AUTODESK UNIVERSITY


# Custom Steel Connections as a Time-Saver in Advance Steel

Udo Haedicke
Autodesk GmbH

## Learning Objectives

- Understand Advance Steel custom-connection workflow
- Learn how to create custom connection according to the model requirements
- Learn how to spread custom connections in the model
- Learn how to adjust custom connections according to model changes

## Description

In this class, you will learn how to take full advantage of Advance Steel software for designing specific steel connections, and you'll discover how you can reuse them in the same project or in other ones to speed up the modeling phase. This session features Advance Steel and AutoCAD.

## Your AU Expert

Udo Haedicke is a Product Manager at Autodesk, responsible also for Advance Steel software. He owns a diploma as structural engineer from German university HTWK Leipzig. After 9 years working as engineer in a design office he started at GRAITEC as Application engineer for Advance Steel. Over the years Udo was promoted to Local Product Manager for the German speaking market and the Head of Technical Team at GRAITEC Germany. Three years ago he moved to Autodesk together with Advance Steel technology acquisition.

## Requirements

- Attendees are familiar with
  - AutoCAD as 3D modelling tool
  - Advance steel modeling functionalities like shortenings, miter, cope
  - Advance Steel connections

## Basics

- What can be a part of a user connection
  - All kind of Advance Steel objects like beams, plates, gratings, bolts, welds,…
  - All kind of features from “Feature” tool palette
  - Many connections from “Connection vault”
  - “Bricks” from the “Custom connection” tool palette

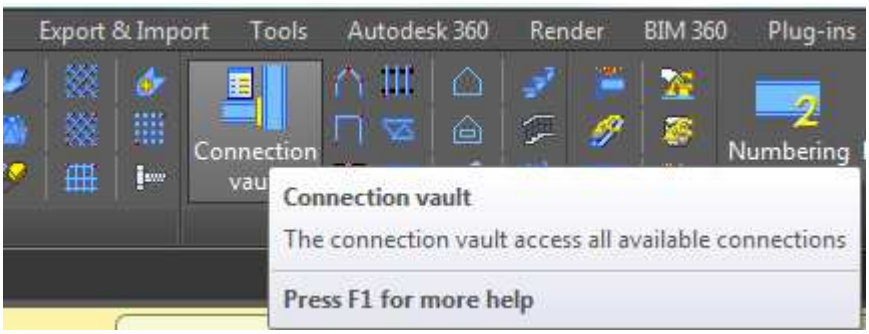
## Abbreviations

- RMB : Right mouse button click

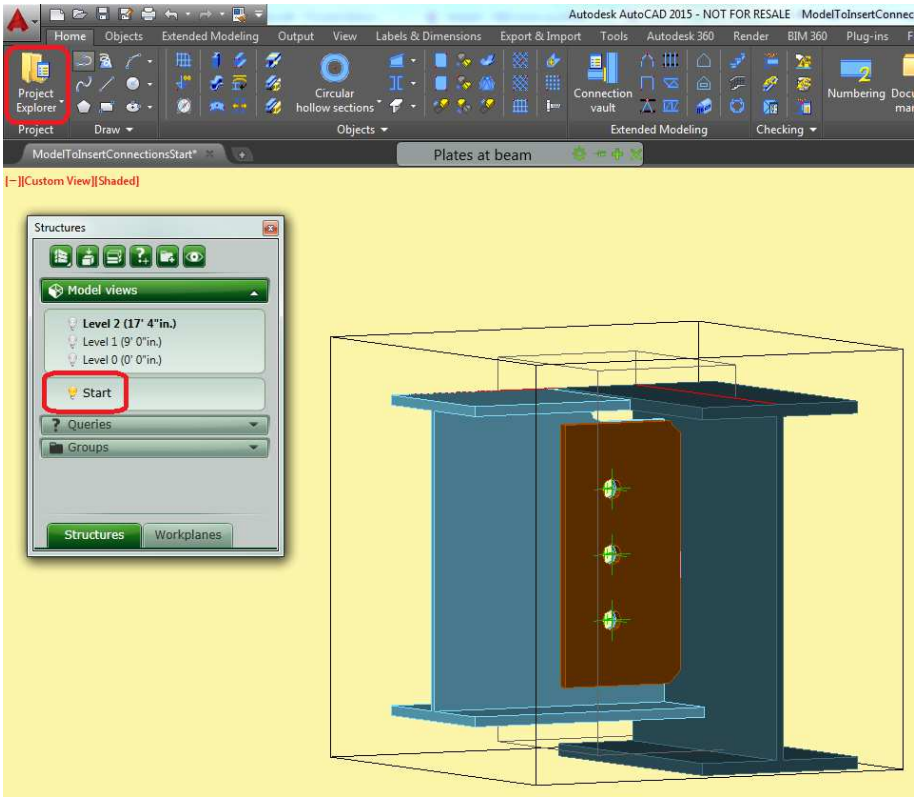
## Preparation:

- Start Advance Steel
- Open the file “ModelToInsertConnectionsStart” and save it with a new name
- Open the Advance Steel tool palette (Home / Settings)


- Open the Connection Vault (Home / Extended Modeling)

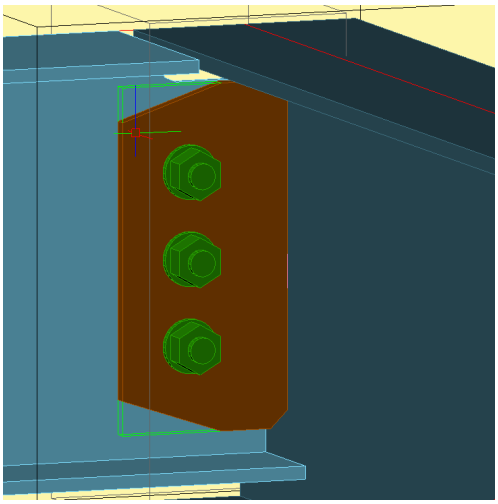


- Open the Project Explorer and use the model view “Start”
- Zoom to the visible model view cube

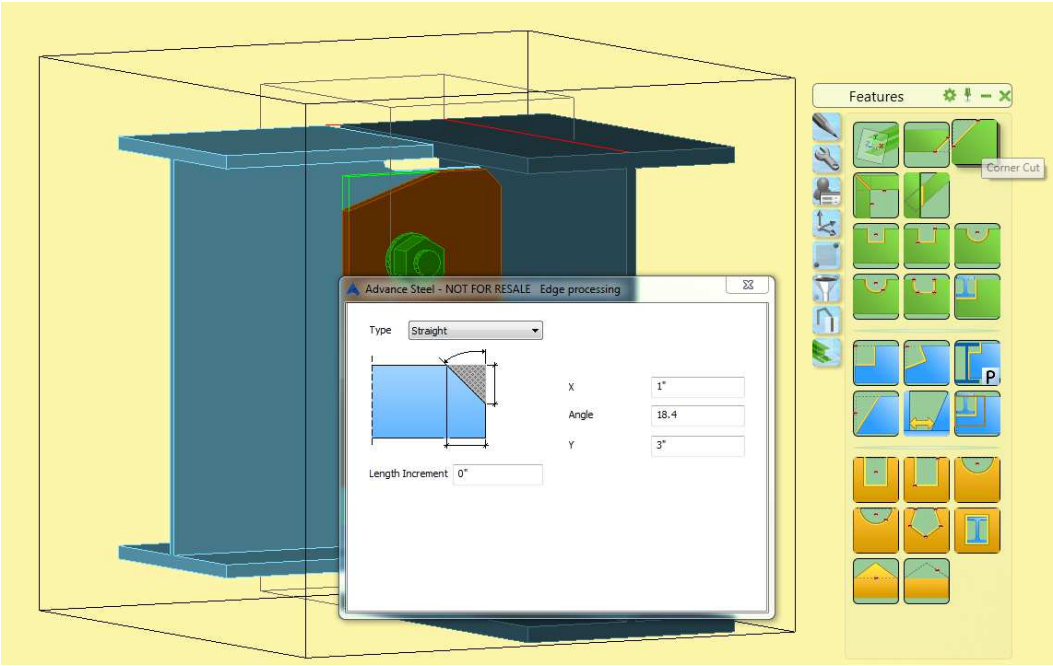


**1st example:**

- Standard shear plate connection, with coped plate corners



- Go to tool palette “Features” and start command “Corner cut”

