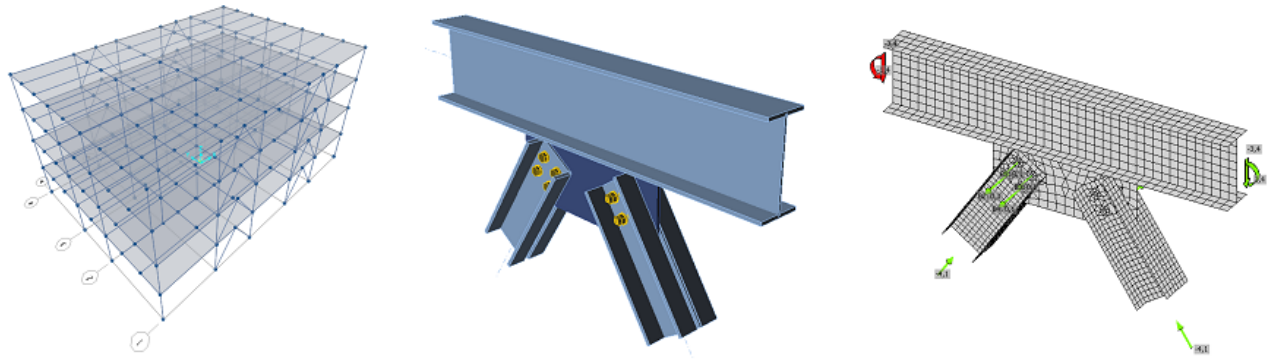


# IDEA StatiCa Tutorial – SAP2000 link

This tutorial will show how to activate and use the link between SAP2000 and IDEA StatiCa Connection.



[Activate the link](#)

[Use the link](#)

[Update the project](#)

[Known limitations](#)

## 1 How to activate the link

Install the latest version of IDEA StatiCa, get it in the [Downloads](#)

Make sure you are using a supported version of SAP2000 – updates are published in the [BIM section](#)

IDEA StatiCa automatically integrates the BIM link into your CAD/CAE software during its installation. You can check the status and activate more BIM links for later installed software in the BIM link installer.

Open IDEA StatiCa and navigate to the panel **BIM** and open the **BIM link installer**. A notification "*Run as administrator*" may appear, please confirm with the **Yes** button.

Calculate yesterday's estimates

STEELCONCRETE

BIM

Resource center

Activate your BIM link...

**IDEA StatiCa is a part of your workflow**

Speed up your analysis and design process by importing data model from the most widespread FEA and CAD programs.

Beam Selection



Design of Beam



Check EC / SIA

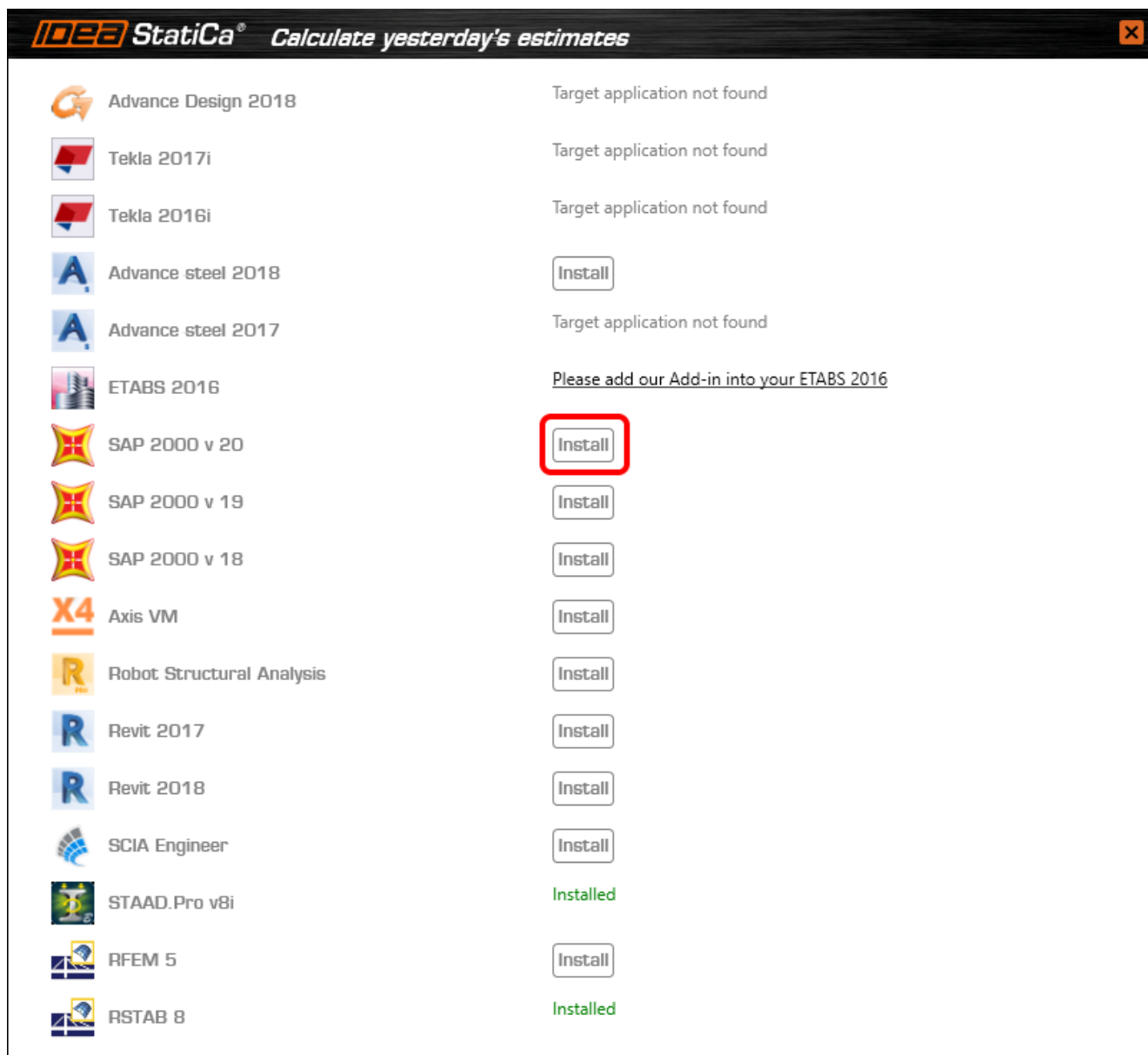


Open existing project  
Import from other program

Have a question?

Keep in touch at   

Select the software to integrate the IDEA StatiCa BIM link, click the **Install** button and check the Installed status.

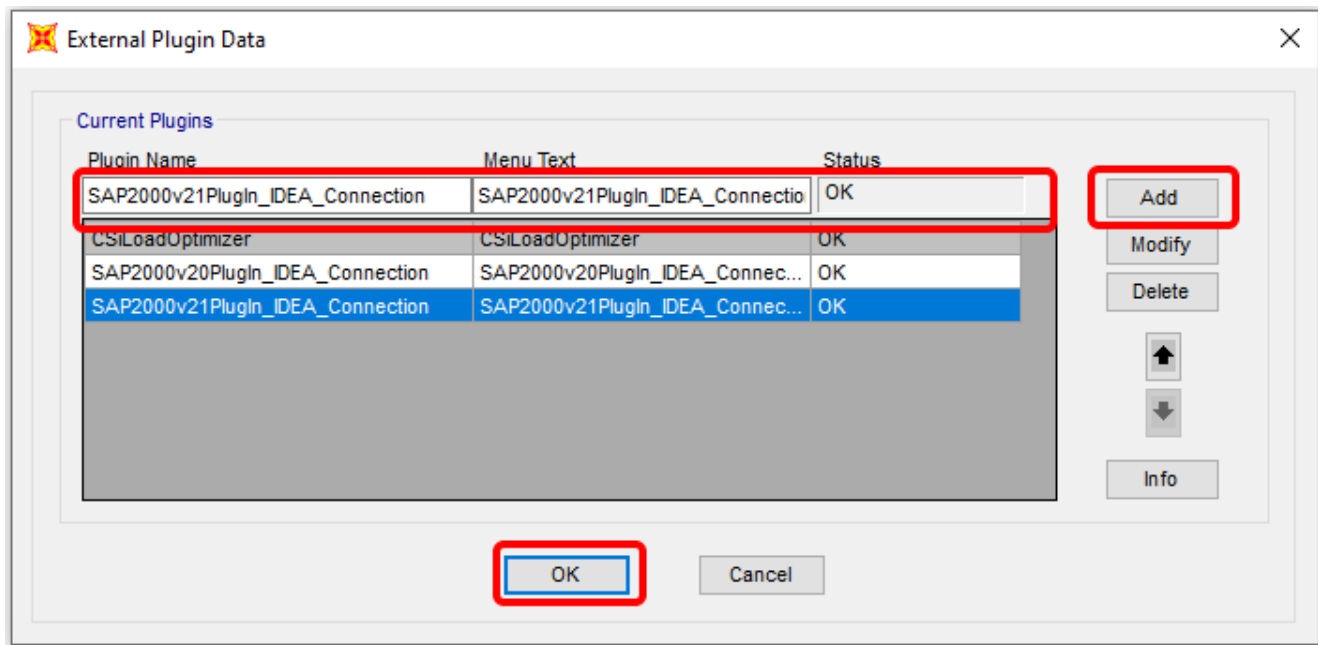


Start **SAP2000**. In menu **Tools** and **Add/Show Plugins** fill the Plugin Name field as follows:

SAP2000v20PlugIn\_IDEA\_Connection (in Version 20)

SAP2000v21PlugIn\_IDEA\_Connection (in Version 21)

