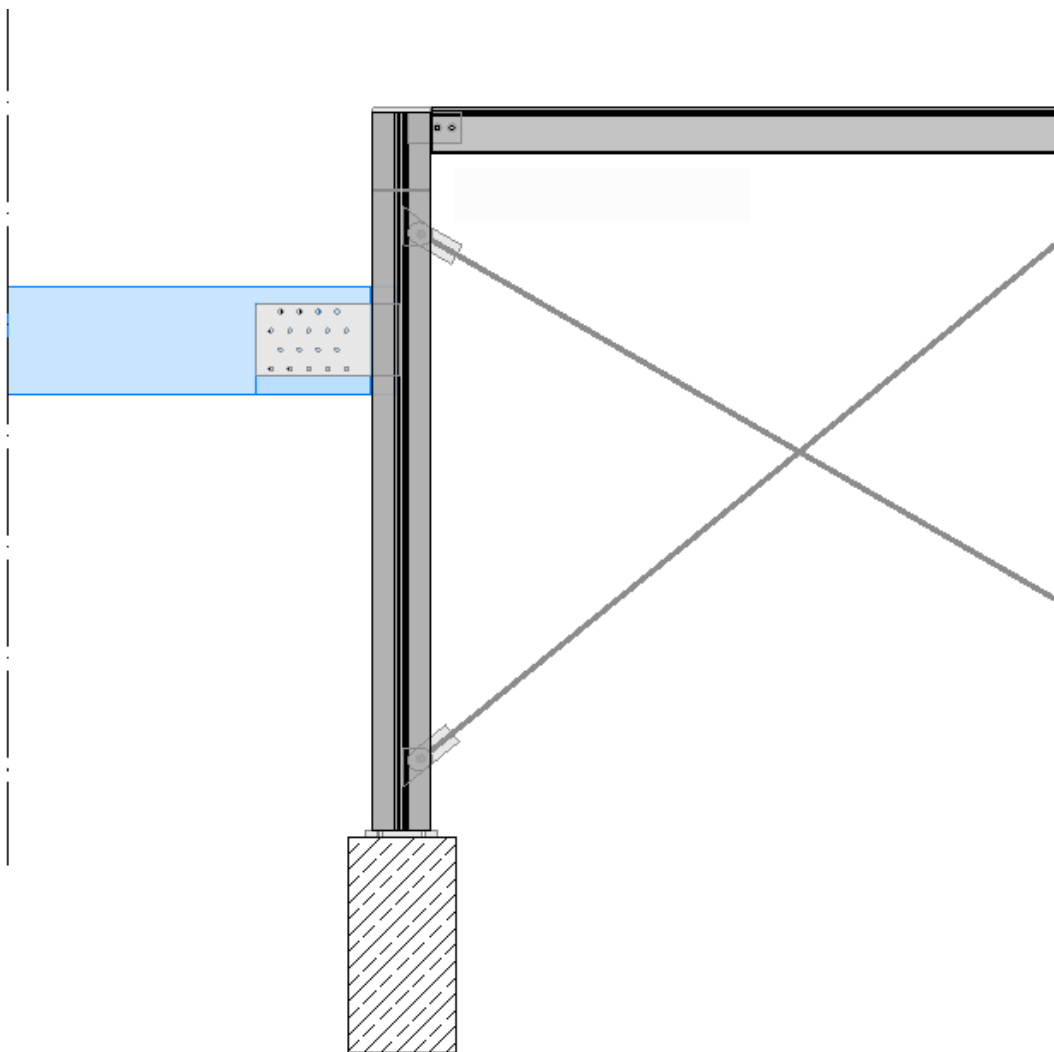

Basic Course Steel Construction



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Basic Course Steel Construction

1. General Points

Basically, all steel components can be created in the Top View, Vertical/Horizontal Section, Joist System, Construction Plane and all layers of the wall.

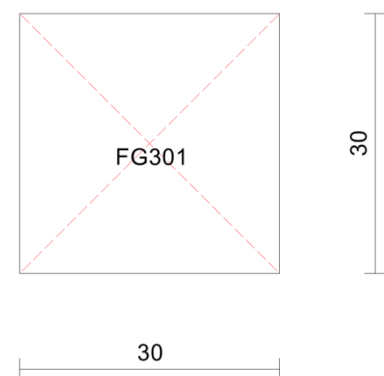
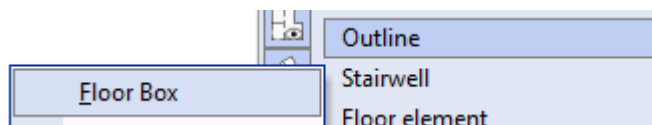
2. Example of Entry

Creation of a steel column from a HEB 160 with end and baseplate. Positioning of a Hotz beam/flag plate connection for further constructional fitting beams. Braces will be arranged to compensate compressive stress occurring in the steel. Connection to horizontal timber girder with slotted plate to which steel dowel pins have been allocated.

2.1. Given Point Foundation


Program selection:  Floor structure

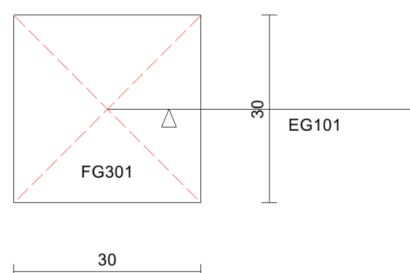
Function selection:



- Create floor shape/point foundation with sizes 30/30/60.
- The centre point of the foundation can be determined via CAD lines.

