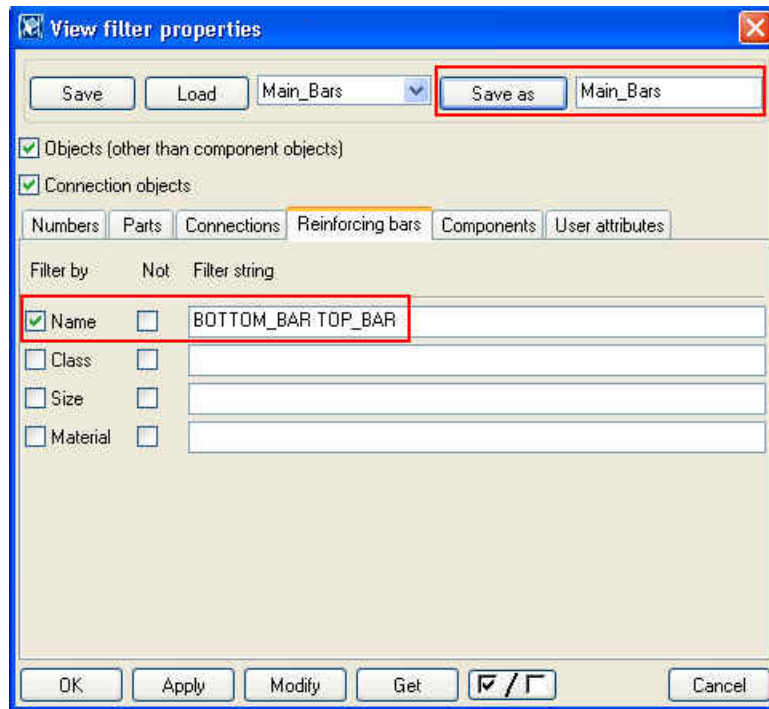
5. **Save** the filter settings with name **Main_Bars** in the **Save as** field.

6. Write then **PNL** to the **Reinforcing bar Name** field.

7. Enter the name **Lifting_Hooks** in the text box next to the **Save as** button, then click **Save as** to save the settings.

8. Next write **STIRRUP** to the **Reinforcing bar Name** field.

9. Enter the name **Stirrups** in the text box next to the **Save as** button, then click **Save as** to save the settings.

10. Click **Cancel** to close the dialog box. Do not click **Apply** or **OK**, as this will apply the current filter to the entire drawing and the Classifier will not work.

We have now defined three different filters for different kind of reinforcements.

Define reinforcement appearance

Next, we will define the appearance settings for the reinforcements.

1. Click on the **Reinforcement...** button to open the **View reinforcing bar properties** dialog box.

2. Select the **Bar appearance** tab page.

3. Select color, which is weighted 0.5 mm (blue color).

4. Enter the name **filter_Beam-Reinforcement_Main_Bars** in the text box next to the **Save as** button, then click **Save as** to save the property file for main bars.

> ⚠️ The name consists of three sections. First there must be the text "filter". Then the drawing or view attribute file name – in this case "Beam-Reinforcement" (the saved settings of drawing or view main dialog). The last section is the name of the filter attribute file – in this case "Main_Bars". The sections are combined with underscores.

5. Next select the **Bar content** tab page.

6. Select **filled line** as the **Representation** type.

7. Select straight line as symbol at reinforcement ends.

8. Enter the name **filter_Beam-Reinforcement_Lifting_Hooks** in the text box next to the **Save as** button, then click **Save as** to save the property file for main bars.

9. Click **Cancel** to close the dialog box.

We now have drawing classifier settings for main reinforcements and lifting hooks, stirrups can use **Beam-Reinforcement** settings.

Define reinforcement mark content

Before modifying the drawing, we will add drawing classifier settings for pullout pictures of stirrup reinforcement marks.