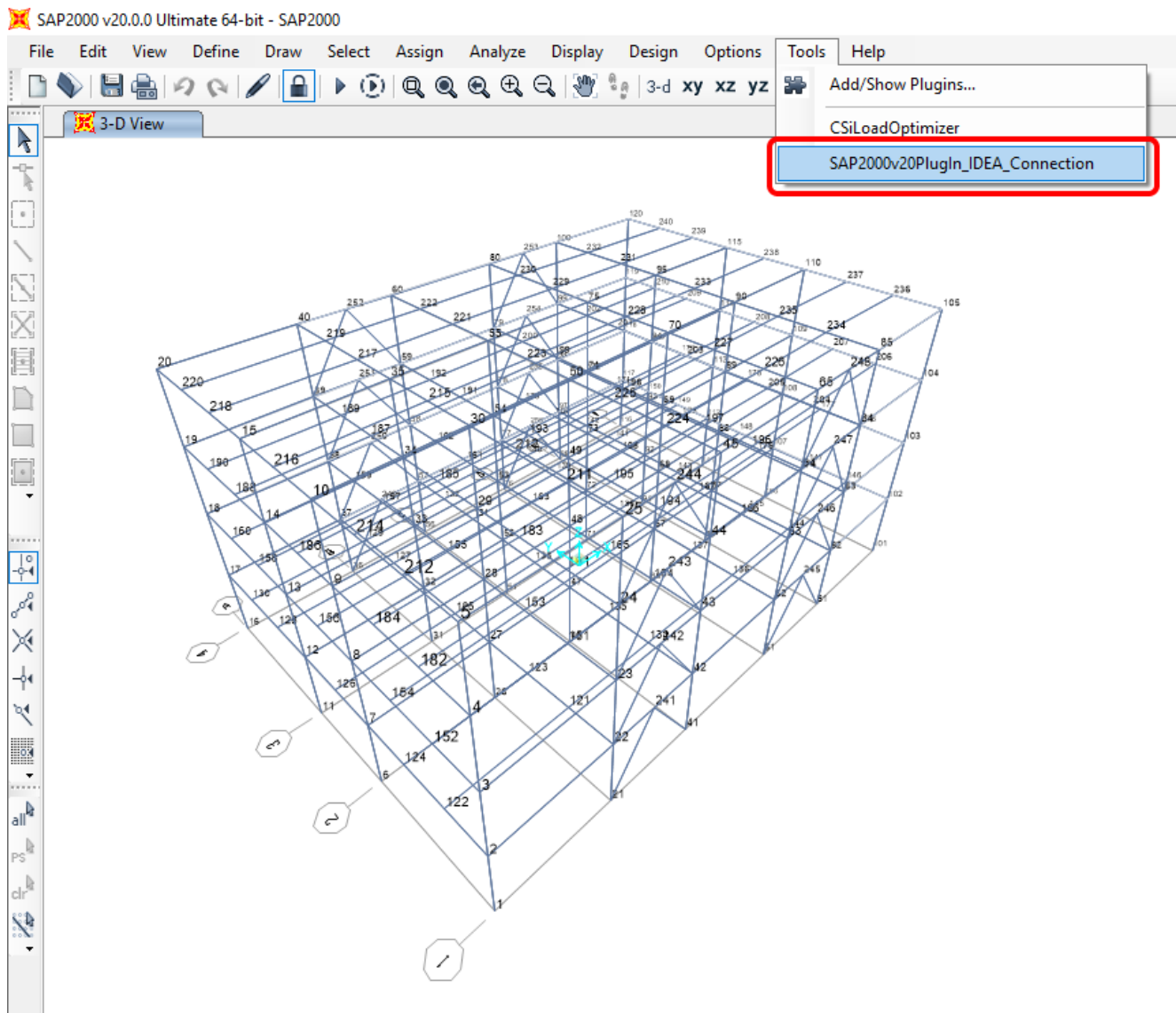
Then type in the Menu Text (command name displayed in the menu) and click **Add**.



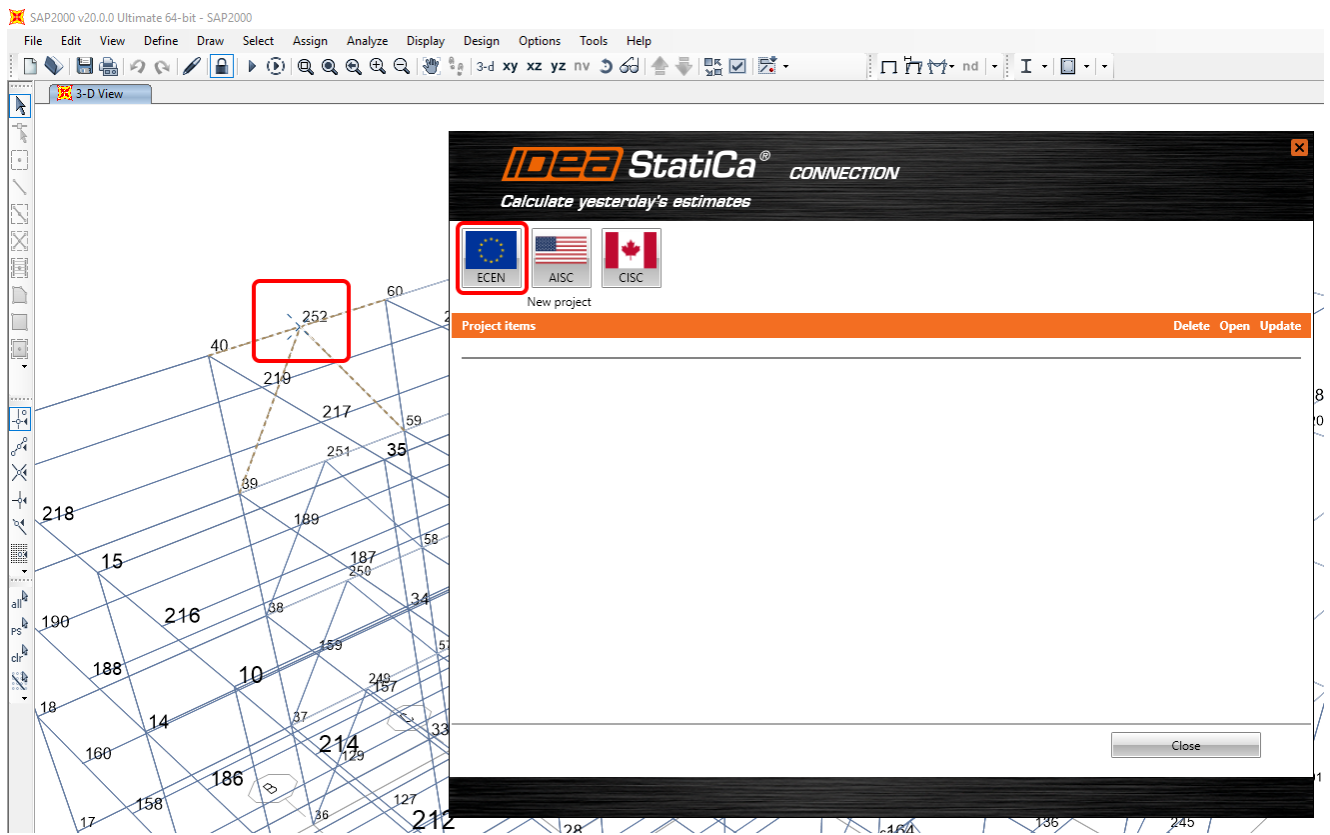
## 2 How to use the link

Open the attached project in SAP2000 and run the CBFEM analysis.

Go to menu item **Tools** and choose **SAP2000v20PlugIn\_IDEA\_Connection** .or  
**SAP2000v21PlugIn\_IDEA\_Connection**



A wizard window is opened, select the join you want to transfer to IDEA StatiCa Connection and click on **ECEN**.



Finally, we click **Connection design** to directly start IDEA StatiCa Connection.

Connection design needs more data to be able to provide a proper design according to national codes. You can use default settings or define them in this wizard.

**Design code:** EN

**Type of structure:** General structure




**Default setting:**

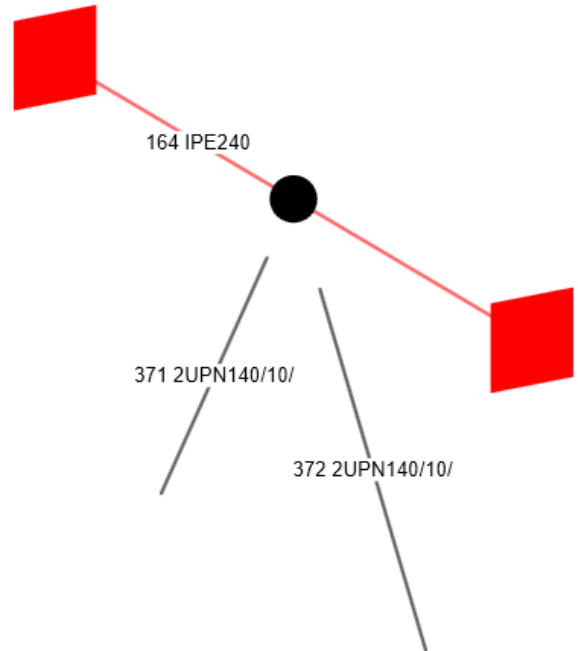
All load combinations are used for the design.

Load combinations are sorted into classes ULS, SLS etc.

**Con 252-Node N1**

Connected members:

	Cross-section		Role	Type
>	164 IPE240 (IPE240)		Bearing	Continuous
	371 2UPN140/10/ (2UPN			Ended
	372 2UPN140/10/ (2UPN			Ended



Connection design

< Previous

Next >

Cancel

### 3 Design

We right-click on **Operation** in the tree menu to add a New operation and select **Stiffening plate**.