2.2. Creation of Steel Beam HEB 160 in a Construction Plane


- Select creation function  "Create construction plane" in top menu bar.
- Input option "From": Hold the shift-key pressed down \hat{u} , click the centre point of the foundation and click free point 2 under input option "To".
- The "Thickness" can be entered either with the keyboard or a mouse click when thickness desired is reached.
- The "Line of sight" is also determined by clicking the mouse.



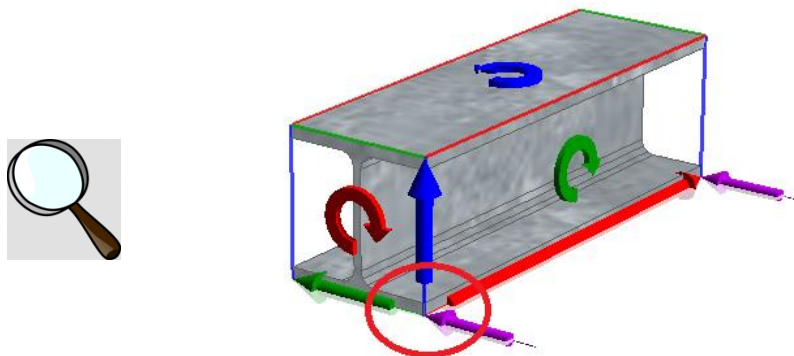
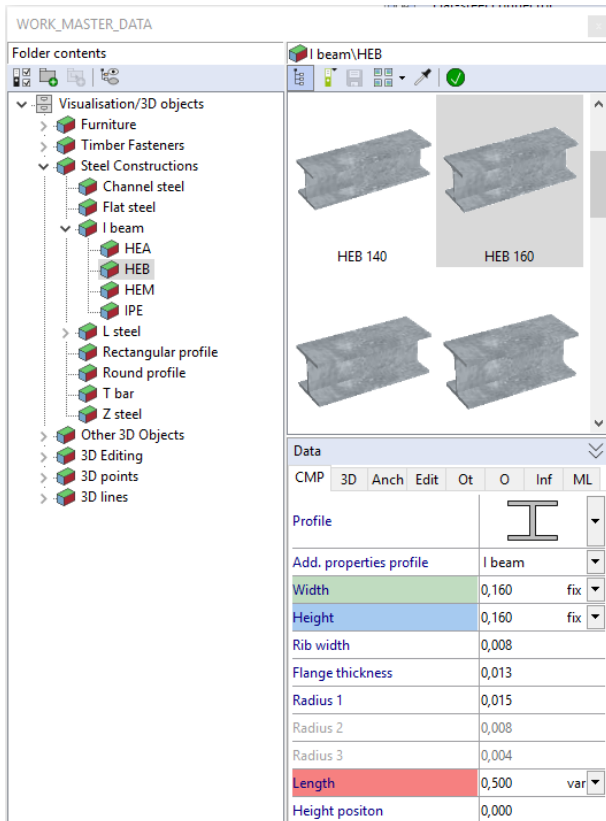
Caution:

A construction plane can only be created in a storey with usage "Walls with roof" or "Walls without roof".

2.3. Creation of an I-Beam

- The construction plane is created via the function  “Panel View” in the top menu bar and subsequent selecting of the line.

- The **HEB 160** can be found by selecting  “3CAD” and “Steel Constructions”, category “I beam”.



The screen image displays how the beam is stored by default and the position of the insertion point (see circle).

- Since the beam is to be set centred onto the foundation, the following settings should be made:

Reference Point X axis: Beginning

Reference Point Y axis: Centre

Reference Point Z axis: Centre

Distance 1: - 0.020 (for baseplate)

Data	
CMP	3D
3D data of envelope	
Ref. Point X axis	Beginning
Ref. Point Y axis	Center
Ref. Point Z axis	Center
X rotation	
Y rotation	
Z rotation	

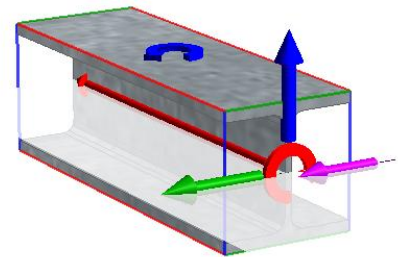


Data							
CMP	3D	Anch	Edit	Ot	O	Inf	ML
Anchoring							
Anchor/ reference point	RFP 1						
Dist. from reference 1	0,000						
Dist. from reference 2	0,000						
Anchor/ reference point	RFP 1						
Dist. from reference 1	0,000						
Dist. from reference 2	0,000						
Anchor/ reference point	Both						
Dist. from reference 1	-0,020						
Dist. from reference 2	0,000						

- The following screen image can be seen:

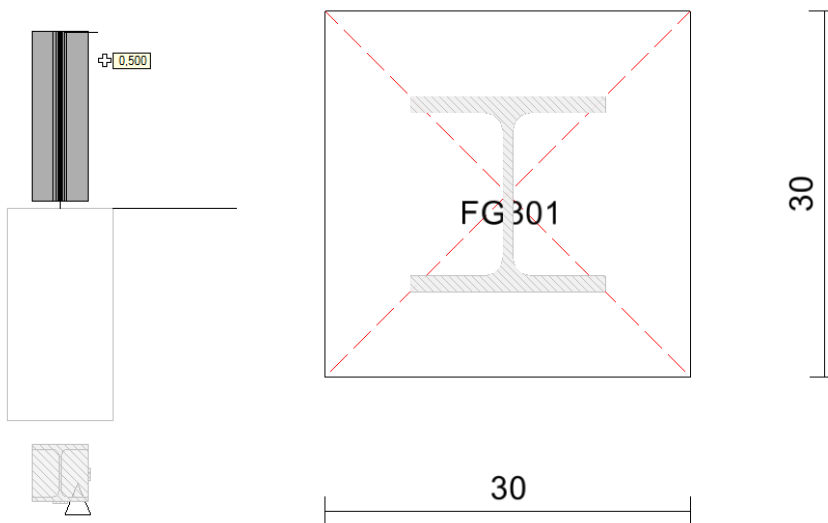
- “From” input: It is possible to set the HEB beam vertically upwards by means of the automatic mark with the mouse feature (in our example, 2 m).