1. Click on the **Reinforcement marks…** button to open the **View reinforcing bar mark properties** dialog box.

2. Select the **Pullout picture** from **Available elements** list on **Single mark** tab page.
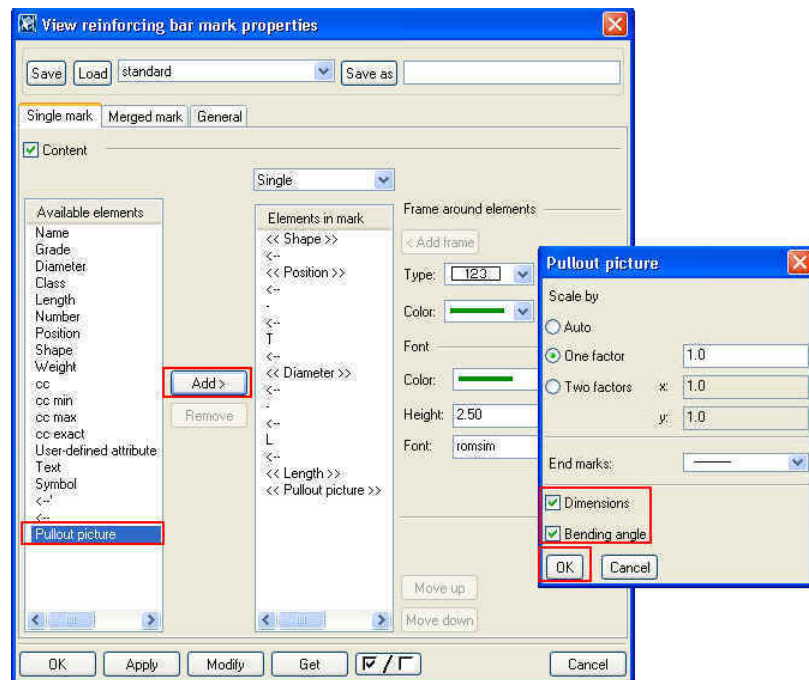
3. Click on the **Add>** button. **Pullout picture** dialog opens.

4. Tick the **Dimensions** and **Bending angle**, then click **OK**.

5. Then, select **Group** above the **Elements in mark** list.

6. Repeat steps 2 – 4 to add the **Pullout picture** for reinforcement group mark.

7. Enter the name **filter_Beam-Reinforcement_Stirrups** in the text box next to the **Save as** button, then click **Save as** to save the property file for stirrup reinforcements.

8. Then remove all elements from **Elements in mark list**.

9. Select **Name** from **Available elements** list and click on the **Add>** button.

10. Select **Diameter** from **Available elements** list and click on the **Add>** button.
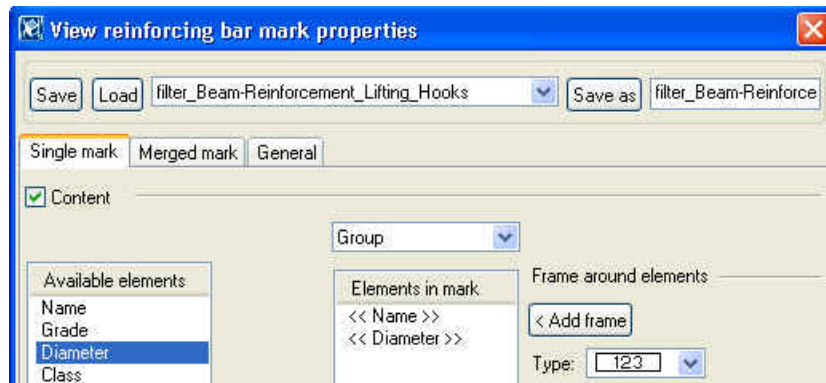
11. Enter the name **filter_Beam-Reinforcement_Lifting_Hooks** in the text box next to the **Save as** button, then click **Save as** to save the property file for lifting hooks.

12. Click **Cancel** to close the dialog box.

Use Drawing Classifier to Edit the Drawing

Now, all drawing classifier settings are ready for use. We will first modify the drawing which is already open.