**IDEA StatiCa® CONNECTION** SAP2000/Joint252.IdeaCon  
Calculates yesterday's simulations

Project | **Design** | Check | Report | Materials

Con 252 | EPS | ST | MC | DR | New | Copy | Undo | Redo | Save | Members | Plates | LCS | New | Gallery | Apply | Create Manager | Code setup | Calculate | Overall check | Loads in equilibrium | XLS Import | Connection | XLS Import | XLS Export | Member | Load | Operation

Project Items | Data | Labels | Pictures | Template | CFEM | Options | Import/Export loads | New

Solid | Transparent | Wireframe

- Members
  - DM1
  - 371 ZUPN140/10/
  - 372 ZUPN140/10/
- Load effects
  - COMBO\_DEAD**
  - STR11
  - STR12
  - STR13
  - STR14
  - STR15
  - STR16
  - STR17
  - STR18
  - STR19
  - STR20
  - QKE1
  - QKE2
  - WS
- Operations

Member	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
> DM1 / Begin	0,0	0,0	-4,8	0,0	-2,0	0,0
DM1 / End	0,0	0,0	-4,8	0,0	2,0	0,0
371 ZUPN140/10/ / End	-6,0	0,0	-0,3	0,0	0,0	0,0
372 ZUPN140/10/ / End	-6,0	0,0	-0,3	0,0	0,0	0,0

Description  
DEAD + G1

Values in disabled cells are not taken into account in CFEM analysis. Members can be loaded only by that components of internal forces which are defined in member "Model type".

Unbalanced forces

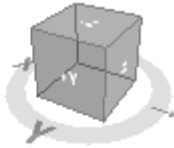
X [kN]	Y [kN]	Z [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
0,0	0,0	0,0	0,0	0,0	0,0