- The component will be placed centred onto the foundation. In addition, a distance of 2 cm from the insertion point has been set for the baseplate.




C Plane

Top View




3. End and Baseplate

- Opening of the 3D view via function  “3D View” in the top menu bar.



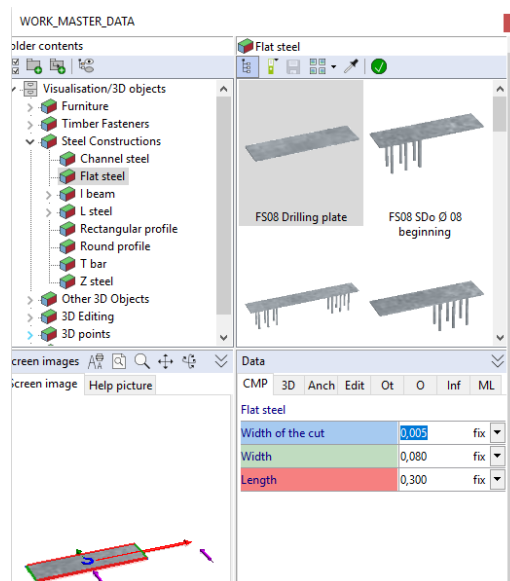
- Selecting and modifying of the flat steel

Program selection: 

Function: 

Sub-function: 

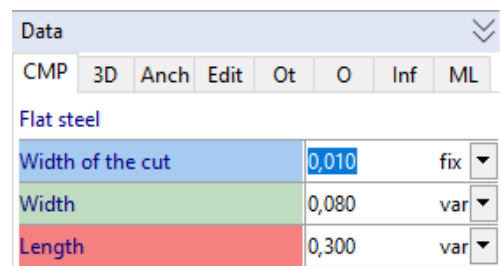
Working master data:



- Flat steel selected here: “FS08 Drilling plate”.
- Changes can be made in the “CMP” tab of the component.

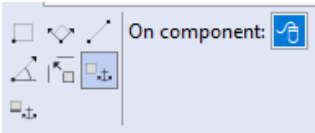
Important Note:

Width & length must be set to “var” (variable), so that the dimensions of the anchored component adapt.



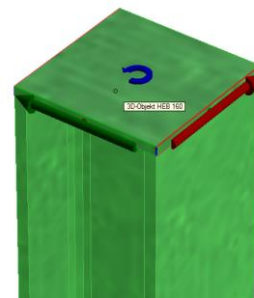
- The reference points of the component can be changed under the point “3D data of envelope”.

- Use the 6th option  “Anchor on component surface” for the creation.



Data							
CMP	3D	Anch	Edit	Ot	O	Inf	ML
3D data of envelope							
Ref. Point X axis	Beginning						
Ref. Point Y axis	Beginning						
Ref. Point Z axis	Beginning						
X rotation							
Y rotation							
Z rotation							

- The end plate is placed on the component end of the HEB beam in the 3D via mouse click.



4. Baseplate with Drilling Pattern

- Again, the flat steel “FS08 Drilling plate” is selected via “3CAD” > “Steel Constructions”.

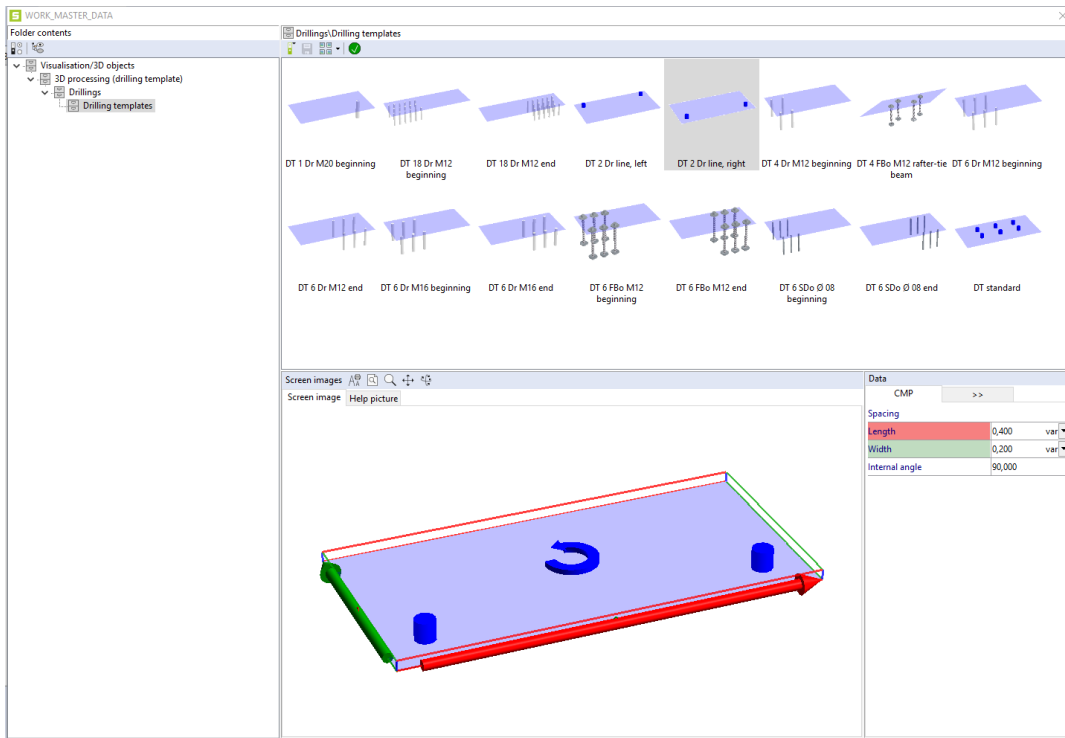
- Change the “Anchoring” tab of the component as follows.