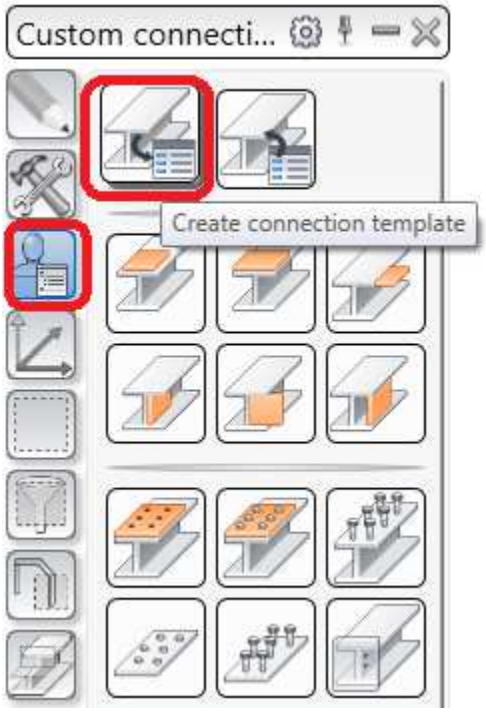


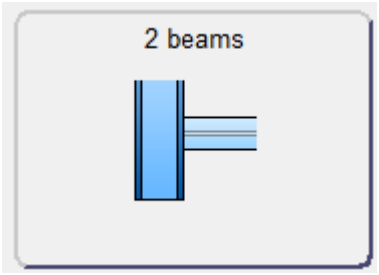

- Select upper plate edge and set X = 1” and Y = 3”

! Repeat the command (hit Enter or start command again from palette) for lower plate edge and set X = 3” and Y = 1”

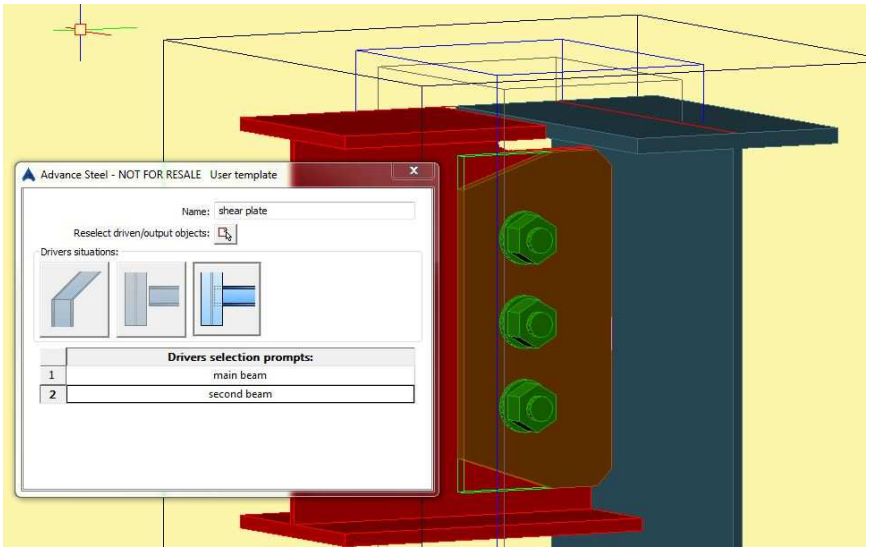
**Note:** The commands “Create by template”, “Create by template, multiple”, “Create joint in a joint group” and “Create joint in a joint group, multiple” will transfer only the connection without the plate corner cuts. To copy also the corner cuts it’s mandatory to create a custom connection.

- Go to tool palette “Custom connections” and run the “Create connection template” command

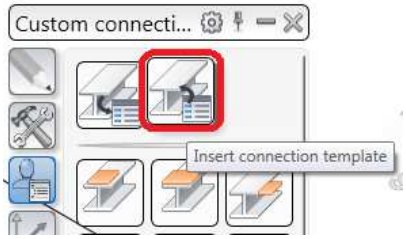



- Click on 

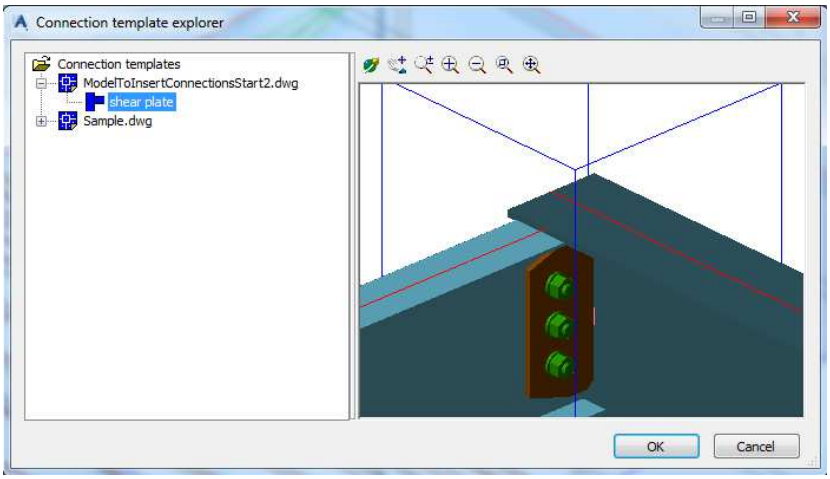

- Select the dark blue beam as 1st input beam, confirm with right mouse button (RMB)
- Select the light blue beam as 2nd input beam, confirm
- In the dialog make the following settings
- When selecting the driven/output objects make sure, you select the grey shear plate connection box and the two corner cuts, confirm with RMB
- When finished, close the command with “x” on top right




- The blue box shows that you have successfully created your 1st custom connection.
- Click to the lamp in front of the “Start” model view in project explorer
- Use “Insert connection template” command to create the connection at another right beam end in the model.



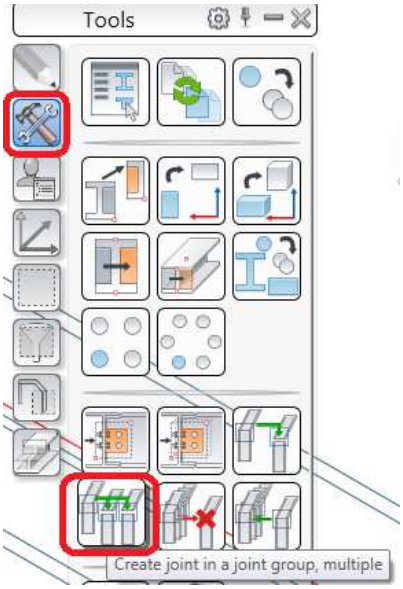

- In the “Connection template explorer” select your model file and the “shear plate” connection, click “OK”



- Select the dark blue beam on grid “C” as main beam and the light blue beam between grid “4” and “5”

- The connections are created

- Transfer this connection to the other beam crossings at grid “C” and “7” using the “Create joint in a joint group multiple” command from “Tools” tool palette.




! Select the blue box around the inserted connection, confirm with RMB

- Select the dark blue beams at grid “C” and “7”, confirm with RMB

- Select the corresponding light blue beams, confirm with RMB

Use this connection also for the other beam side, but with inverted bolts.

- Run the “Insert connection template” command, select the connection and create it at the dark blue beam on grid “B” as main beam and the light blue beam between grid “3” and “3”

- In the dialog check the box for “Allow object modification” then close the box

- Double click on the grey connection box, go to tab “Plate & bolts” / “Bolts and holes”

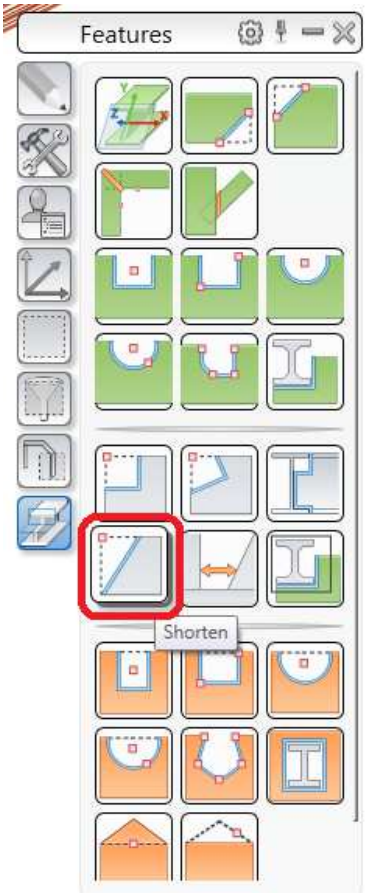
- Set the check box for “Inverted” (sometimes the change is made after 2nd tick)

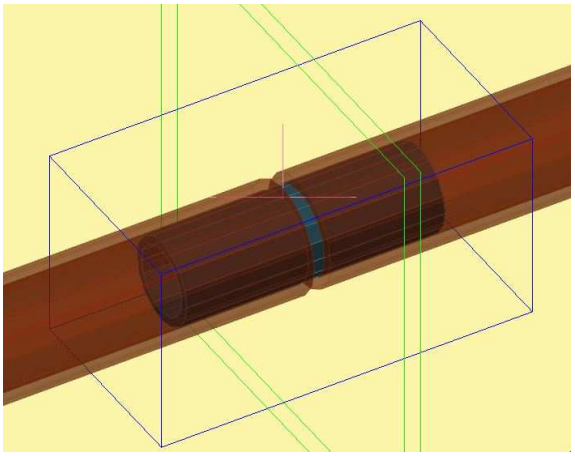
Transfer this connection to the rest of the light blue beams.