Design code: EN Analysis: Stress, strain Load effects: In equilibrium Units: mm

www.ideastatica.com



Solid Transparent Wireframe



▲ **Members**

- ☒ DM1
- ☒ 371 2UPN140/10/
- ☒ 372 2UPN140/10/

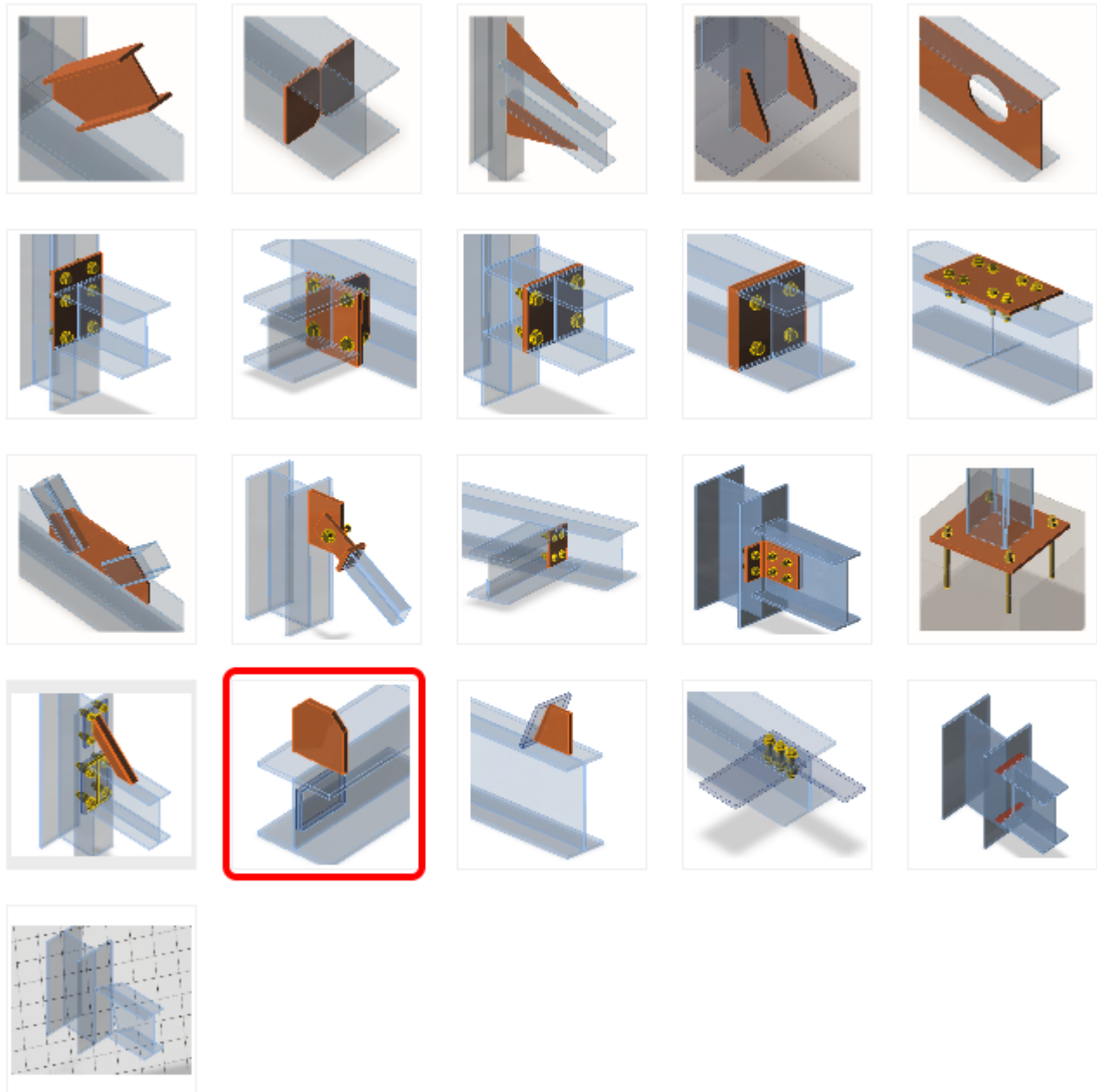
▲ **Load effects**

- ☒ COMBO\_DEAD
- ☒ STR14
- ☒ STR15
- ☒ STR16
- ☒ STR17
- ☒ STR18
- ☒ STR19
- ☒ STR20
- ☒ QKE1
- ☒ QKE2
- ☒ WS

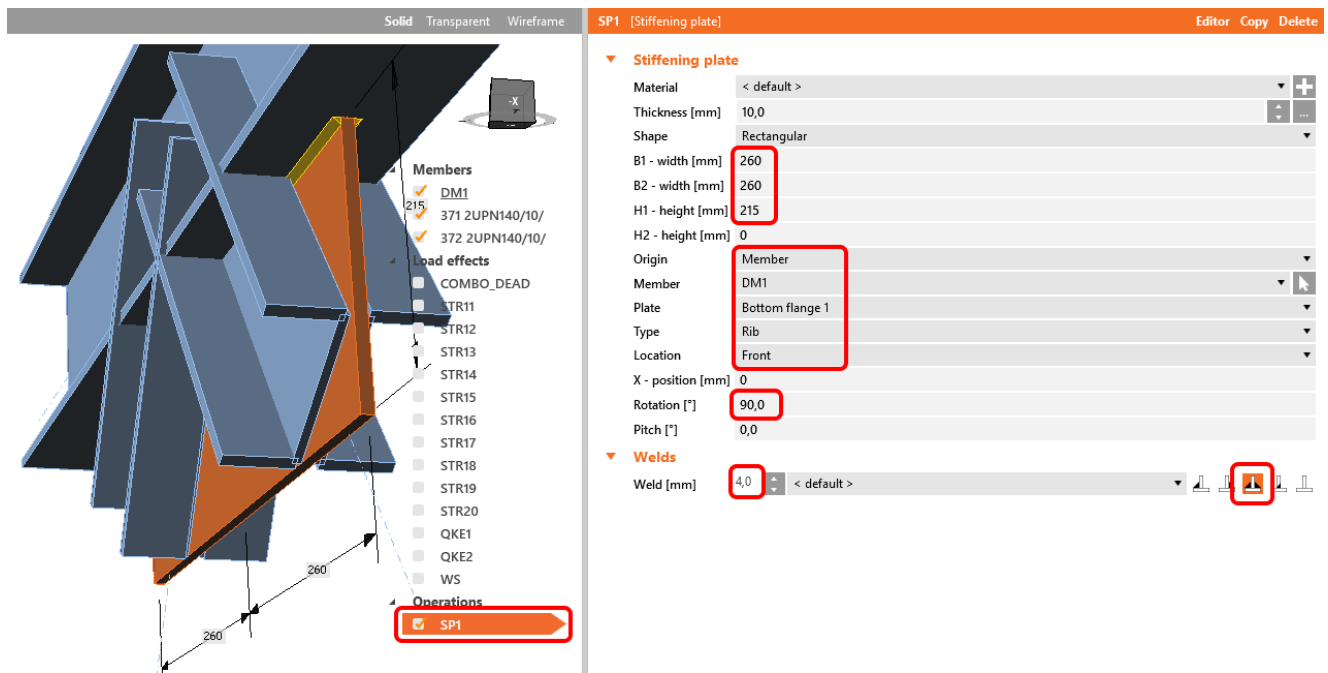
**Operations**

- ☒ New operation
- ☐ Clear

Select operation

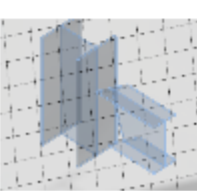
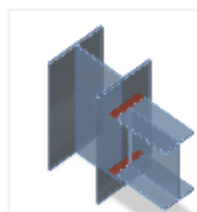
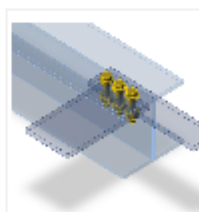
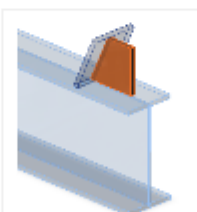
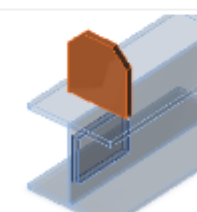
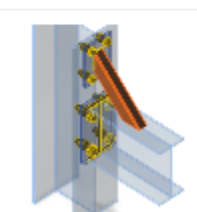
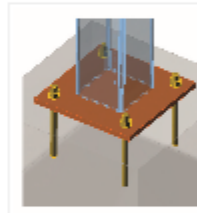
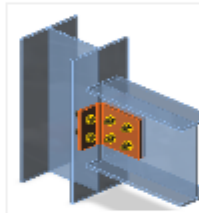
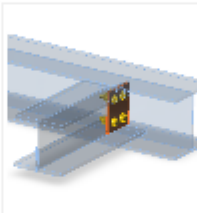
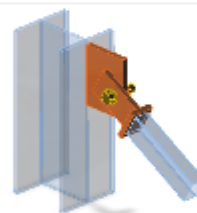
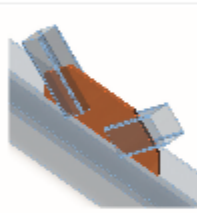
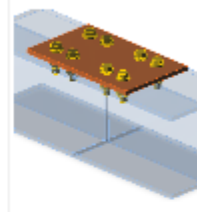
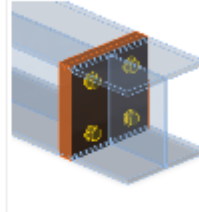
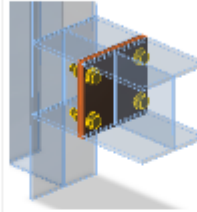
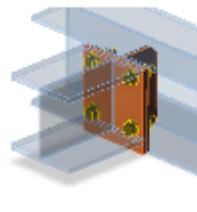
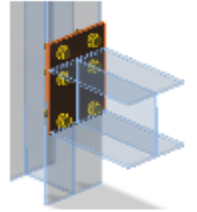
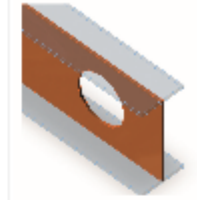
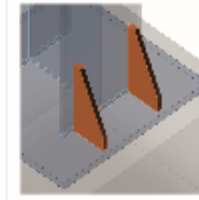
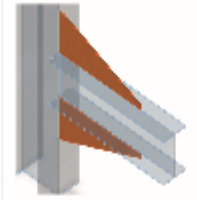
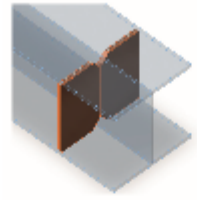
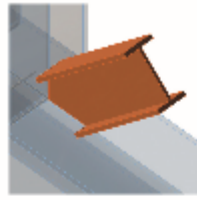


Cancel

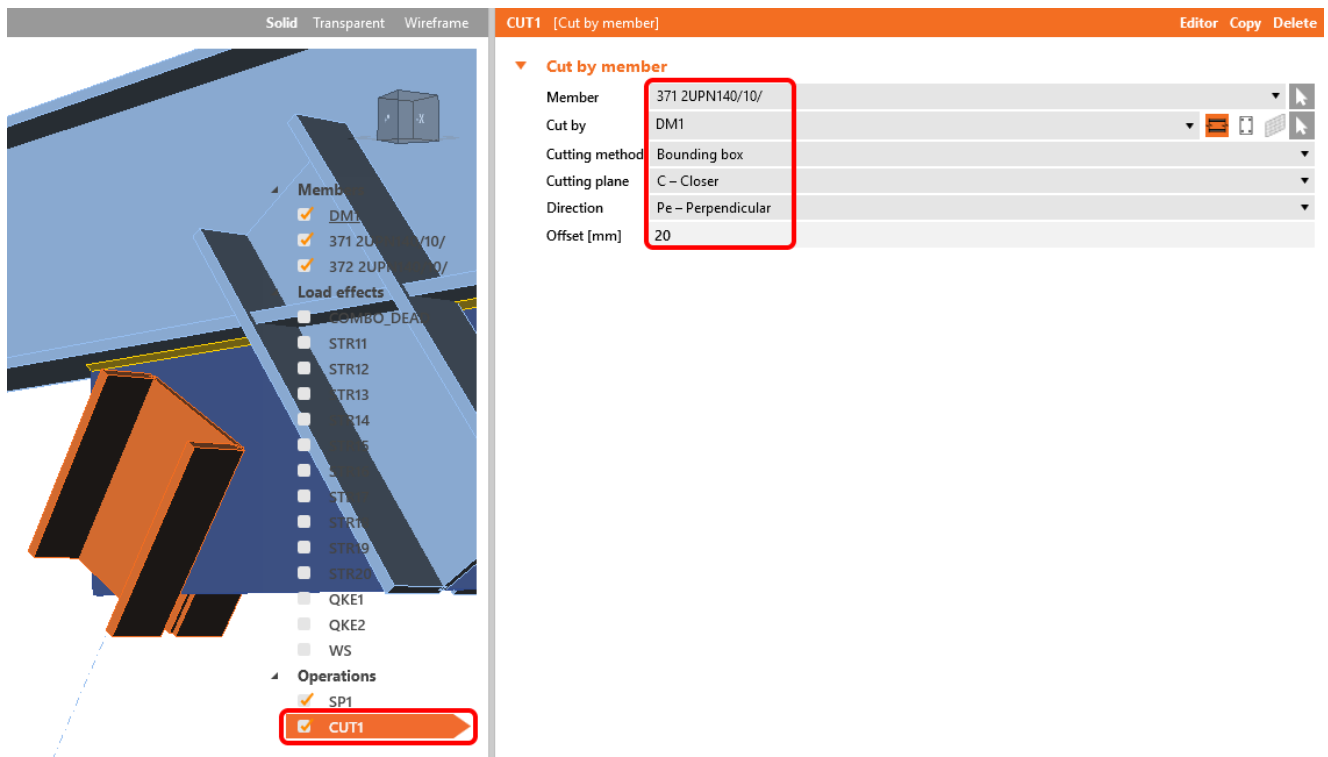


In the same way we add the manufacturing operation **Cut** and fill in the values below.