Data							
CMP	3D	Anch	Edit	Ot	O	Inf	ML
Anchoring							
Anchor/ reference point	RFP 1						
Dist. from reference 1	0,000						
Dist. from reference 2	0,000						
Anchor/ reference point	Both						
Dist. from reference 1	0,005						
Dist. from reference 2	0,005						
Anchor/ reference point	Both						
Dist. from reference 1	0,020						
Dist. from reference 2	0,020						

- The processings (drillings and the play for the flat steel) the flat steel is to create for the timber can be defined under the “Edit” tab.

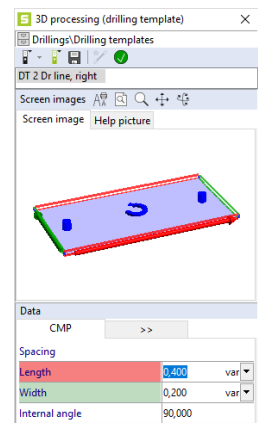
- Left mouse click into select menu “Drilling template 1”.

Select drilling template “DT 2 Dr line, right”.



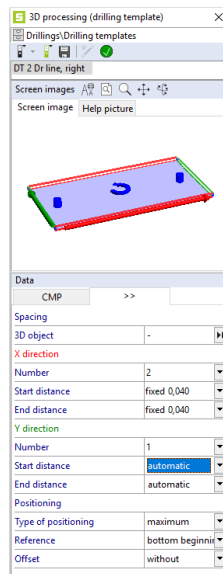
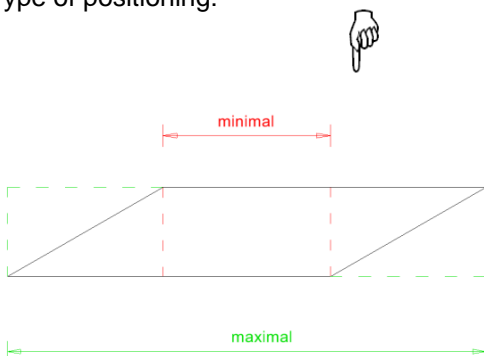
- Select the drilling template with a mouse click and confirm to adopt with the green tick .

- The size will be adjusted automatically under the “CMP” tab. The dimension/spacing is set to “var” (variable) by default. If desired, it can be adapted to the size of the drilling plate for better visual control.



- The number and direction can be defined under the “further data” tab “>>”.

Type of positioning:



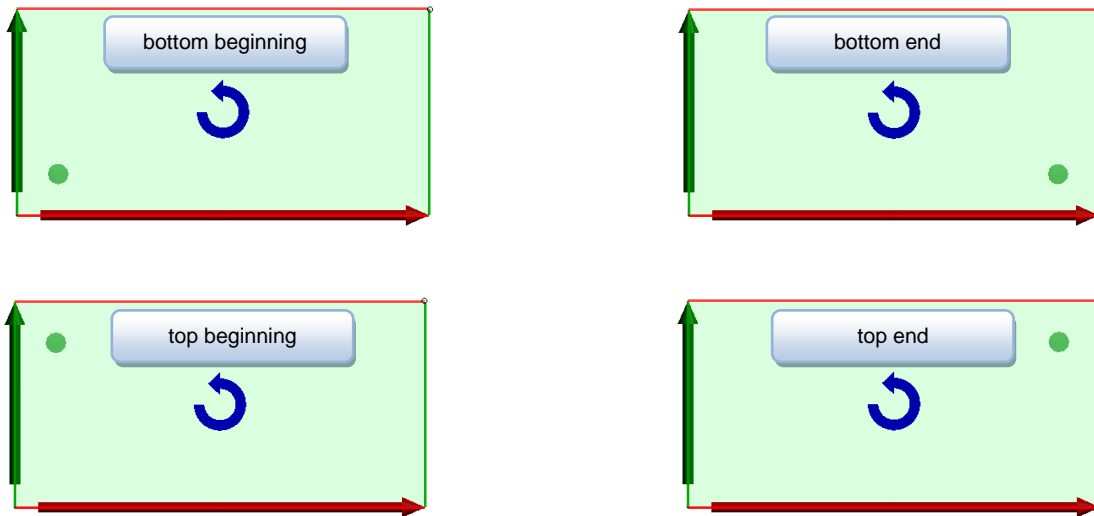
Drilling/steel dowels/screws can be selected here.

Number and distances of the 3D objects along the red line “X direction”

Number and distances of the 3D objects along the green line “Y direction”

Offset ½ drilling distance can be entered. Offset can also be distributed diagonally over the surface.