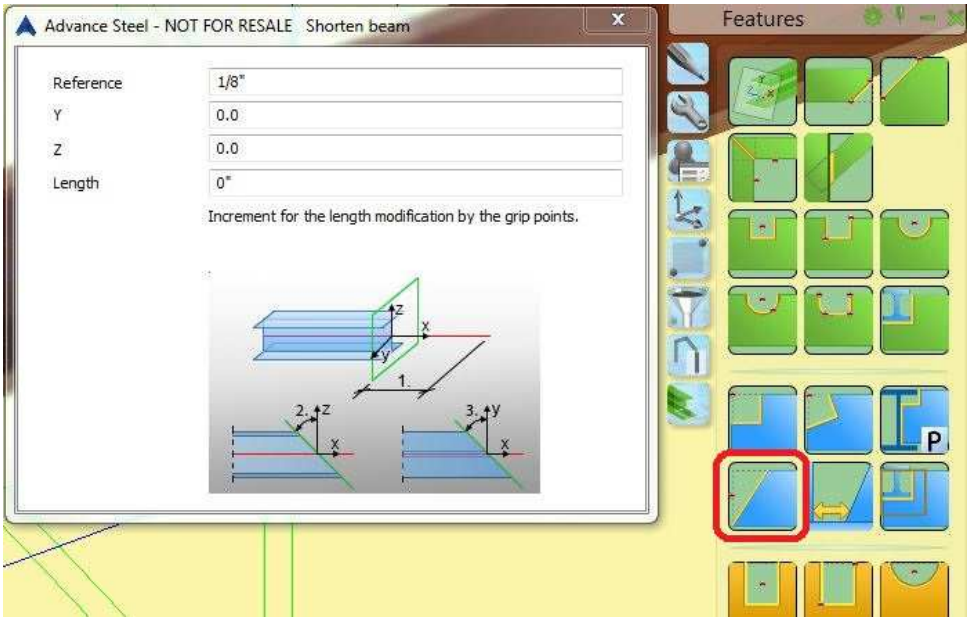
**2nd example:**

- Grab rail connection
- This connection is one, that we may use later also in a different model.
- Double click model view "2nd example"
- Select the 2 handrail tubes and press CTRL + C
- Open a new drawing
- Paste the object with CTRL + V into this empty model
- Save the file as "railing connections.dwg" under

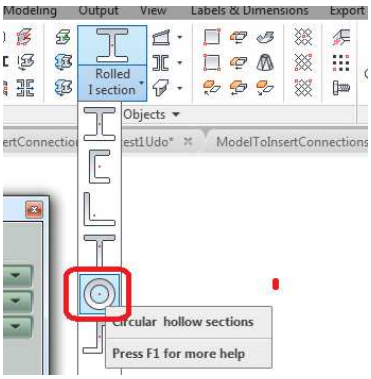
  **C:\ProgramData\Autodesk\Advance Steel 2017\Shared\ConnectionTemplates**
- Use the shorten command from "Features" tool palette for both beam ends at contact point






- In wireframe mode create a tube *AISC HSS Pipe Std\Pipe 1 Std* inside the tubes starting from system line end point in one orthogonal direction with length = 4”

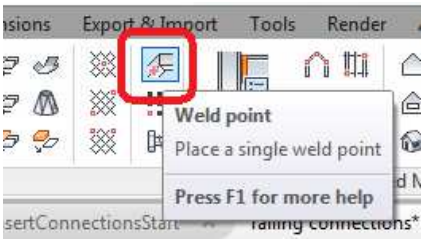



! Use the snap point “node” to snap to the system line endpoint, zoom out and move the mouse in one direction – type “4” and hit enter

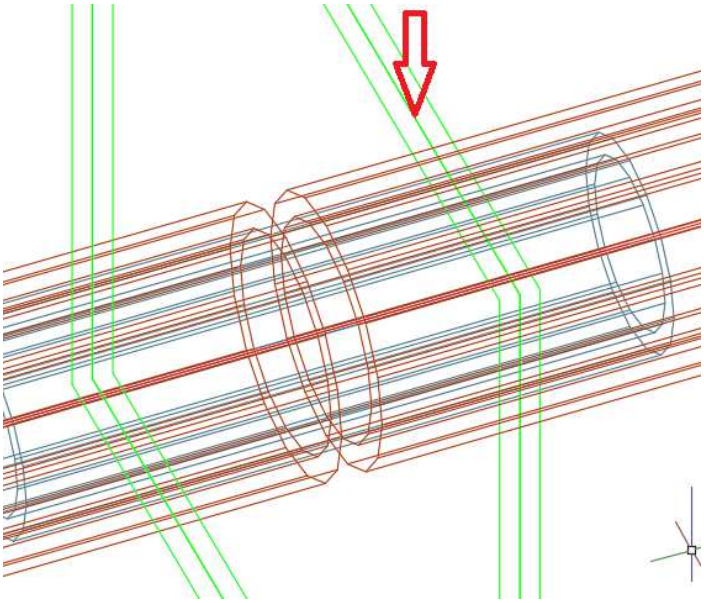
- Move (press “m” to start the command) the inner tube 2” in direction, so that it is placed centered between the 2 outer tubes

- Run a clash check


- Weld the inner tube and left outer tube

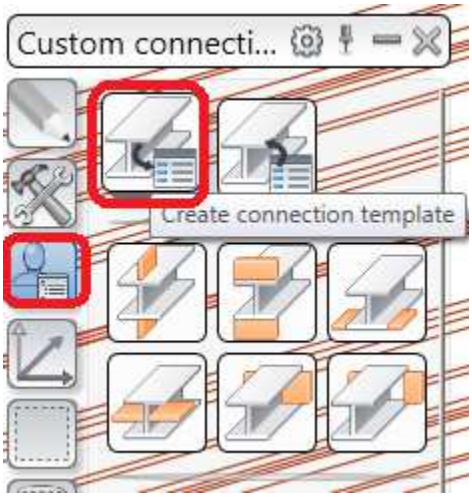


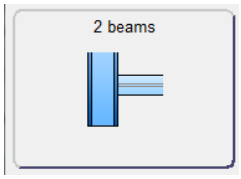

- Change the presentation type of the outer beams to “Features”
- Delete the 2 features in the middle



**Specify the custom connection**

- Start the dialog from the Tool Palette



- Select 

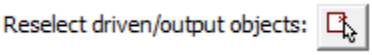
from the dialog

- When asking for the input beam:

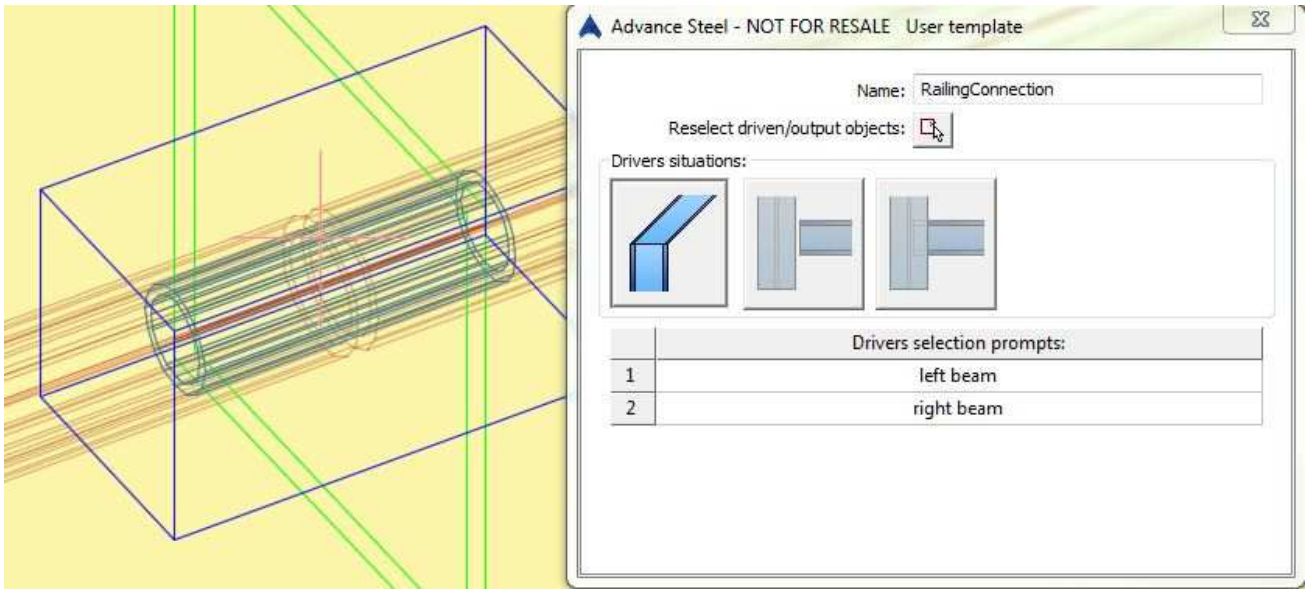
! Select the left tube / RMB / Select the right tube / RMB