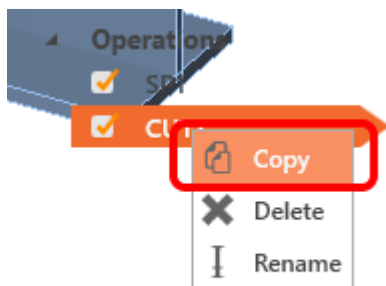
Select operation

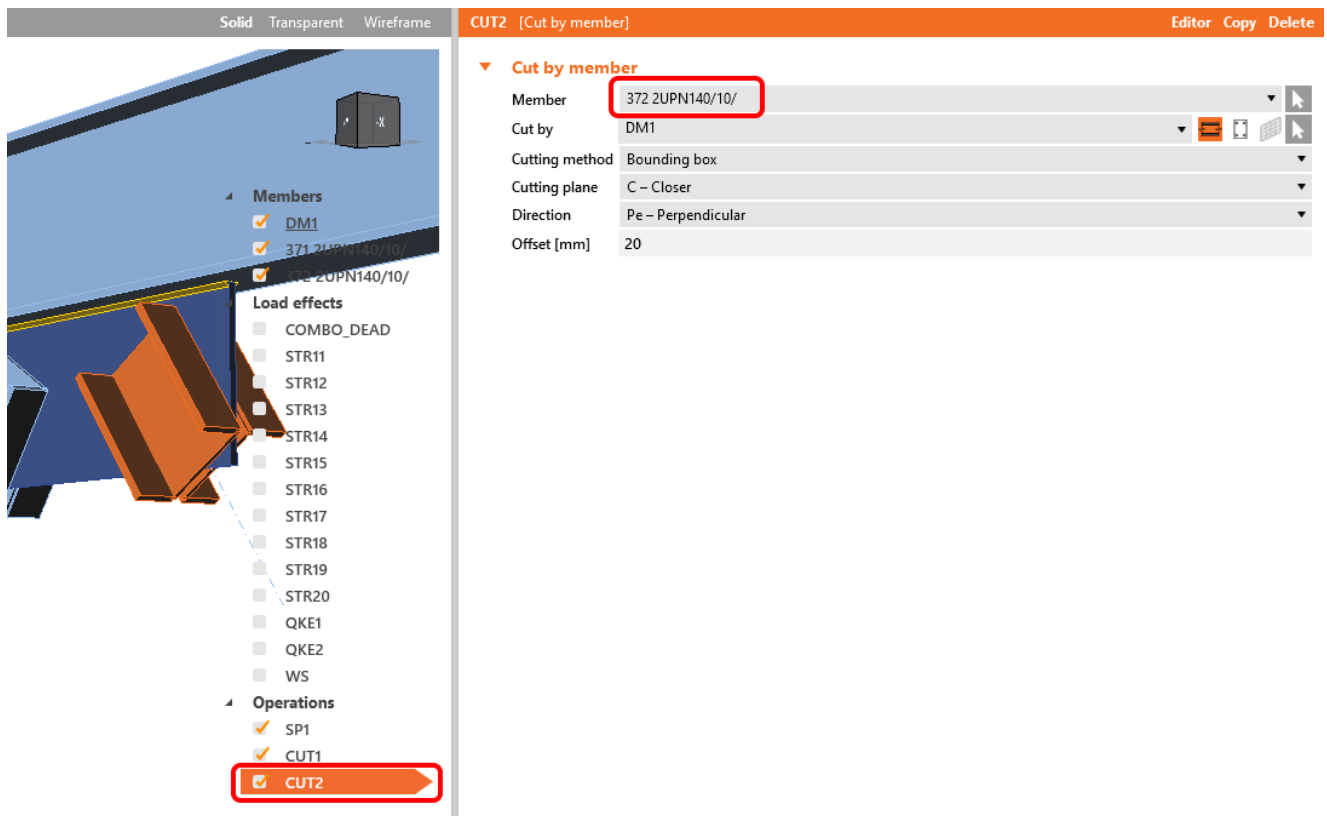


Cancel



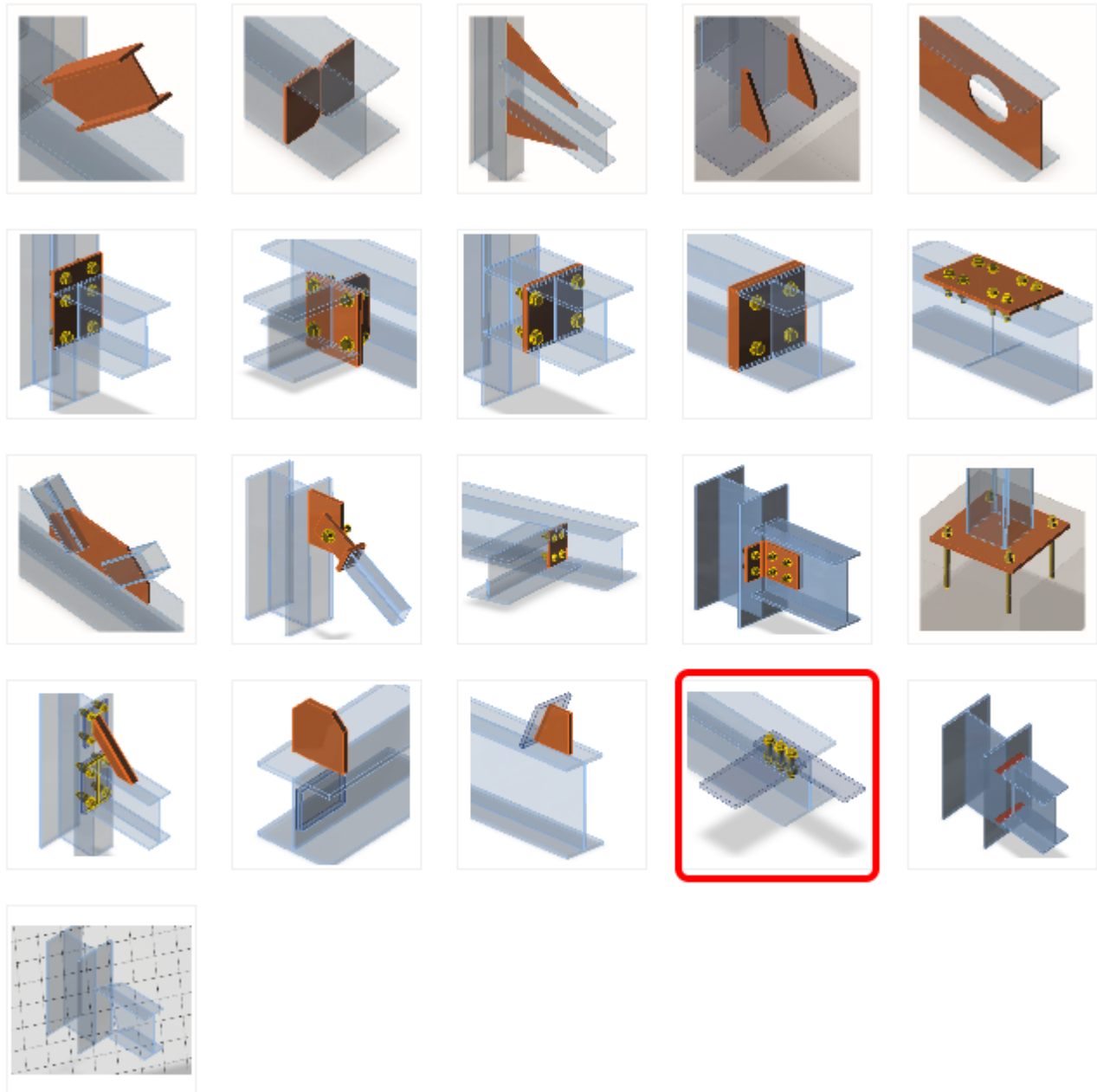
In the next step, right-click on Operation **CUT1** and select **Copy**. Then change the value for Member to **372**.





Let's continue with input of manufacturing operation **Bolt grid or contact**. Values set according picture.

Select operation



Cancel

Bolt assembly

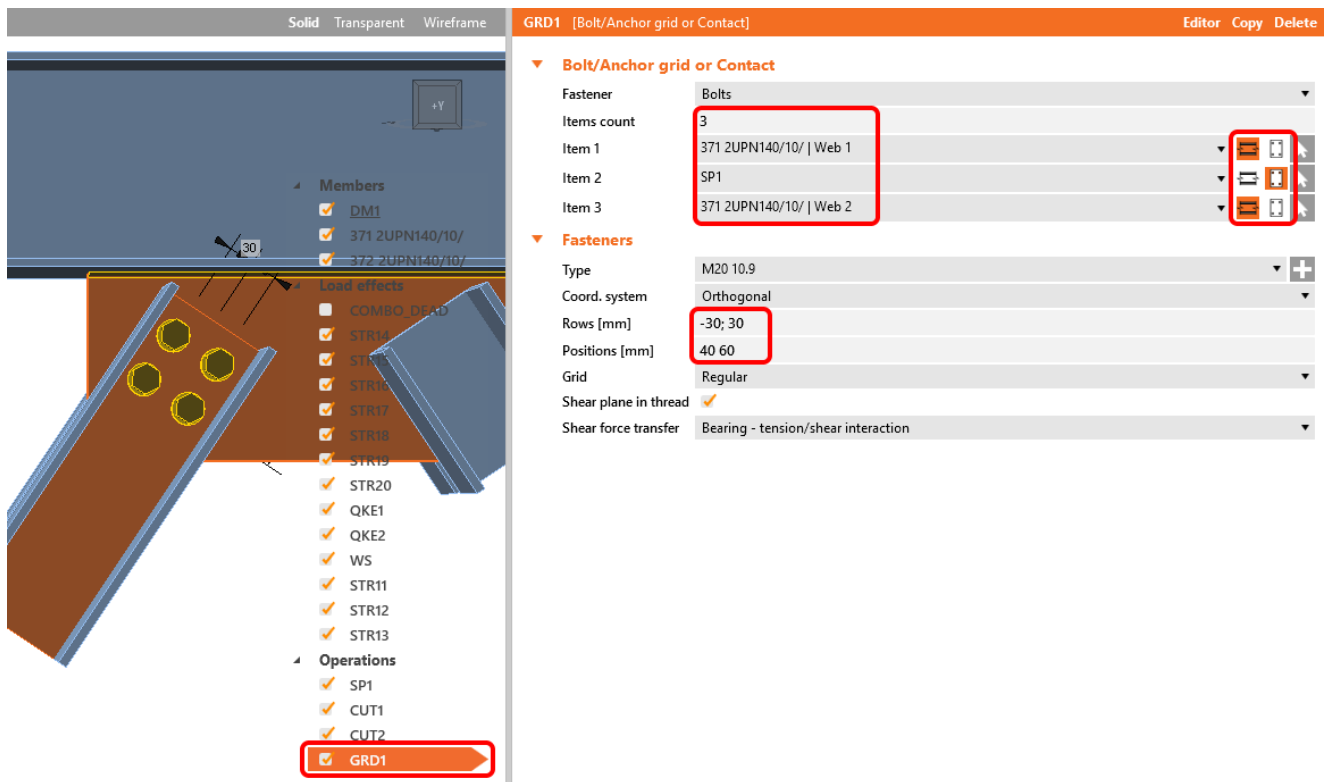
✕

4.6	M12 10.9
4.8	M16 10.9
5.6	M20 10.9
5.8	M22 10.9
6.8	M24 10.9
8.8	M27 10.9
10.9	M30 10.9
EC	M36 10.9
	M39 10.9
	M42 10.9
	M48 10.9
	M52 10.9