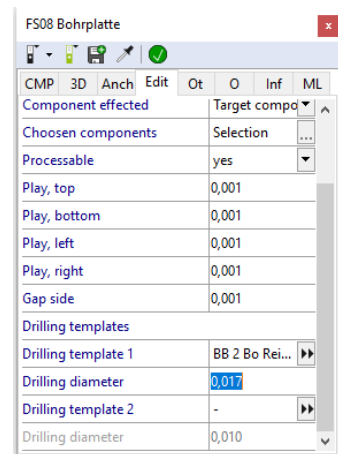
- The reference relates to the beginning of the arrow (example: with one drilling, fixed initial distance, each)





- If no 3D object is selected, it is possible to set the drilling diameter for the drilling plate (see blue colour).

- A 3D object stored will create the drilling diameter for the adjacent component.

- The drilling diameter for the flat steel can be set higher (variable).



- After selecting the designated drilling pattern and confirming/adopting it with the green tick , it can be anchored on the front surface of the HEB 160 via the 6th option  “Anchor on component surface”.

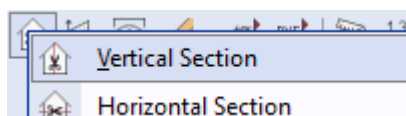
5. Placing of a Flag Plate

Hotz/Flag plates are created via a vertical section in the 3D view to be then fixed to the HEB 160.

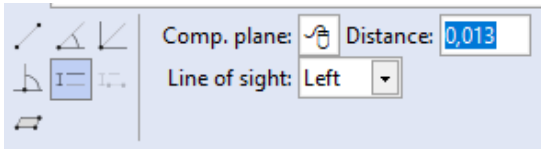
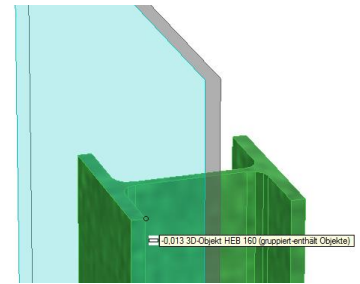
- Opening of the 3D view via function button  “3D View” in the top menu bar.

- Select function  “Create section” in the top toolbar.

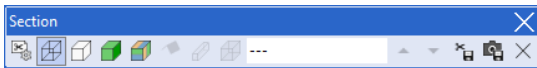
- Select “Vertical Section” in the menu.



- Use the 5th option (parallel) for the creation
- Press space bar 1x for additional distance
- Component plane: select web surface
- Distance: enter -0.013 cm = Flange thickness (T) HEB 160
- Line of sight: Left



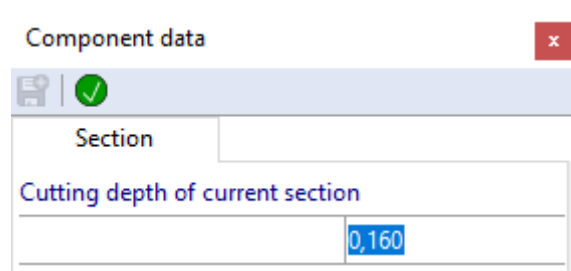
- Display section in the “Wire grid model” (orange colour).



- The cutting depth of the current section can be changed to 0.160m in the “3D intersection parameter”



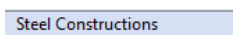
- Since the flag plate will be fixed directly on the flange, it is necessary to consider the weld seam of the HEA beam.



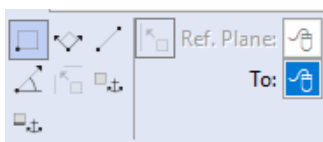
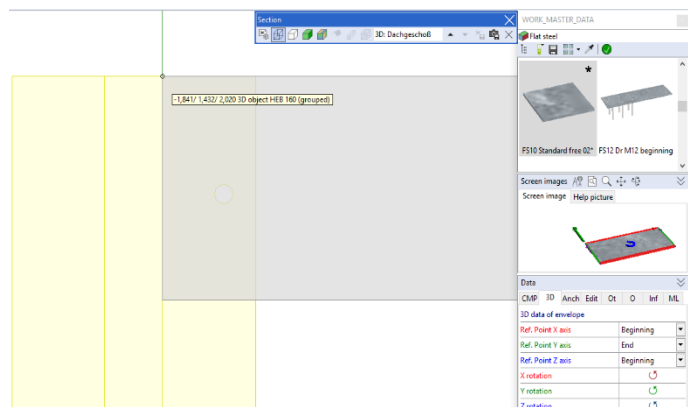
Program selection:



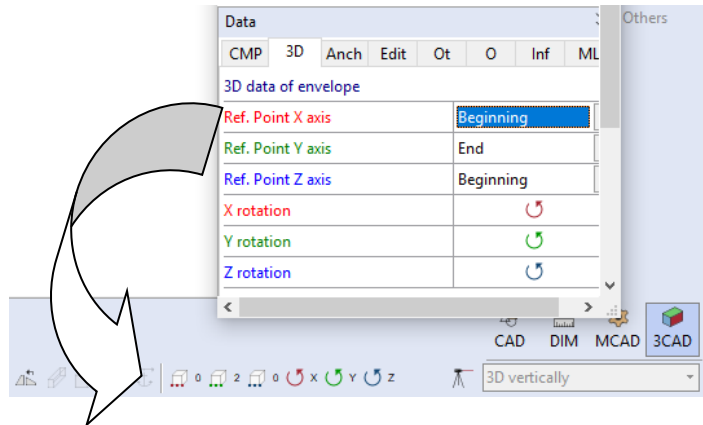
Function:



- Flat steel “FS10 Standard free 02” is selected.
- Make changes under the “CMP” tab of the component.
- The steel plate will be placed to the outermost point of the weld seam (first option used).