- Specify the name as shown below

- Select the left picture and type the names for driver 1 and 2 as shown below

- Hit 

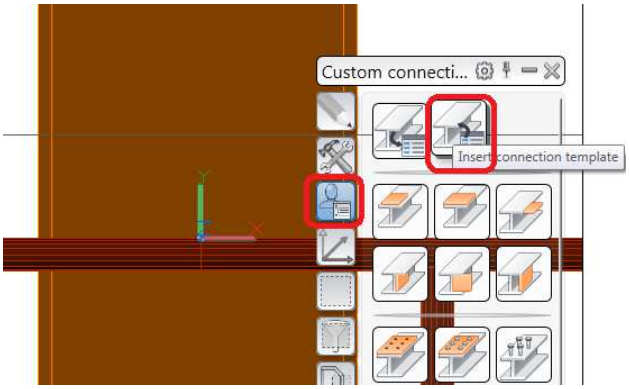

- Create the custom connection by selecting the green feature frames, the inner tube and the weld as “driven/output objects”

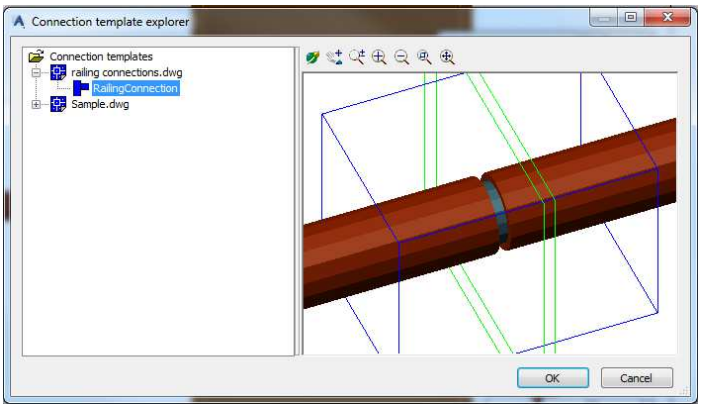



- After selecting hit enter -> a blue box is created around the connection -> close the dialog

- Save & close the file

- Insert the connection to the test model.




- You can insert the connection also to the knee rail


- Select and change the name to "RailingConnection2"
- Now you can change the inner tube size to AISC 14.1 HSS Pipe Std\Pipe 3/4 Std
- Run clash check again
- Distribute the connections in the model to the other railings, where appropriate as learned in example 1 – page 8

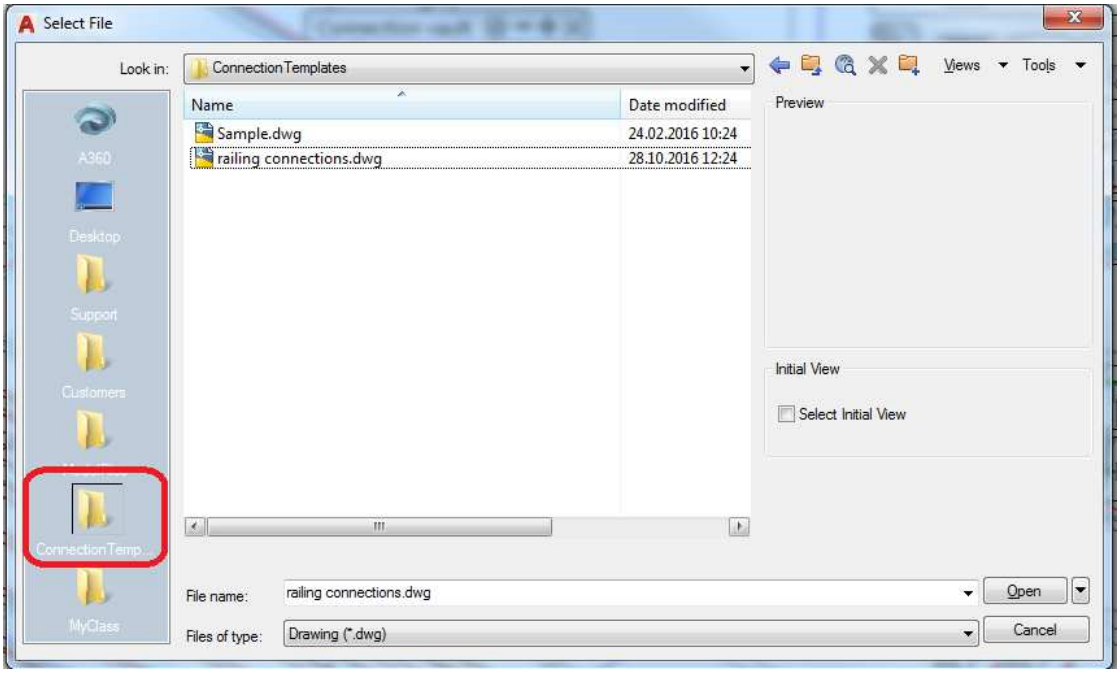
**Usability:**

In you daily work you will go back very often to the folder of the quick connections, so it is useful to have this place as a quick link available.

- Start the “open” dialog -> from “Quick Access Toolbar”
- Go to the path (or copy & paste from here)

  C:\ProgramData\Autodesk\Advance Steel 2017\Shared

- Select the folder “ConnectionTemplates” and drag&drop it to the places list on the left side



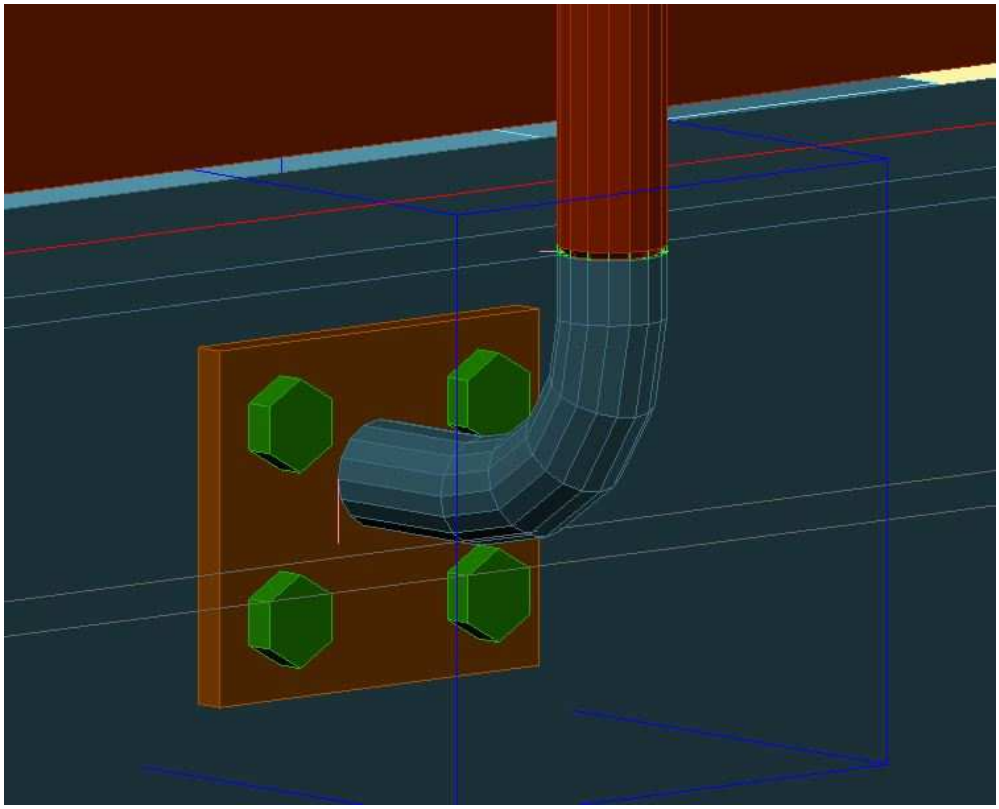

- From now on you have quick access to this folder

If you work in a collaborative team and would like to share the different custom connections with your colleagues – you can do that.

There is a default in Management Tool of Advance Steel allowing you to specify a net-drive, where the custom connection tool is looking as well for defined Custom Connections.