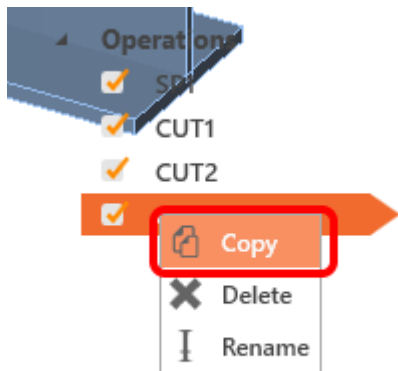
OK

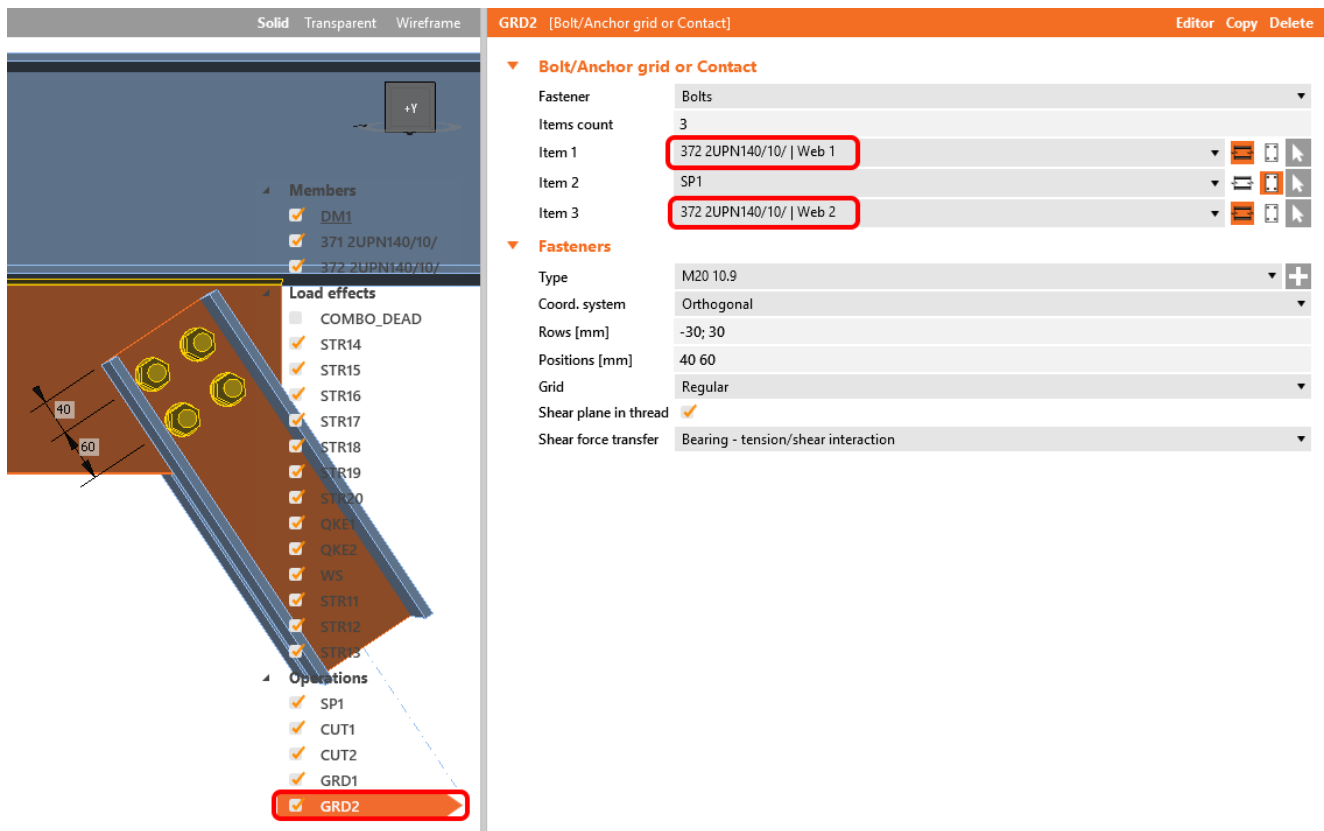
Cancel





In the next step, right-click on **Operation GRD1** and select **Copy**. Then change the value for Item 1 type and Item 2 type to 372.

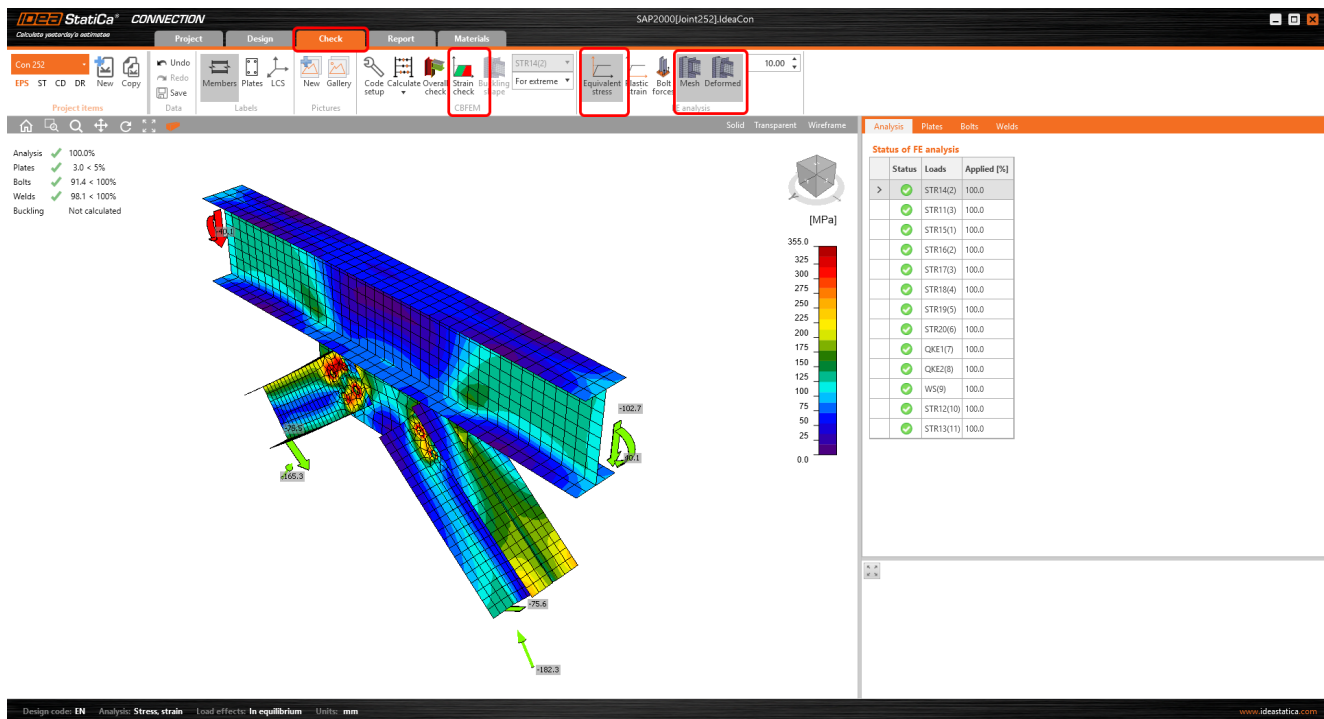




## 4 Check

Nonlinear analysis is started by icon **Calculate** from the top ribbon. Analysis model is automatically generated, calculation is performed and we can check results.

Activate **Strain check**, **Equivalent stress**, **Mesh** and **Deformed** from the ribbon to get a full picture of what is happening in the joint. Everything is displayed in the 3D window.



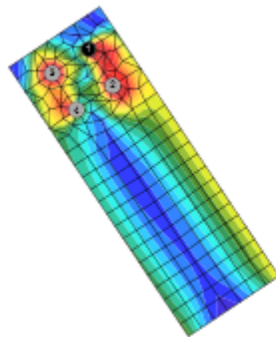
All values can be reviewed in detailed in the tables and 2D window. For example to display check of bolts select tab Bolts/Anchors tab.

## Check of bolts for extreme load effect

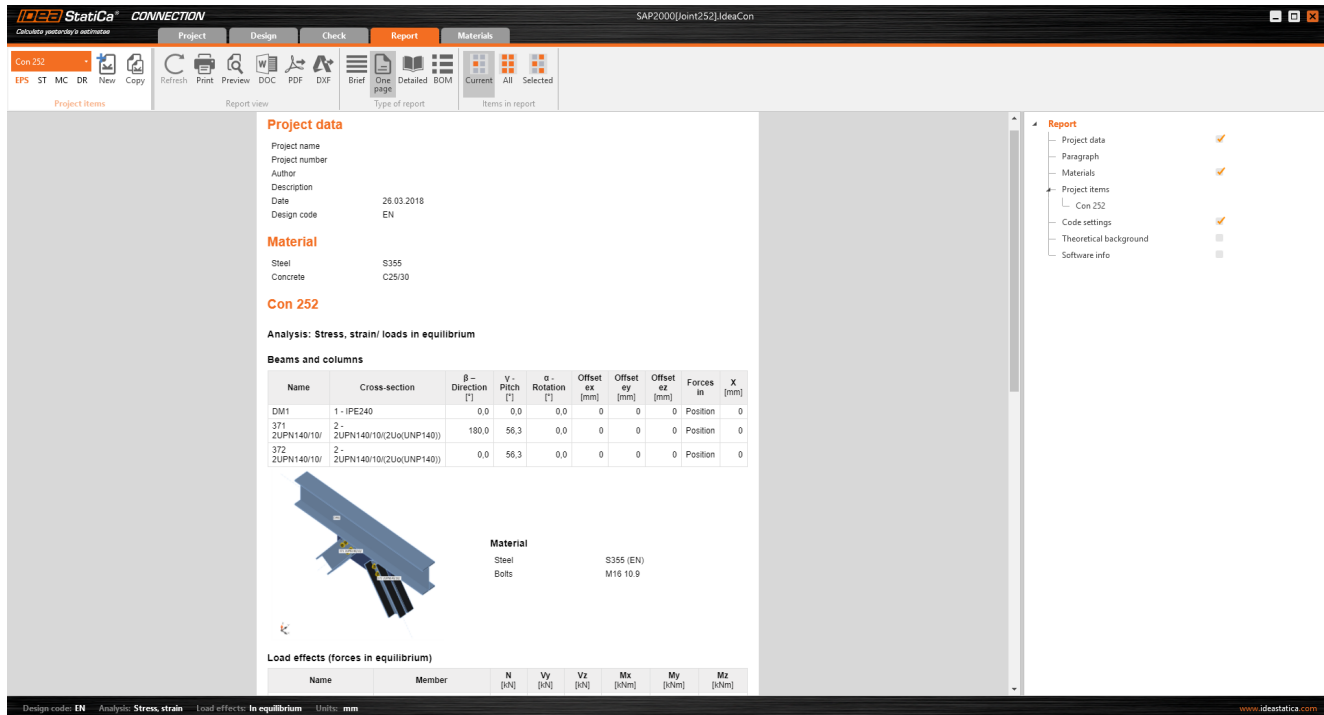
		Status	Item	Grade	Loads	Ft [kN]	V [kN]	Fb,Rd [kN]	Utt [%]	Uts [%]	Uts [%]
>	+	✓	B1	M20 10.9 - 1	STR14(2)	10.3	82.0/82.2	204.0	5.8	83.8	88.0
	+	✓	B2	M20 10.9 - 1	STR14(2)	14.1	75.2/75.2	204.0	8.0	76.7	82.4
	-	✓	B3	M20 10.9 - 1	STR14(2)	15.6	63.2/63.2	204.0	8.8	64.5	70.8
<p><b>Tension resistance check (EN 1993-1-8 Table 3.4)</b></p> $F_{t,Rd} = \frac{k_2 f_{ub} A_s}{\gamma_{M2}} = 176.4 \text{ kN} \geq F_t = 15.6 \text{ kN}$ <p>where:</p> <p><math>k_2 = 0.90</math> – Factor</p> <p><math>f_{ub} = 1000.0 \text{ MPa}</math> – Ultimate tensile strength of the bolt</p> <p><math>A_s = 245 \text{ mm}^2</math> – Tensile stress area of the bolt</p> <p><math>\gamma_{M2} = 1.25</math> – Safety factor</p>											
	+	✓	B4	M20 10.9 - 1	STR15(1)	12.9	46.4/46.4	204.0	7.3	47.4	52.6
	+	✓	B5	M20 10.9 - 2	STR14(2)	10.8	85.3/85.3	204.0	6.1	87.0	91.4
	+	✓	B6	M20 10.9 - 2	STR14(2)	13.1	78.0/78.0	204.0	7.4	79.6	84.9
	+	✓	B7	M20 10.9 - 2	STR14(2)	12.5	64.1/64.1	204.0	7.1	65.4	70.5
	+	✓	B8	M20 10.9 - 2	STR14(2)	12.6	47.2/47.2	204.0	7.1	48.2	53.3