- The same settings as under the “3D Tab” can be made via the toolbar => bottom right edge of the program.



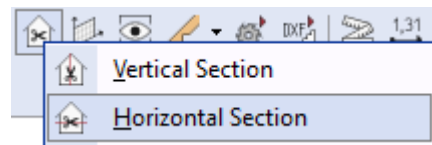
- It is, of course, also possible to define a “drilling template” via the “Modify” command after the placing of the flat steel.

6. Creation of Braces

- Select function “Create section”.

Height position of the cut:

- Select “Horizontal Section” and set “Height position of the cut” to 1.80 metres.



- Confirm this command with “Enter”.


- Program selection:




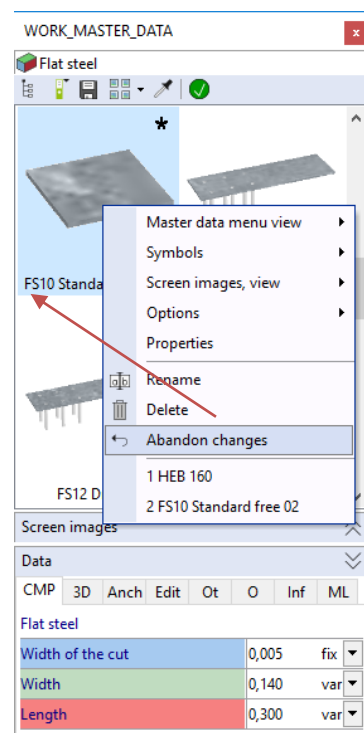
- Function:

- Changes previously made can be abandoned by right-clicking the master data.

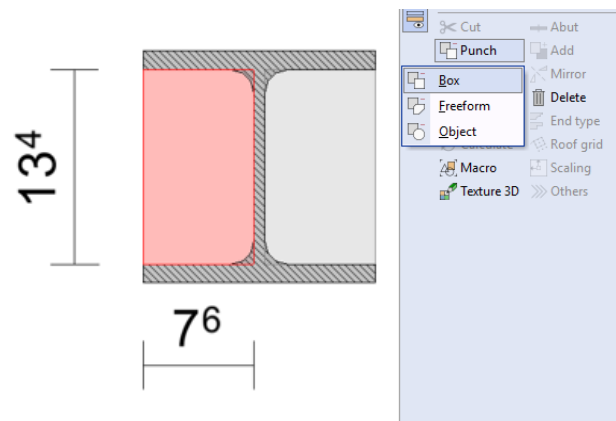
- The component data are then adapted relating to the dimensioning set previously.


- The steel plate will be placed via the first option  “Original size” (see picture).

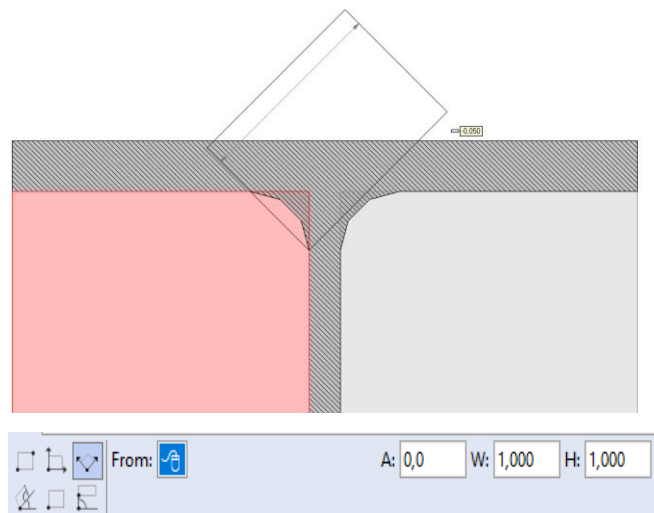
- With the first steel plate placed, it can be copied directly to the other side via “Copy”  .



- The corner of the steel plate can be adapted to the contour of the steel beam via the edit command **“Punch > Box”**.




- The corner will be punched by a spaciouly drawn out box via the 3rd option  **“Define component by angle, width, height”**. Only components marked previously will be edited.
- Punching procedure will be repeated for all corners contacting the weld seam.




Hint: The command used last can be called up again by pressing the “Enter key”.

7. Steel/Timber Connections by Means of a Steel Butt Strap

7.1. Creation of a Timber Beam in a Construction Plane Determined Previously

- The construction plane can be created via the function  **“Panel View”** in the top menu bar and subsequent selection of the line in the Top View.

- Program selection: 

- Creation command: 

- Any piece of timber from the timber-framed construction can be selected.

- The width, height and Z position are defined (see picture).

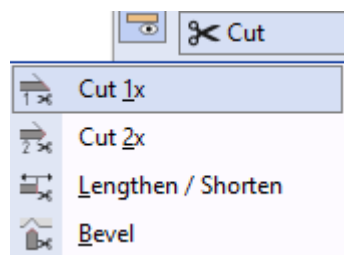
- The timber component can be created at any height in the direction of the steel support/beam.

Data	
Dat	>> St MC S Ot O Add N ML
Component	Post
Component width	0,300
Component height	0,160
Preferred lengths	5,000
Priority intersection	30
Type of cut	0
Function	0
Z position	0,000
Layer position	inside
Corner macro	no
Hardness	soft
End type	

Hint: Intersection for the steel support can be performed in both the 2D and 3D mode.