**3rd example:**

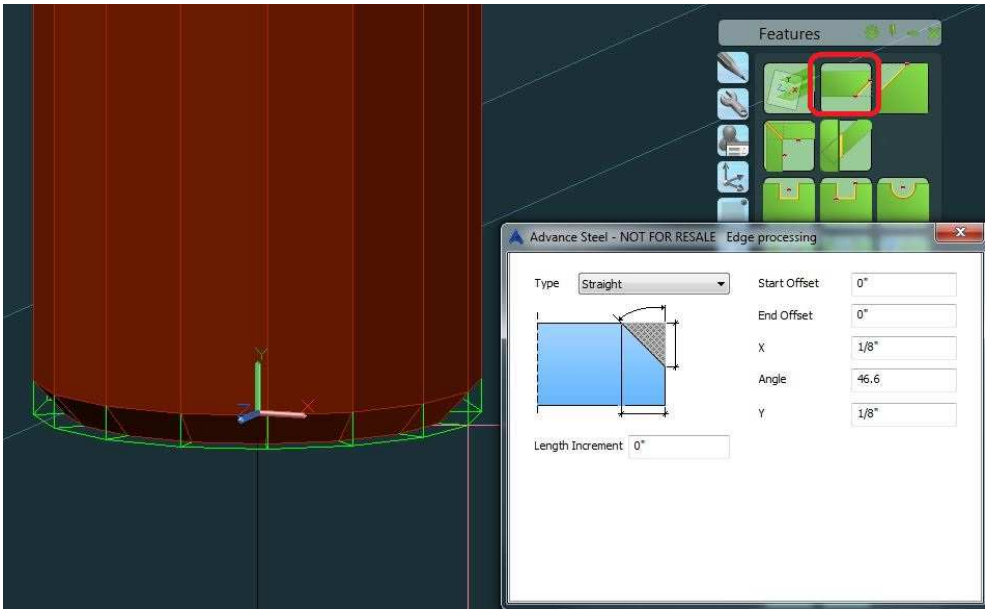
- Curved post connection



- Activate model view "3rd example"
- Copy two objects (blue beam & post) with CTRL + C to the clipboard
- Open the file "railing connections.dwg" under C:\ProgramData\Autodesk\Advance Steel 2015.1\Shared\ConnectionTemplates and insert the 2 objects with CTRL + V
- Zoom with double click on center mouse wheel to the objects
- Place the UCS per drag & drop to the post system line

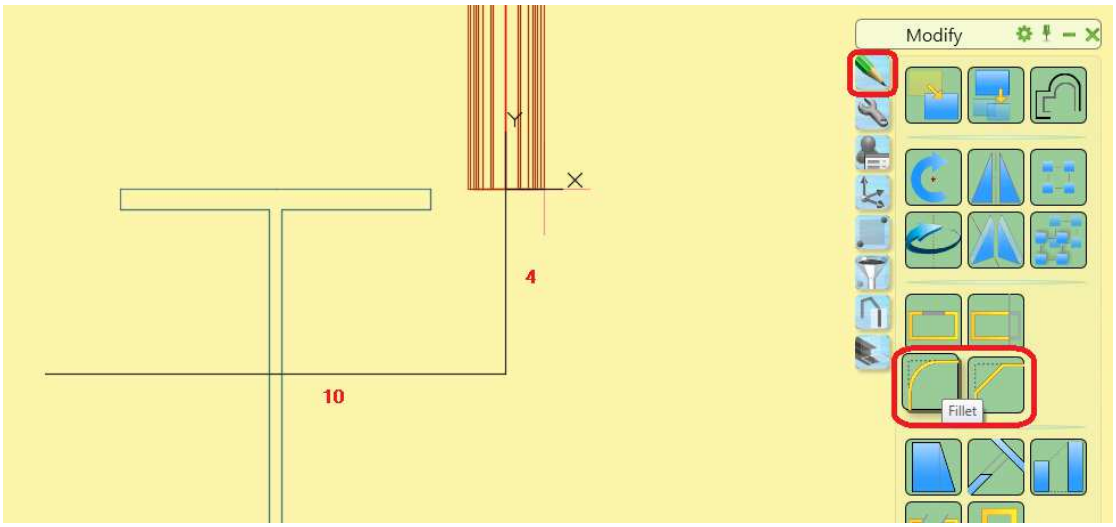
  ! Select the UCS / pick the cube in the middle / move it to system end line with snap point setting "node"

- Create a weld preparation on the lower post end with the command "bevel cut" from "Features" tool palette




! Rotate to front view using the view cube / Use the “UCS view” command from UCS tool palette

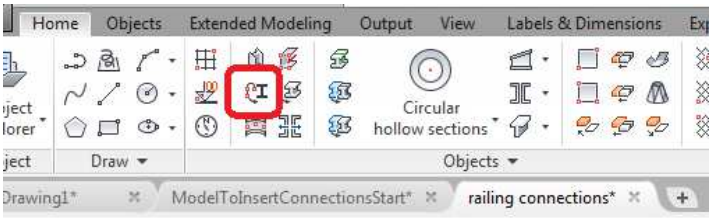
- Create a polyline starting from system line end point by typing “0,0,0” and press ENTER. Going 4” down and 10” left




- Use the “Fillet” command from Modify tool palette to create a fillet with radius = 3”

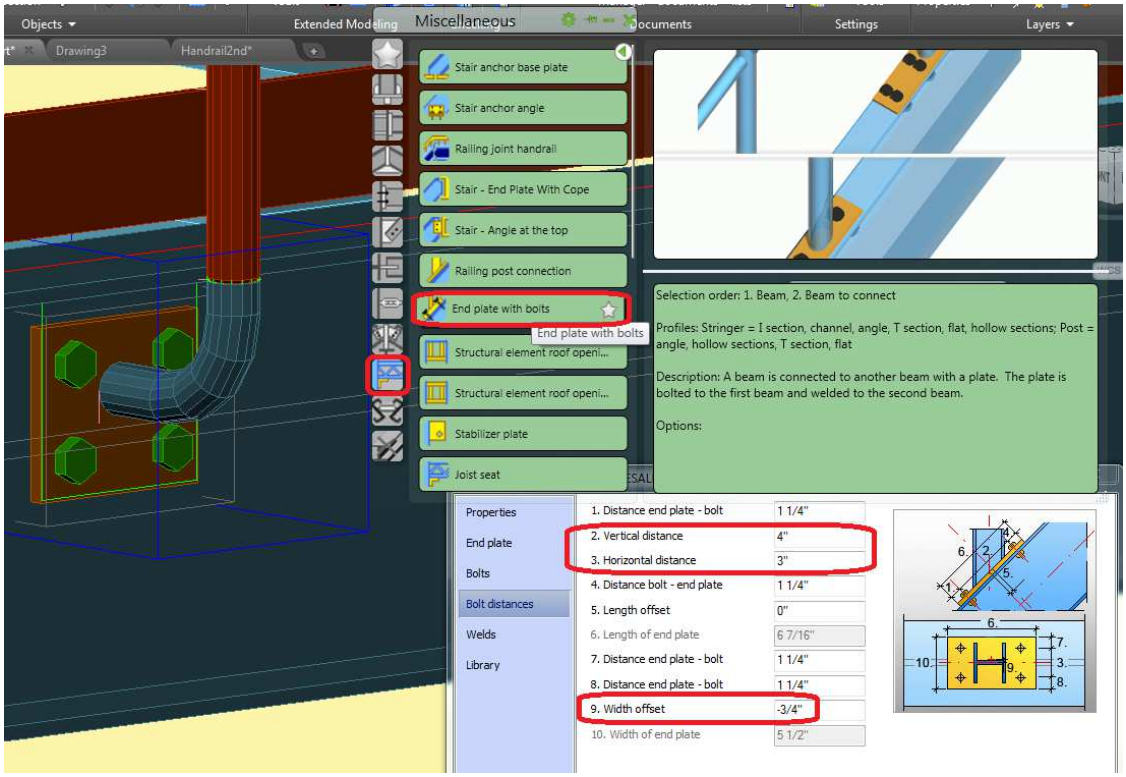
! Start the command, type “r”, type “3”, hit enter, select the 2 lines (read the advices in command line)

- Create a polygonal beam on that polyline with section size AISC HSS Pipe Std\Pipe 1 1/4 Std




- Create a shop weld between the two sections – Weld type Flare V – thickness ¼ - Continous

- Create an endplate connection between stringer and polygonal beam using the “end plate with bolts” connection from “Miscellaneous” tab of connection vault