Modify the drawing

1. Close all view dialogs by clicking **Cancel**.

2. Double-click on any empty space to open the **Cast unit drawing properties** dialog.

3. Click **Modify**. Tekla Structures edits the picture using drawing classifier settings.
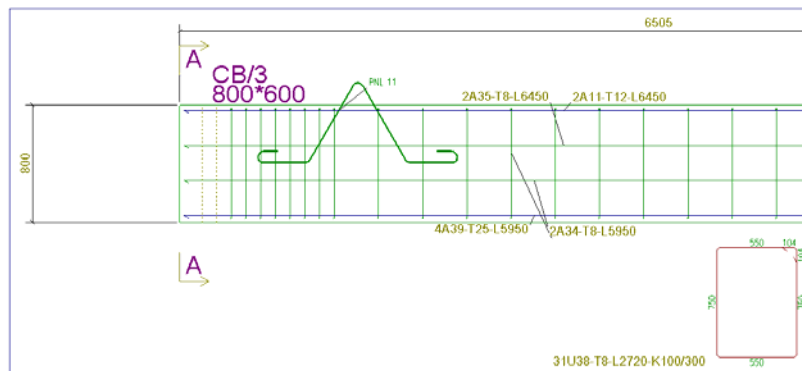
Main reinforcement bars are now represented with line weighted 0.5 mm, lifting hooks with filled line having name + diameter in the mark, and stirrups have a pullout picture in the mark.

4. Now, close the drawing saving it.

Use the Drawing Classifier to Create New Drawings

Next we will create new drawings of rest of the concrete beams with the same Drawing Classifier settings.

1. Select **Properties > Cast unit drawing…** to open the **Cast unit drawing properties** dialog.

2. Select **Beam_Reinforcement** drawing settings from pull-down menu list.

3. Click on the **Load** button.

4. Click **OK** to apply the settings and to close the dialog.

5. Select **BEAM_CONCRETE** select filter.

6. Make an area select of the whole model. All concrete beams will be selected.

7. Select **Drawing > Cast unit drawing**. Tekla Structures generates cast unit drawings of the selected beams using drawing classifier settings for reinforced beams and they appear in the drawing list with title BEAM REINFORCEMENT.

Define Cast Unit Drawing Properties for Columns

Using the settings for beam cast unit drawing as basis, we will next define drawing settings for columns and generate cast unit drawings of them.

1. Select **Properties > Cast unit drawing…** from drop-down menu to open the **Cast unit drawing properties** dialog.

2. Select the **Beam-Reinforcement** from saved attributes list and click **Load**.

3. Change the name field to **COLUMN REINFORCEMENT**.

4. Enter the name **Column-Reinforcement** in the text box next to the **Save as** button, then click **Save as** to save the settings.

Set the dimensioning attributes

Next we add elevation dimensioning to the dimensioning settings. See more in Tekla Structures **Help: Drawing > Dimensioning**.

1. Click on the **Dimensioning…** button.

2. Select the **Beam** from saved attributes list and click **Load**.

3. Select the **Position dimensions** tab page.

4. Set the **Elevation dimensions** to **On**.

5. Enter the name **Column-Reinforcement** in the text box next to the **Save as** button, then click **Save as** to save the settings.

6. Close the dialog by clicking **OK**.

7. All other objects can use standard or **Beam-reinforcement** settings. Now save these settings by clicking **Save as** in the main dialog. Apply all setting and close the dialog by clicking **OK**.

Create Cast Unit Drawings for Columns

We will first create one cast unit drawing for a column which has reinforcements, using the predefined attribute values. Then we will modify the settings and use them in new drawings for other columns with help of the drawing classifier.

1. Select the column on grid intersection A7.

2. Select **Drawing > Cast unit drawing** from drop-down menu. A cast unit drawing is created of the selected column.

Modify the Drawing Classifier settings

We will next modify the Drawing Classifier settings for columns:

1. Open the column cast unit drawing.

2. Double-click on any view border to open the **View properties** dialog box.

3. Open the **Reinforcement properties** dialog by clicking **Reinforcement…**

4. Select **filter_Beam-Reinforcement_Main_Bars** from pull-down list and click on the **Load** button.

5. Enter the name **filter_Column-Reinforcement_Main_Bars** in the text box next to the **Save as** button, then click **Save as** to save the settings.