## Design data

	Item	Ft,Rd [kN]	Bp,Rd [kN]	Fv,Rd [kN]
>	M20 10.9 - 1	176.4	193.3	98.0
	M20 10.9 - 2	176.4	206.2	98.0

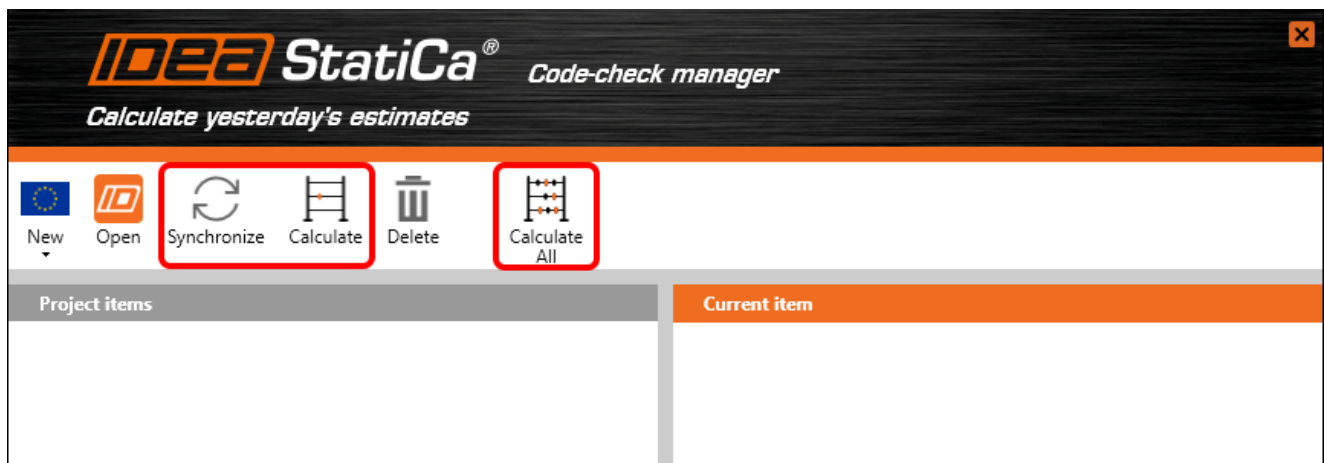


At last we go to the tab **Report**. IDEA StatiCa offers fully customizable report to print out or save in editable format.



We have imported a joint from SAP2000 and designed and code-checked it according to Eurocode.

## 6 Synchronize models



Code-check manager is a BIM tool to export and synchronize connections from other programs. It is launched directly in the 3rd party applications via a command/icon.

**Synchronize** - IDEA StatiCa detects changes in already imported entities (changes in thickness, changes in cross-section, modification of properties of welds, bolts, etc.) and updates the project in IDEA StatiCa Connection.

**Calculate** - Synchronize and calculate current item and provide a new set of results.

**Calculate all** - Synchronize and calculate all items and provide new set of results.

### Note

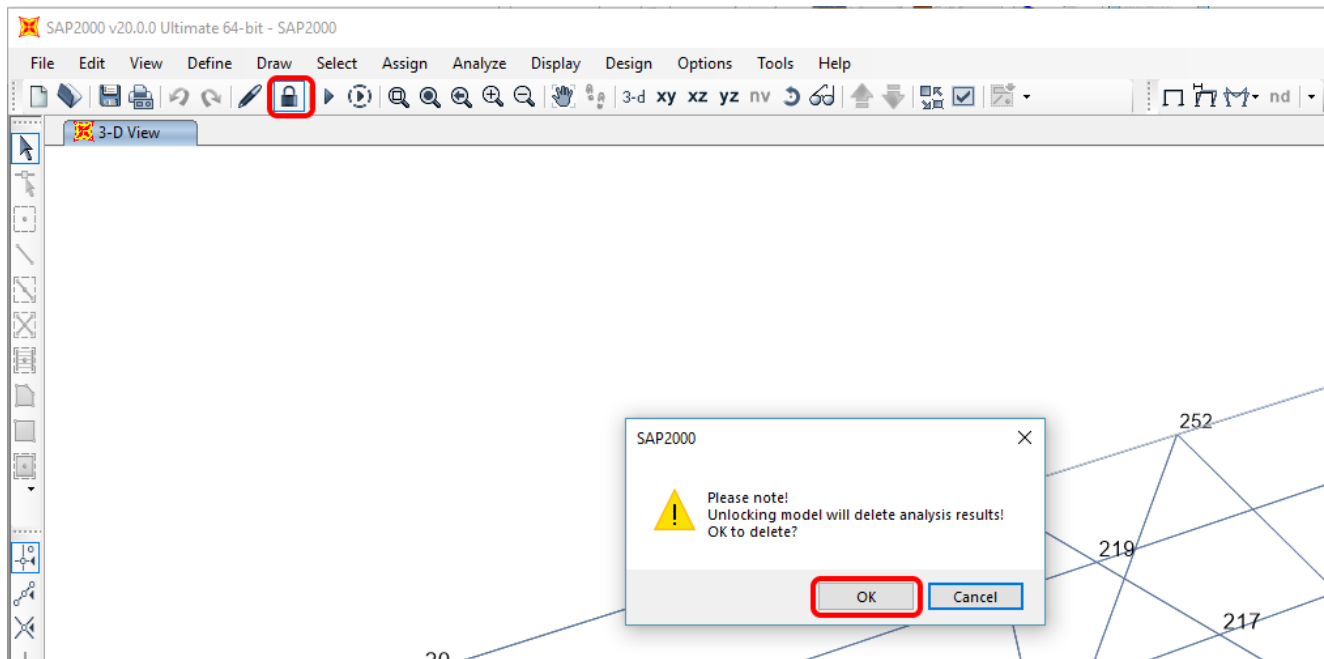
Kindly be aware that IDEA StatiCa syncs with a model of the 3rd party application, not the other way around. If we **add operations in IDEA StatiCa** and then use the options described above (Synchronize; Modify; Calculate; Calculate all), the additionally added operations will be deleted.

We save the project in IDEA StatiCa and close the application Connection. All joints exported from SAP2000 project to IDEA StatiCa are kept on the list inside SAP2000.



If we modify the project in SAP2000 (e.g. change cross section of any member or add another loads) we can simply update the project in IDEA StatiCa without modeling it all again. Let's change the cross section of one of the members.

First, we unlock the project in SAP2000.



**Right-click** on the member 371 and following window appears. Go to **Assignments** and change the cross-section from 2UPN140/10/ to **2UPN160/10/** and click **OK**.