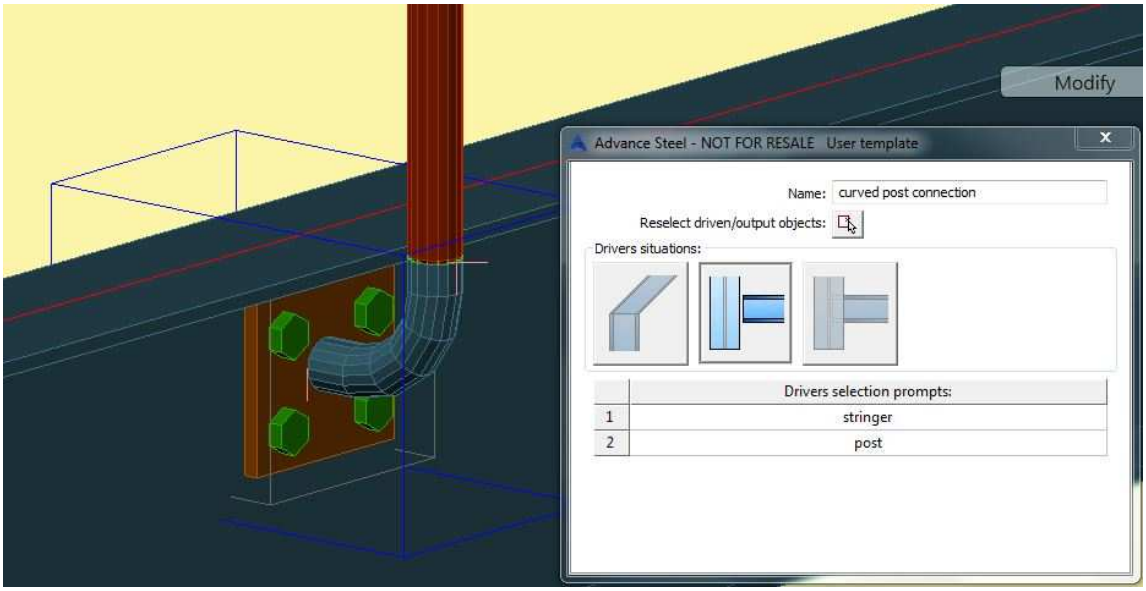

- Close the connection dialog when all settings are done

- Make sure, that the weld preparation and the connection box are visible

- Run a clash check

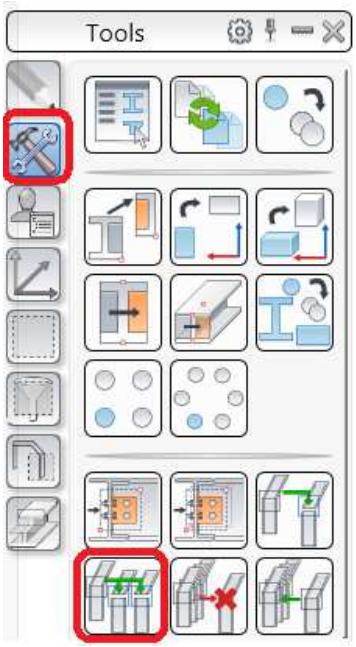
- Create the custom connection with the known command and the following settings as learned in 2nd example

- Make sure, that you select the weld symbol & preparation, the polygonal beam and the connection box as driven/output objects



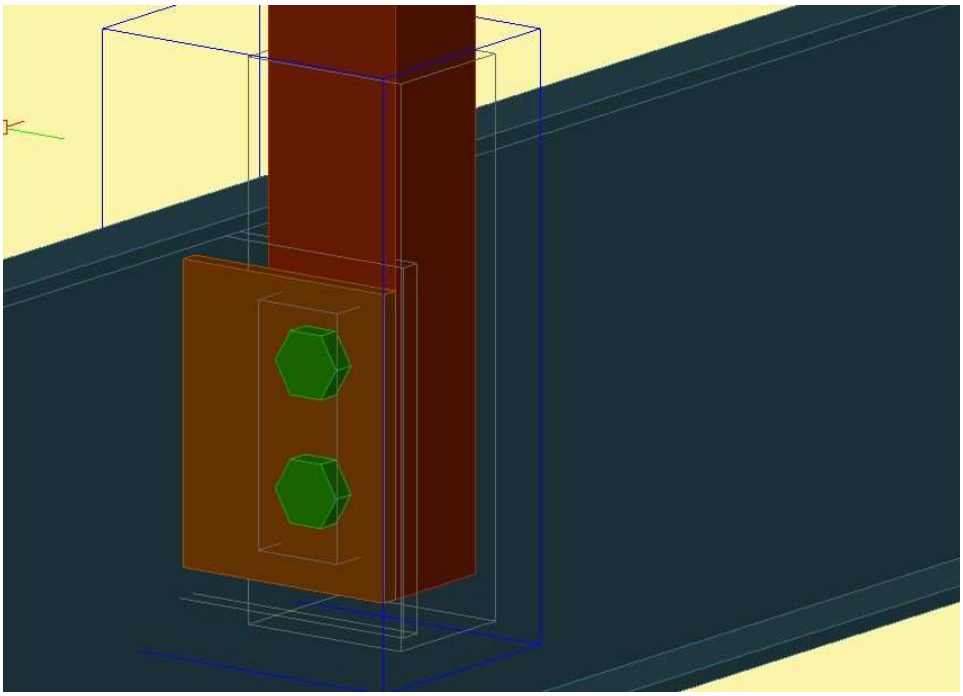

- Save & close the file, insert the custom connection to one post in the model.
- Transfer the connection in the model to the other tube posts
- Both steps were handled earlier and are described in more details in 1st and 2nd example

! Place the connection to other posts along grid 7 using the “joint group” functionality. You can select multiple stringers at once, RMB, select multiple posts at once and RMB – voila, the objects are connected.