6. Then load the settings of **filter_Beam-Reinforcement_Lifting_Hooks**.

7. Enter the name **filter_Column-Reinforcement_ Lifting_Hooks** in the text box next to the **Save as** button, then click **Save as** to save the settings.

8. Click **Cancel** to close the dialog box.

We will next add part mark settings for column shoes. First we need to define the filter for components.

1. In **View properties** dialog, click **Filter…**

2. As all parts inside the components have class number 100, we can use that for filtering. Enter 100 into **Class** field on **Parts** tab page.

3. Enter the name **component** in the text box next to the **Save as** button, then click **Save as** to save the settings.

4. Click **Cancel** to close the dialog box.

Next we will define part mark settings for Drawing Classifier, using the component filter.

1. In the **View properties** dialog, click **Part mark…**

2. Remove all elements from **Elements in mark** list, both for main part and secondary part.

3. Enter the name **filter_Column-Reinforcement_component** in the text box next to the **Save as** button, then click **Save as** to save the settings.
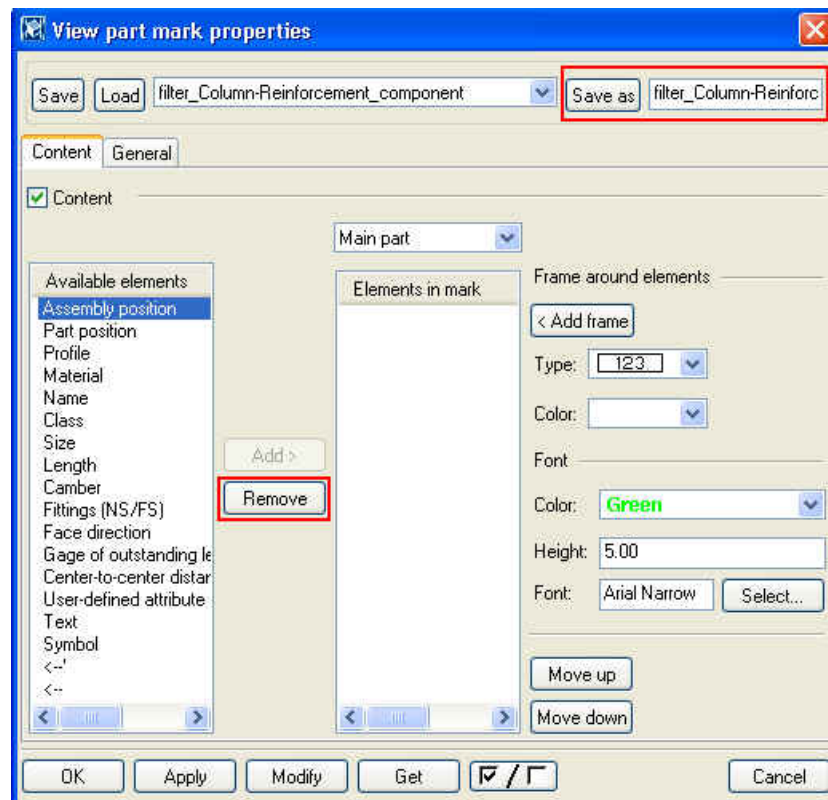
4. Click **Cancel** to close the dialog box.

5. Double-click on any empty space to open the **Cast unit drawing properties** dialog.

6. Click **Modify**. Tekla Structures edits the picture using drawing classifier settings.

7. Close the drawing and save it.

Use Drawing Classifier to create new drawings

We will now create cast unit drawings for all concrete columns with the drawing classifier settings.

1. Select **COLUMN_CONCRETE** select filter.

2. Make an area select of the whole model. All concrete columns will be selected.

3. Select **Drawing > Cast unit drawing**. Tekla Structures generates cast unit drawings of the selected beams using drawing classifier settings for reinforced beams and they appear in the drawing list with title COLUMN REINFORCEMENT.

Create Additional Cast Unit Drawings

You can create two or more cast unit drawings from the same cast unit. Drawing might be produced as three separate smaller size drawings i.e. One including main geometry + embeddings + dimension lines, one having Reinforcement, another Surface finishing (tiles etc.).