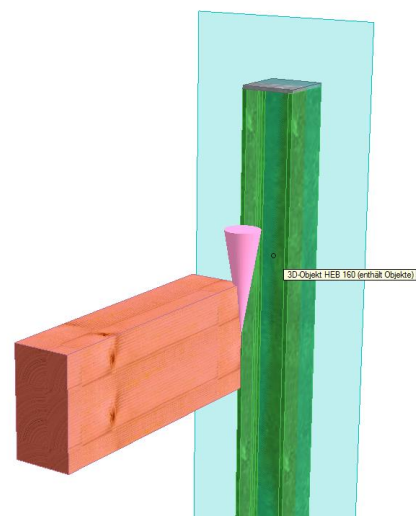
- Open the 3D view via function  **“3D View”** in the top menu bar.

- Edit command:



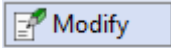
- The front surface can be selected with the correct position in the 3D view and the **“parallel option”**.

- Confirm command with **“OK”**.



- As a rule, a timber component is not intersected at a steel component fitting accurately – it is, thus, also possible here to determine a play in all directions.

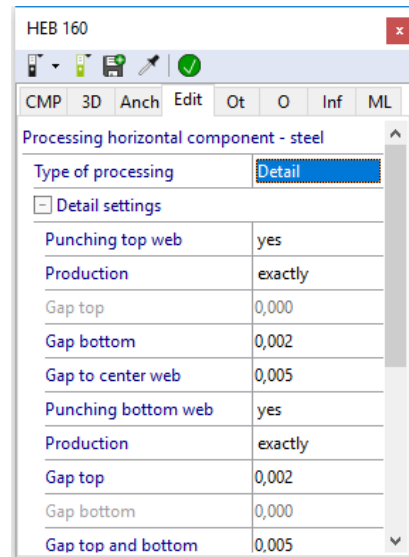
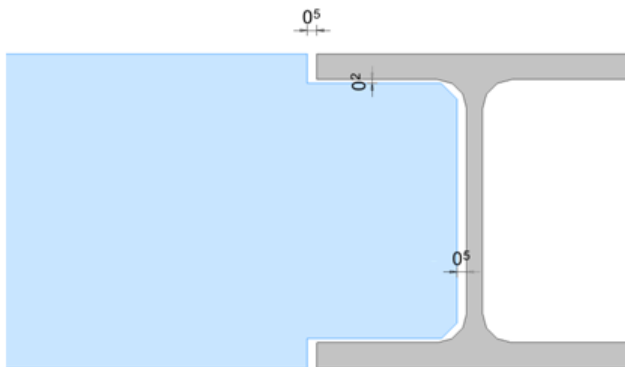
- Mark HEA 160.

- Edit command: 


- Open “Edit” tab.


- Set “Type of processing (horizontal) to “Detail”.


- Open “Detail settings”.



7.2. Creation of a Flat Steel Connector with Steel Dowel

Program selection: 

Creation command:  Flat-steel connector
 Single connector
 Node connector
 Steel Constructions
 Timber component
 Timber member from object

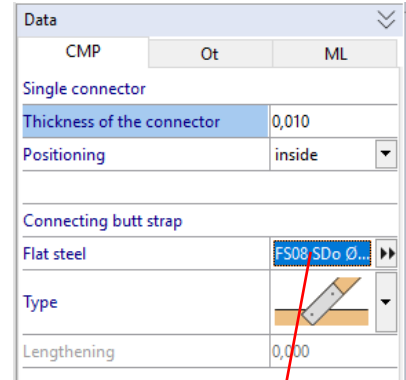
Master data: 
 SC08 SDø Ø08
 inside

Hint: The best method is to change the existing master data that is similar to the component designated.

- Change the following points under the “**CMP tab**”:

- Thickness of the connector: 0.010

- Type: Single connector cut at the component end (see also screen image).

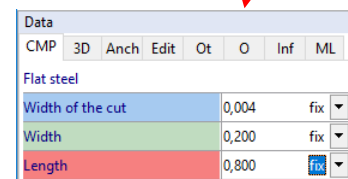


- Further settings for the flat steel can be made by clicking into the select menu.

- Thickness: not relevant in this window. The entry in the previous window “**Thickness of the connector**” is the relevant value.

- Width: 0.2 fix(ed)

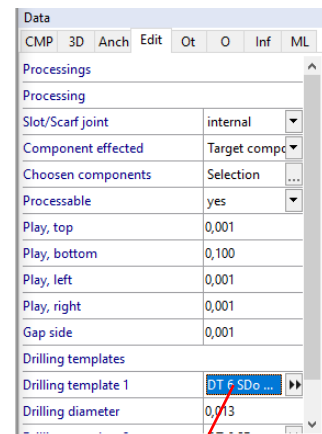
- Length: 0.8 fix(ed)



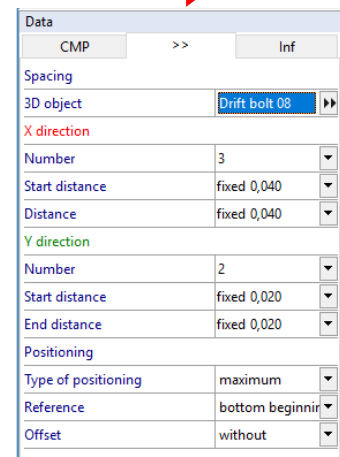
- The “**Edit**” tab comprises all criteria for processing that are to be applied for the timber beam.