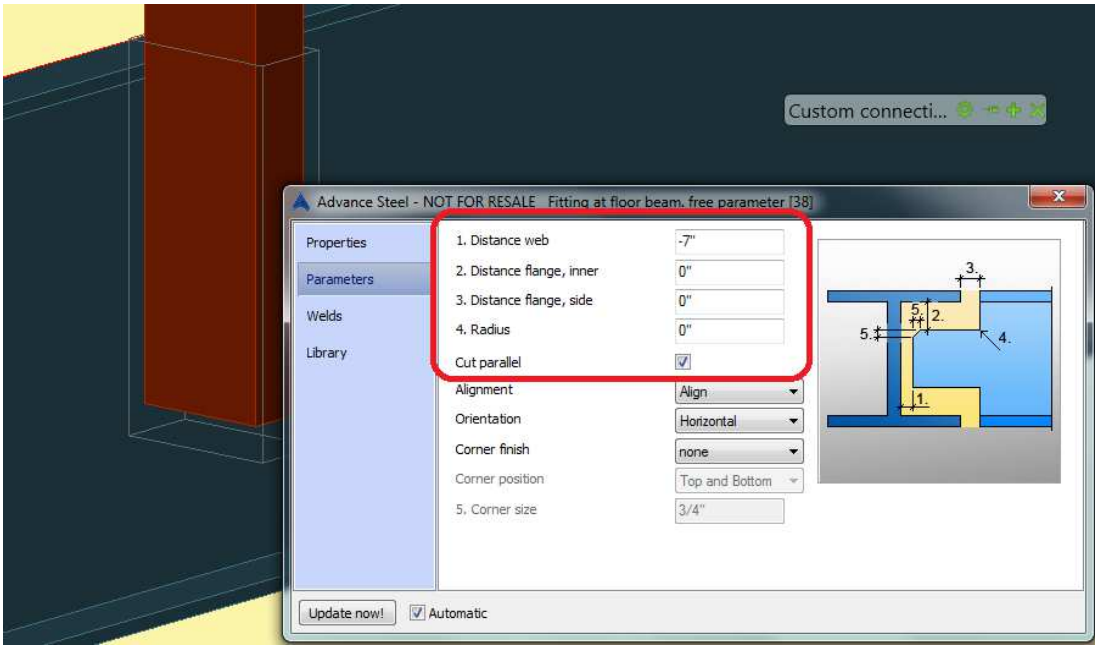


**4th example:**

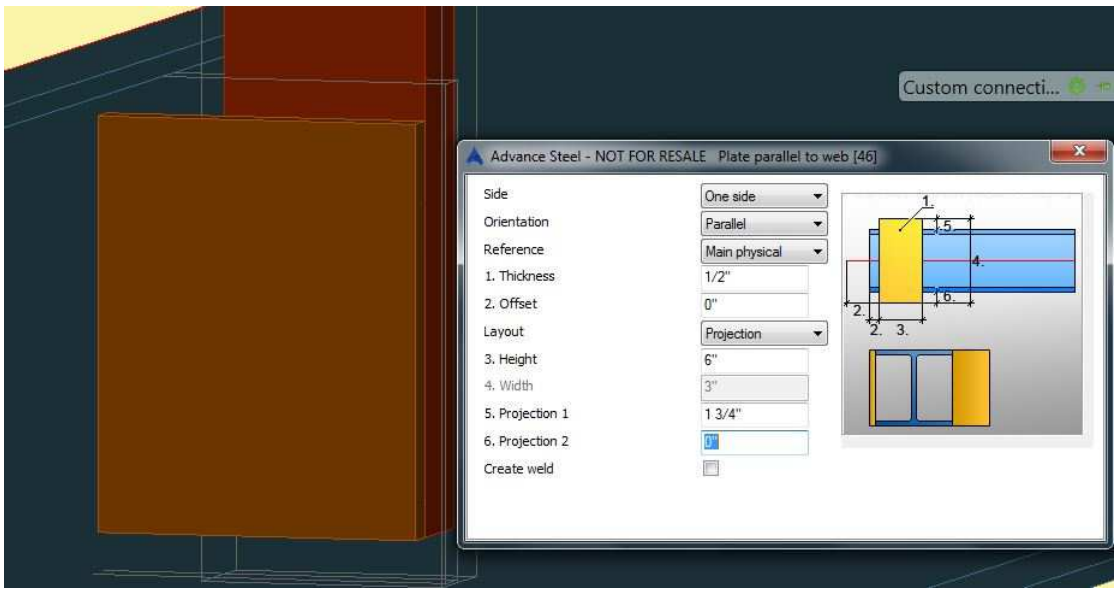
- Post connection with plate



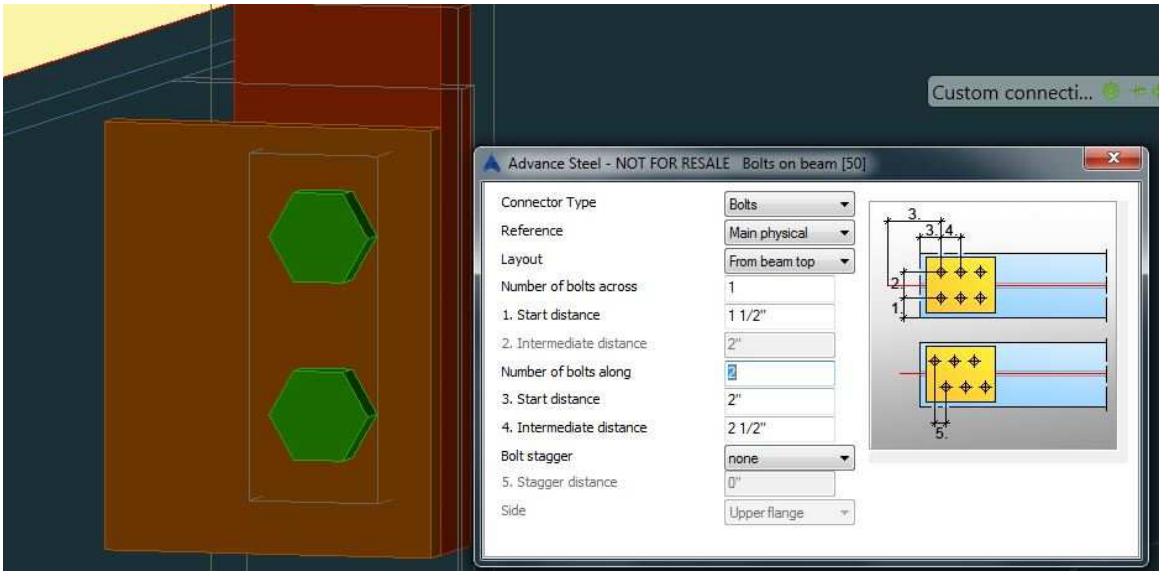
- As you are now familiar with the basic procedure to create a custom connection, the following steps are not explained as detailed anymore like the previous.
- Select model view "4th example".
- Copy stringer and post to the file "railing connections.dwg".
- Use the "cope, parametric" from Features palette for the post end




- Add the brick “plate parallel to web” from the “custom connections palette” to the post end.




- Use the brick “bolts on beam” to create the bolts between plate & post.

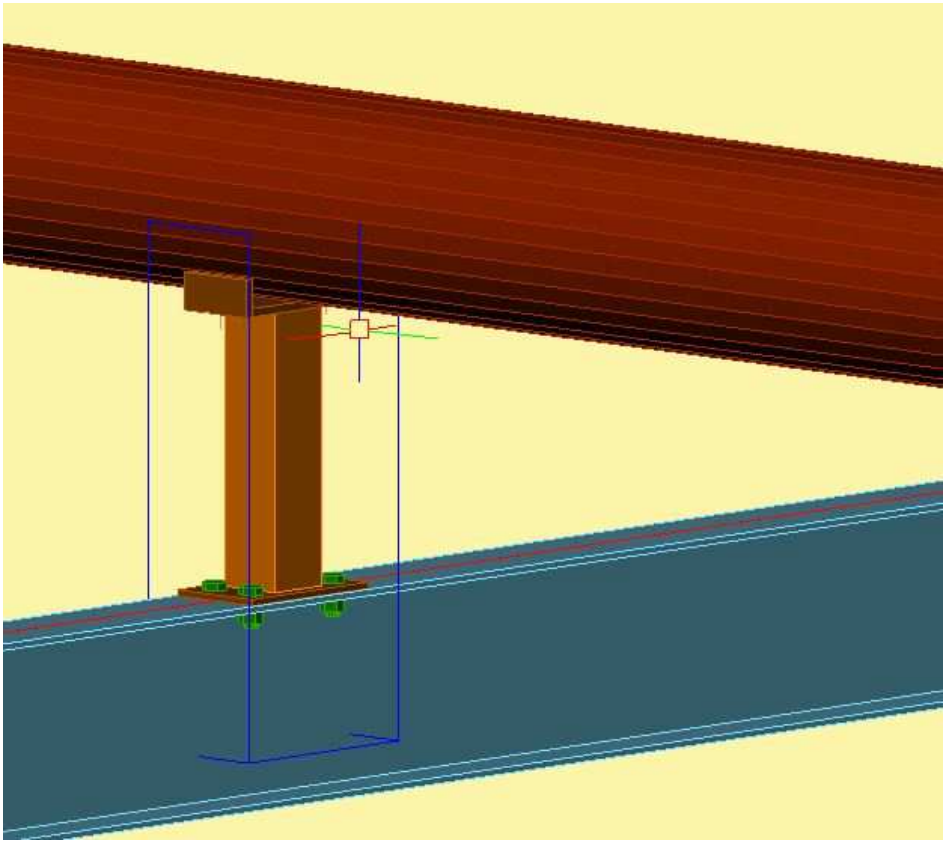



- Weld the plate to stringers web.
- Run a clash check.
- Create the custom connection and save the file.

! Insert the connection to the posts in the model. Try also the posts on sloped stringers and you will see the benefits of the brick – the plate is adjusting. Move the stringers inside railing macro.

**5th example:**

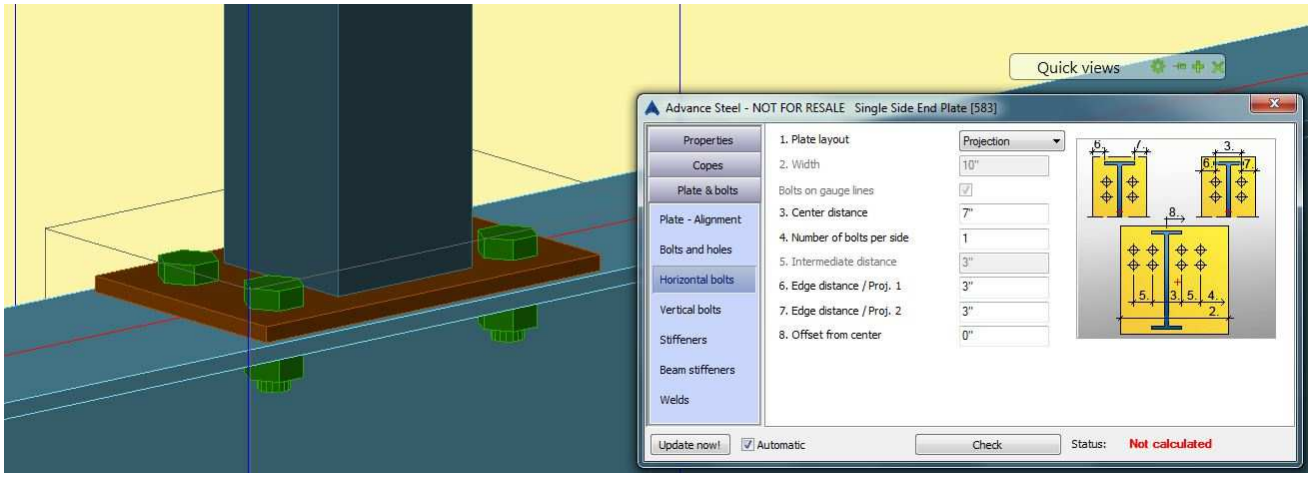
Pipe support (to be used for different distances between pipe and beam)

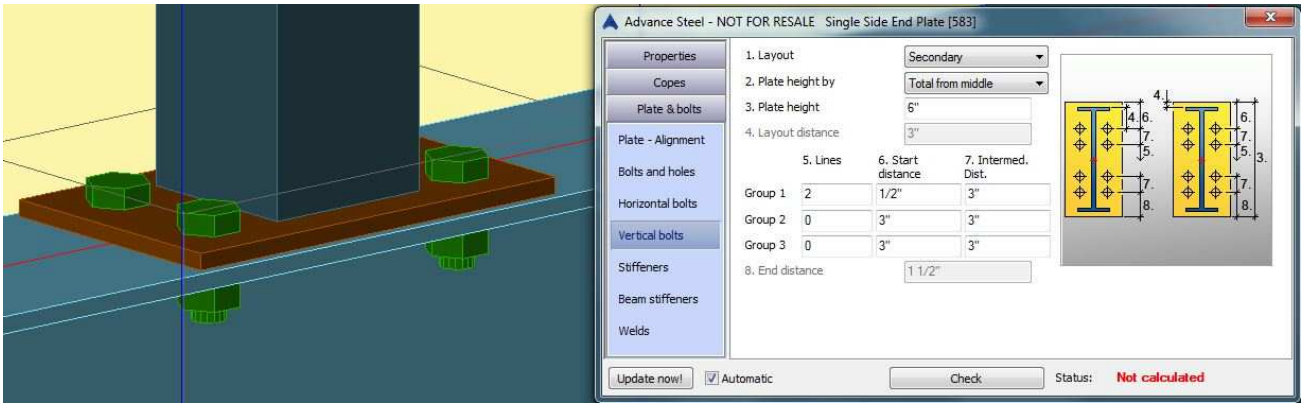


- Use the command “All visible” from “Quick views” palette in our model.
- Copy a pipe and one light blue beam under a pipe to a new drawing and save it in the custom connections folder
- Create a square rectangular beam AISC HSS square\HSS 4X4X3/8 from center of the light blue beam to top with a length of 2”

! To allow this connection to be used at different distances between beam and pipe it is key, to have the supporting section shorter than the distance.