> Alternatively, you can add several new views from the same cast unit to an existing drawing using **Create > View > Basic > Front**, **Up**, **Back** or **Down** commands.

Set the drawing attributes

First, we need to define the drawing settings.

1. Select **Properties > Cast unit drawing…** from drop-down menu to open the **Cast unit drawing properties** dialog.

2. Select the **Column-Reinforcement** from saved attributes list and click **Load**.

3. Change the name field to **COLUMN DIMENSIONS**.

4. Enter number 2 to the **Sheet number** field.

> ⚠ Every additional cast unit drawing of the same cast unit must have a different sheet number.

5. Enter the name **Column-Dimensions** in the text box next to the **Save as** button, then click **Save as** to save the settings.

6. Click on the **Reinforcement…** button.

7. Set the visibility of reinforcing bars to **Not visible**.

8. Enter the name **Column-Dimensions** in the text box next to the **Save as** button, then click **Save as** to save the settings.

9. Close the dialog by clicking **OK**.

10. Now save these settings by clicking **Save as** in the main dialog. Apply all setting and close the dialog by clicking **OK**.

**Generate an additional cast unit drawing**

We will now create a dimensioning drawing of one column.

1. Select a column on gridlines **1** and **C** intersection.

2. Select **Drawing > Cast unit drawing** from drop-down menu. A cast unit drawing is created of the selected column. The drawing appears in the drawing list with title COLUMN DIMENSIONS. The drawing name has a new sheet number.

Edit the additional cast unit drawing

We will next edit the dimensioning drawing and add there also details for connecting parts. For this create basic views of them by selecting part and **right-click > Create view > Part basic views**.

1. Open the cast unit drawing.

2. We will first add running dimensions for corbel. Double-click on the **Create x dimension** icon to open the dialog.

3. Select **straight dimensioning** to option, which has running dimensions.

4. On the **Appearance** tab select arrow shape to be filled arrow.
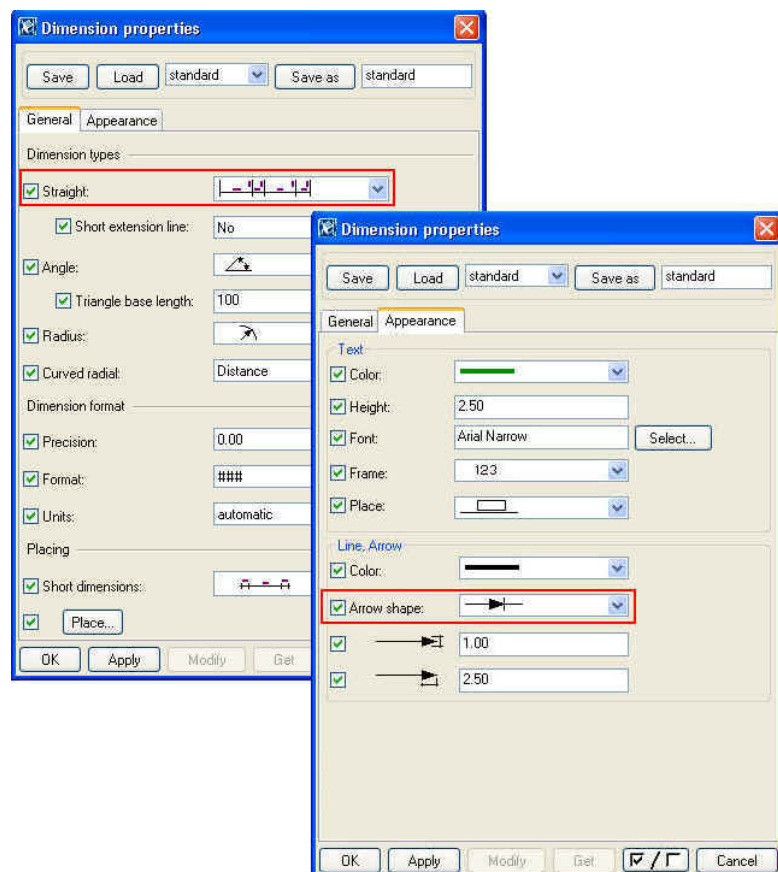
5. Click **OK**.