- Play, bottom: 0.1

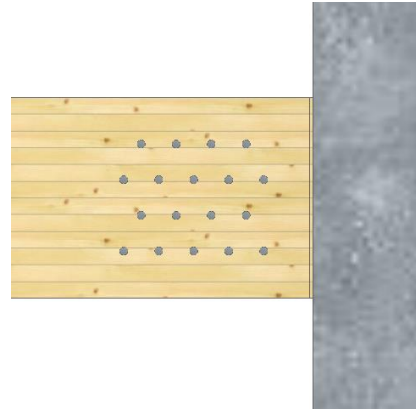
- Drilling diameter (flat steel): 0.013







- 3D objects, number, directions and offset can be defined under the further data tab “>>”.

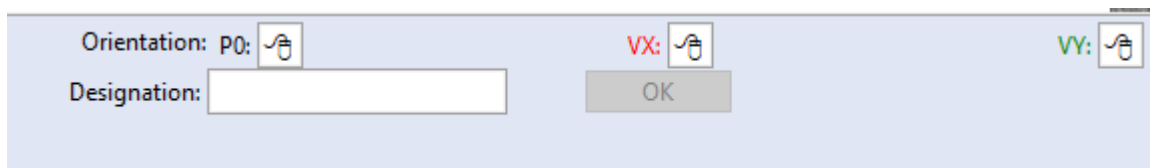


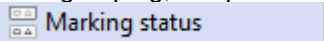
- With all changes made as desired, the single connector can be anchored on the timber (on the face side) with a mouse click.





8. Grouping of the Steel Column with all Components

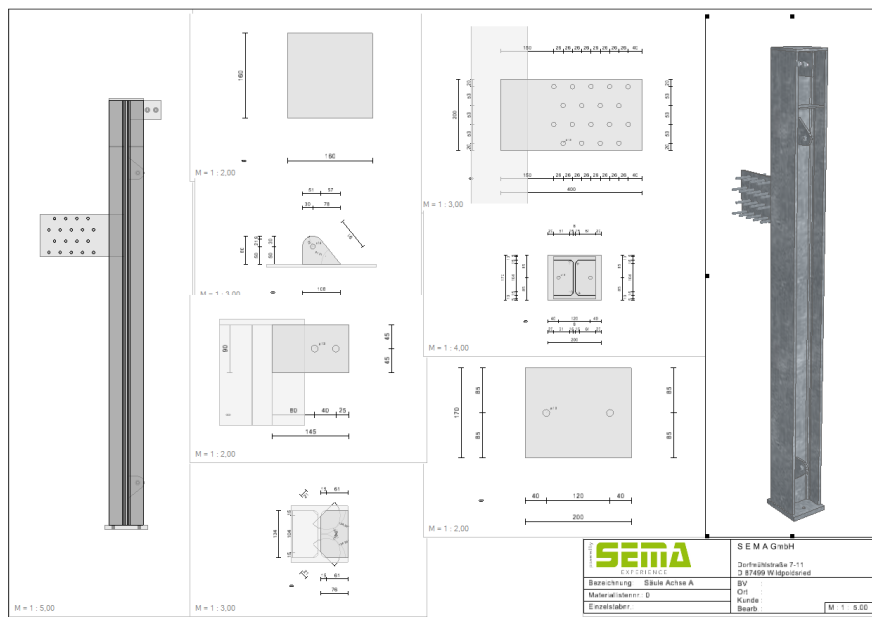
- Mark all steel components involved
- Select option  Macro
- Command  Group will open options at the bottom left.
- Switching between two options is possible.
-  Standard orientation
-  Freely changeable orientation (the side which is to become the view side in the layout view can be determined here)
- A name for the component group can be assigned in the field "Designation".



- After grouping, it is possible to access the individual components without ungrouping the group via the  Marking status .
- These types of processing enable the design of additional components in a detailed way. Furthermore, it is possible to copy the construction plane in the top view. Steel constructions can, thus, be duplicated easily and quickly.

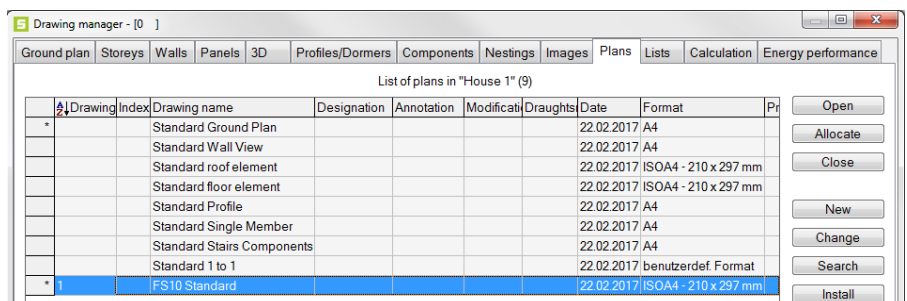
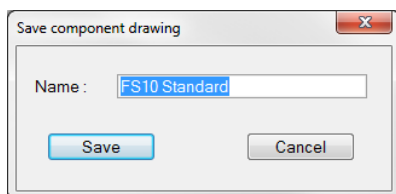
9. Print Output

- Mark the component group.
- Select function  “Single component view” in the top menu bar.
- Switch to the layout view with button  “Switch between normal and layout view”.
- A predefined plan will be opened automatically.



10. Saving of the Plan

- The plan can be saved via the icon  “Diskette” in the floating menu of the plans.
- The plan can be opened again in the Drawing manager.



Please visit: www.sema-soft.de/en/software/features/ for further features.