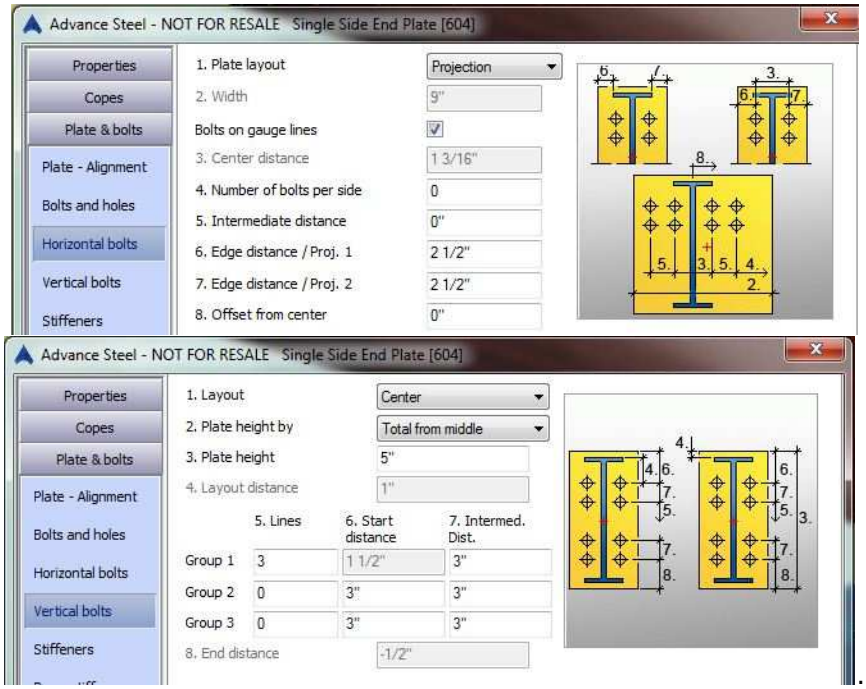
- Connect the beam and the rectangular section with single side end plate connection from connection vault



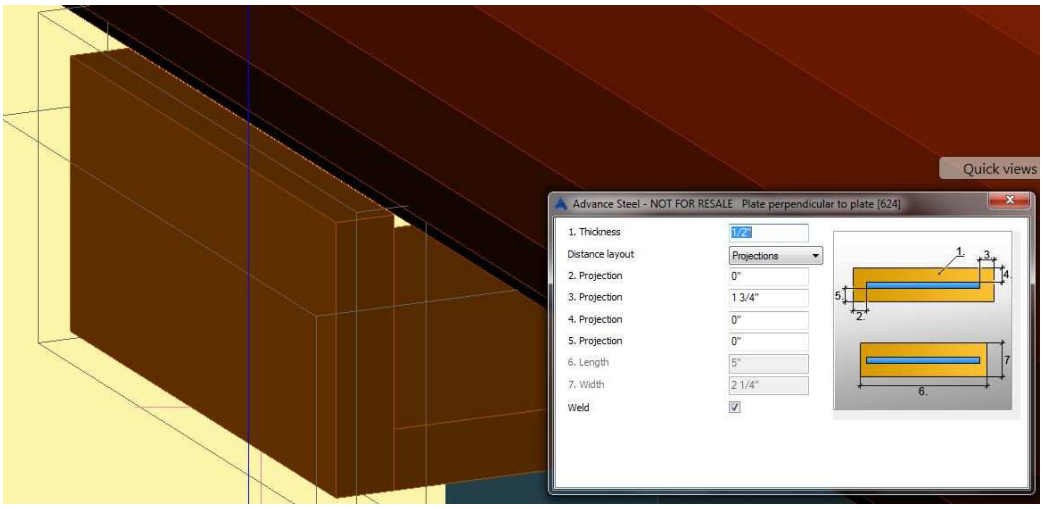




- If you like, you can add some stiffeners to the light blue beam using the stiffener connection from connection vault.

- Use also the single side end plate for the supporting plate under pipe



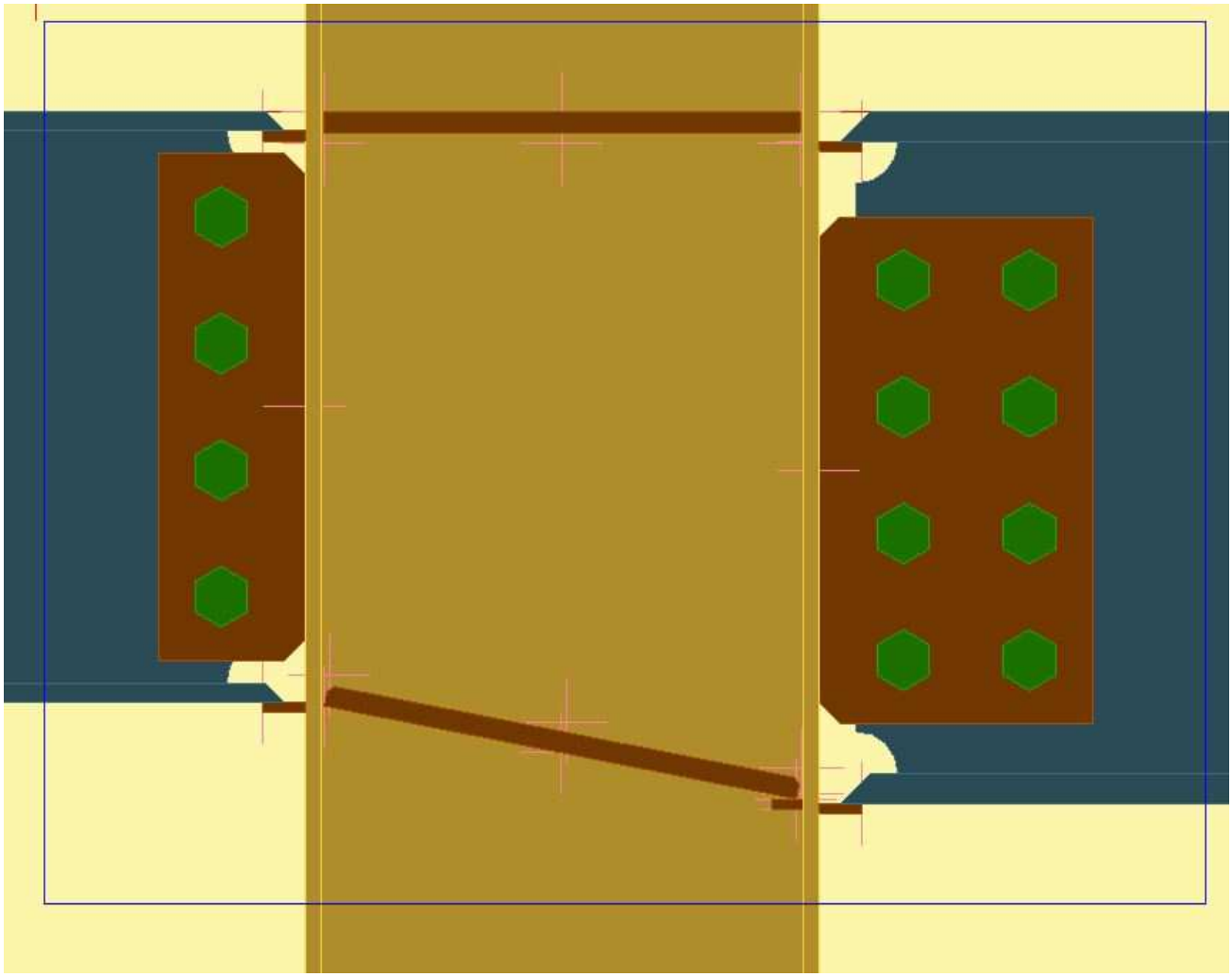

- Use brick “plate perpendicular to plate” to the plate edge.




- Copy this as a slave connection to the other side of the plate.
- Create the custom connection and insert it in the model to different situations.

**6th example:**

Try to use the things you know already and have learned in the last minutes to create the connection as shown below. Don't hesitate to ask, if you feel uncertain about the procedure at one point.



- Use the shear plate connection and moment connection from Connection vault
- Use the column stiffener brick from custom connection tab
- Used the clash check?
- If that last exercise was easy for you – you're an EXPERT now. Congratulations from Autodesk.