6. Click the corner points of the column and the corbel, end with middle button.
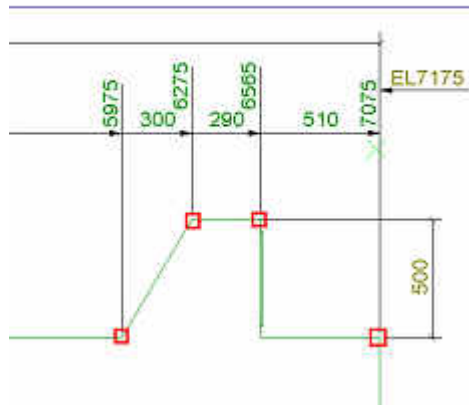
Next add part mark for bearing pad.

1. Select the bearing pad.

2. **Right-click > Part mark**.

3. Double-click on the part mark to open the **Part mark properties** dialog.

4. **Remove** all elements from **Elements in mark** list.

5. Add **Name** and **Material** to **Elements in mark** list.

6. Select the elements and click **<Add frame**.
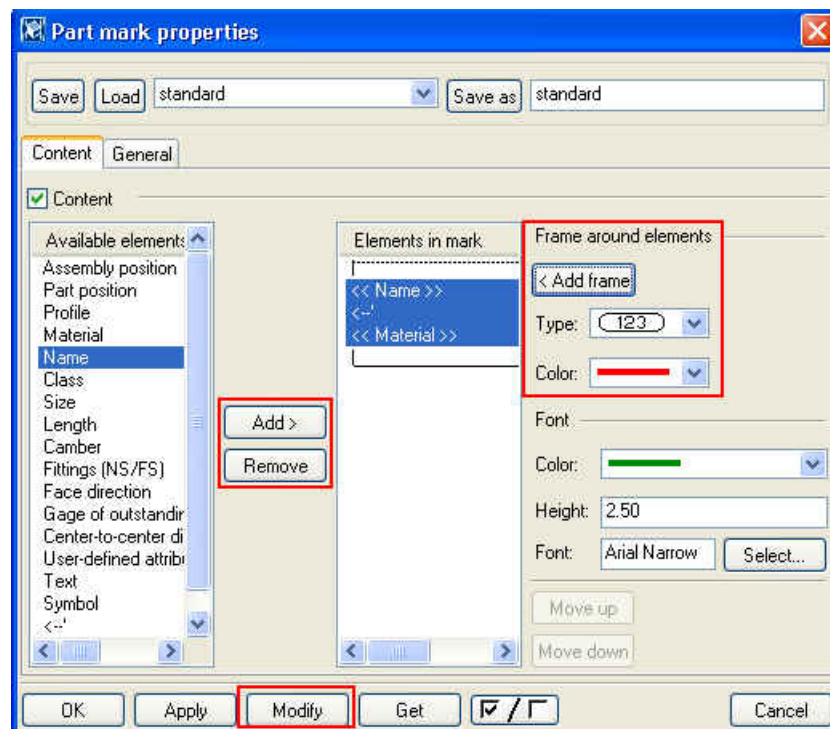
7. Click **Modify**.

We will now add part basic views to the drawing to show the connecting structures.

1. In **Create** pulldown menu select **View > From model > View**.

2. Select the **Part end view** of the pad footing. Tekla Structures generates a new view to the drawing.

3. Right-click at any empty space and select **Place views** command. The views are rearranged in the drawing.

4. Remove unnecessary part marks from the view by selecting them and by clicking on the **Delete** button.

5. Double-click on the view border and select **Part**.

6. Set hidden lines visible and click **Modify**.
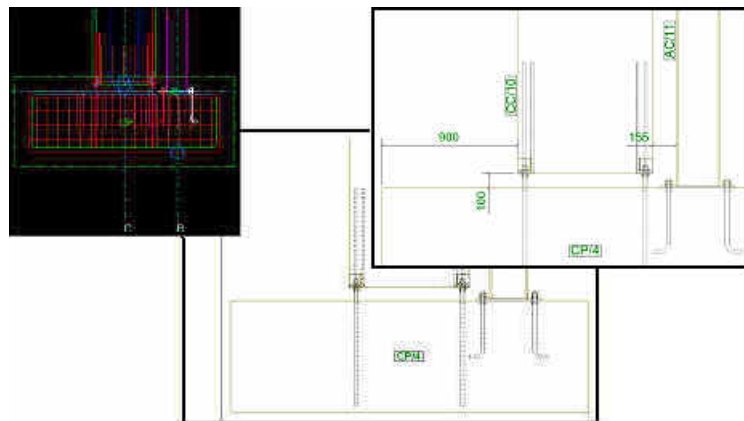
7. Add needed dimensions using dimensioning tools.

8. Close the drawing saving it.

Cloning Drawings

We will next clone the additional cast unit drawing for columns on gridline **F**. You can clone drawings to produce cast unit drawings of same or similar cast units.

You should consider cloning drawings when:

1. There are several almost similar parts or cast units in the model.

2. You need to produce several cast unit drawings of same cast unit.

3. The drawings need a lot of manual editing.

 See more about cloning in Tekla Structures **Help: Drawing > Getting started with drawings > Drawing reference > Drawing>Clone drawing**.

Steps to clone drawings:

1. Finalize, save, and close the drawing you want to clone.

2. In the model, select cast units to include in the drawing.

3. Click **Drawing > List...** to open the drawing list.

4. Select the finalized drawing on the drawing list.

5. Click **Clone...**
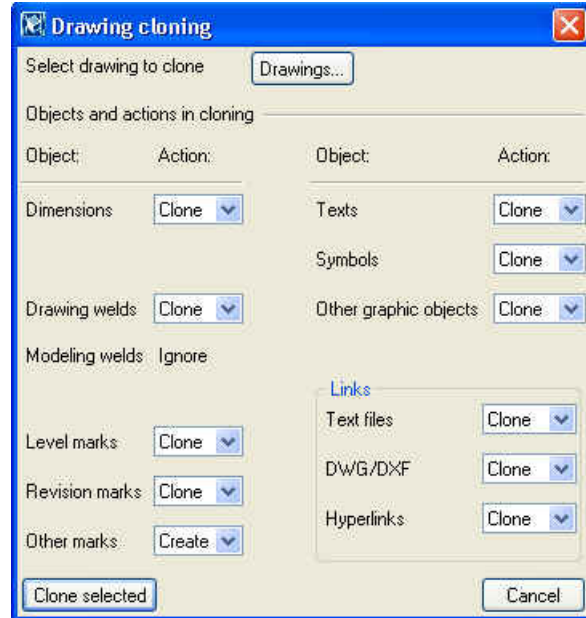
6. In the **Drawing cloning** dialog box, select the drawing objects in the finalized drawing that you want to copy into the new drawing. If you want Tekla Structures to red circle the dimensions for which it cannot find a reference point on a part, select the **Indicate dimension points** that need checking checkbox.

7. Click **Clone selected**.

> ⚠ Always check dimensions and drawing view sizes in cloned drawings.

You can have Tekla Structures to indicate the dimension points that need to be checked. Select the checkbox **Indicate dimension points** that need checking in the **Drawing cloning** dialog box. Tekla Structures circles in red the dimensions for which it cannot find a reference point on a part. To remove the red circles in cloned drawings, do one of the following:

- To remove one circle, in the **Drawing Editor**, click **Edit > Remove dimension point circle > Single circle** and select the circle to remove.

- To remove all circles, click **Edit > Remove dimension point circle > All**.

Create a new dimension point (**Edit > Add dimension point**) at the correct position and delete the existing dimension point (**Edit > Remove dimension point**).

When you delete incorrect dimensions the red circles will also disappear. You can then recreate the dimensions.

⚠️ In order to add and remove dimension points and to remove dimension point circles, you may have to adjust the drawing view size so that the dimension points are inside the view.