Object Model - Line Information

Location **Assignments** Loads Design

Identification

Label  Design Procedure

Section Property	<input type="text" value="2UPN160/10/"/>
Property Modifiers	None
Material Overwrite	None
Releases End-I	T, M2, M3
Releases End-J	M2, M3
Partial Fixity Springs	None
Local Axes	Default
Insertion Point	Default
End Length Offsets	None
Min. Number Stations	3
Station at Elm Intersect	Yes
Station at Conc Loads	Yes
P-Delta Force	None
T/C Limits	None
Nonlinear Hinges	None
Line Springs	None
Line Mass	None
Automatic Mesh	
Mesh Option	At Intermediate Joints

KN, mm, C

Reset All

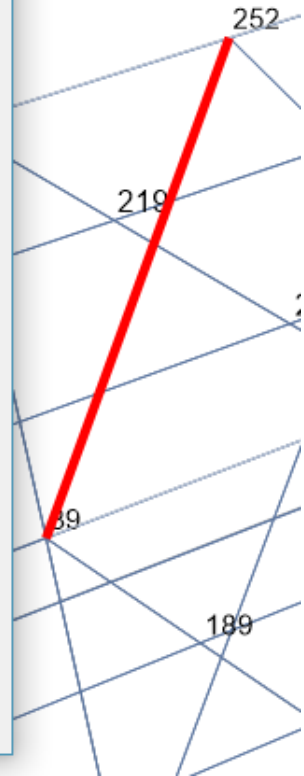
Update Display

Modify Display

**OK**

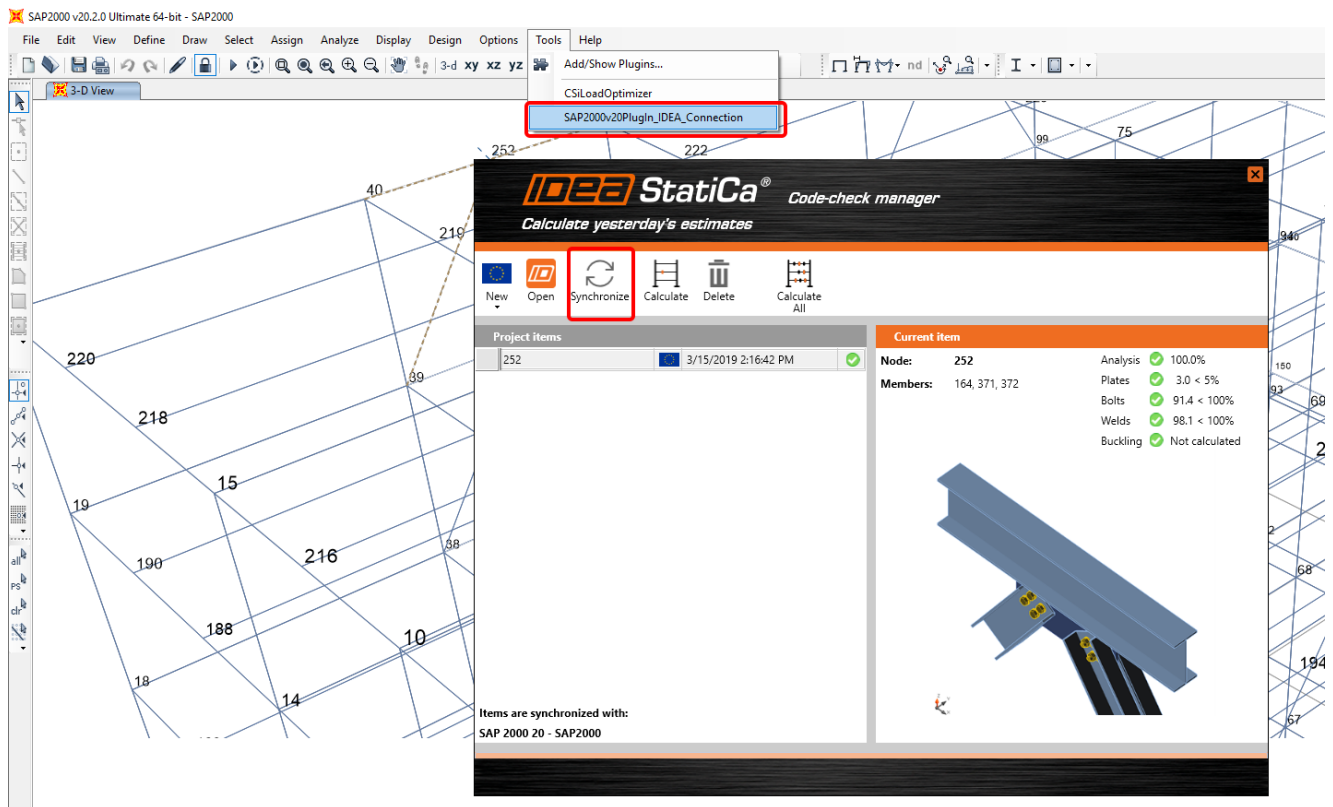
Cancel

Double click white background cell to edit item.

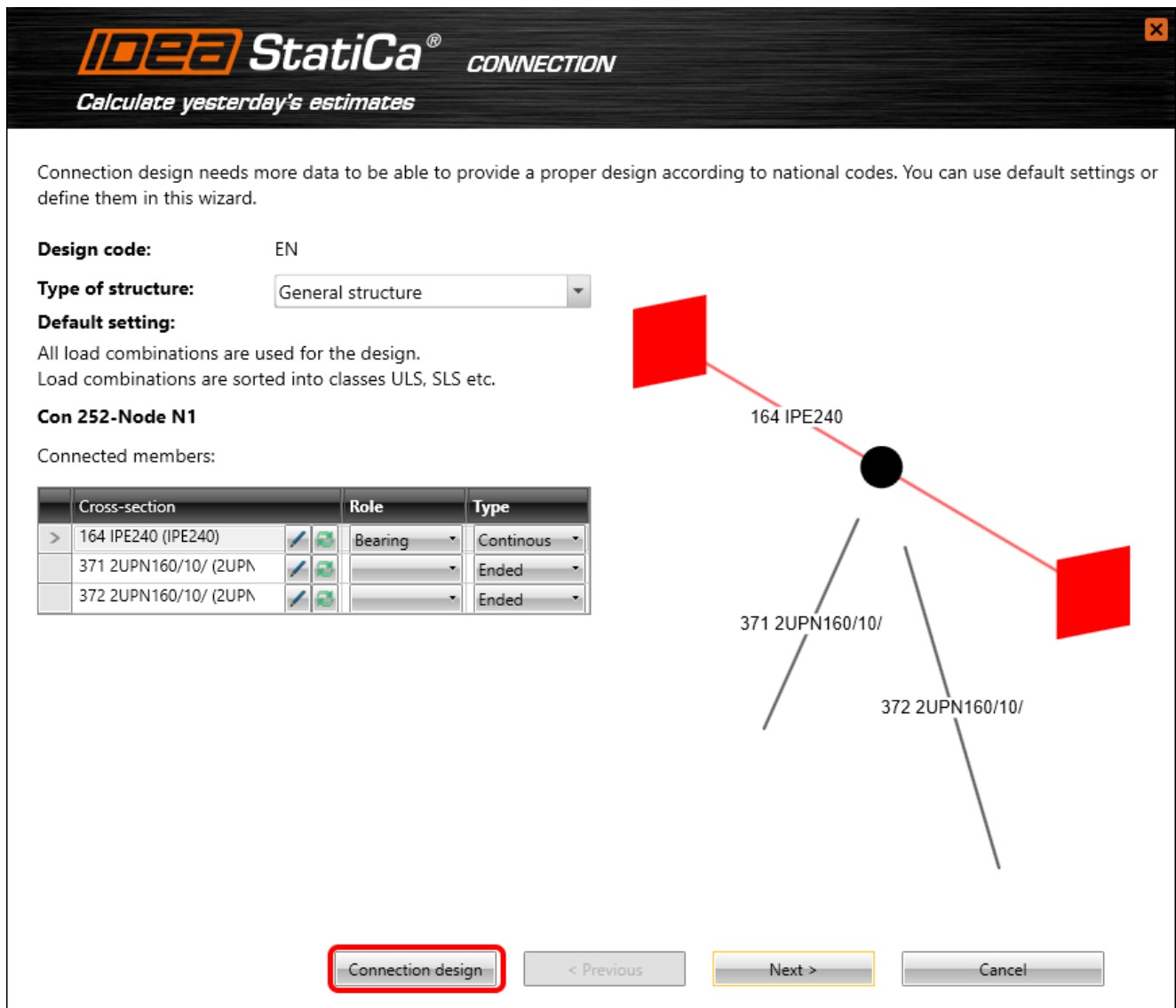


We repeat the same for the Member 372 as well. Run the analysis, select **SAP2000v20PlugIn\_IDEA\_Connection** in the upper ribbon and in the Code-check manager click on **Synchronize**.

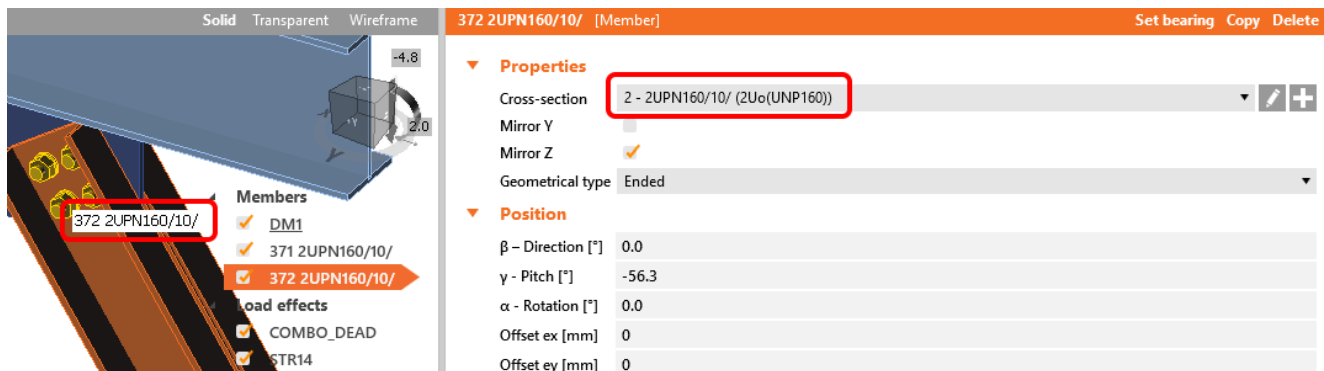




In the next window just select Connection design.



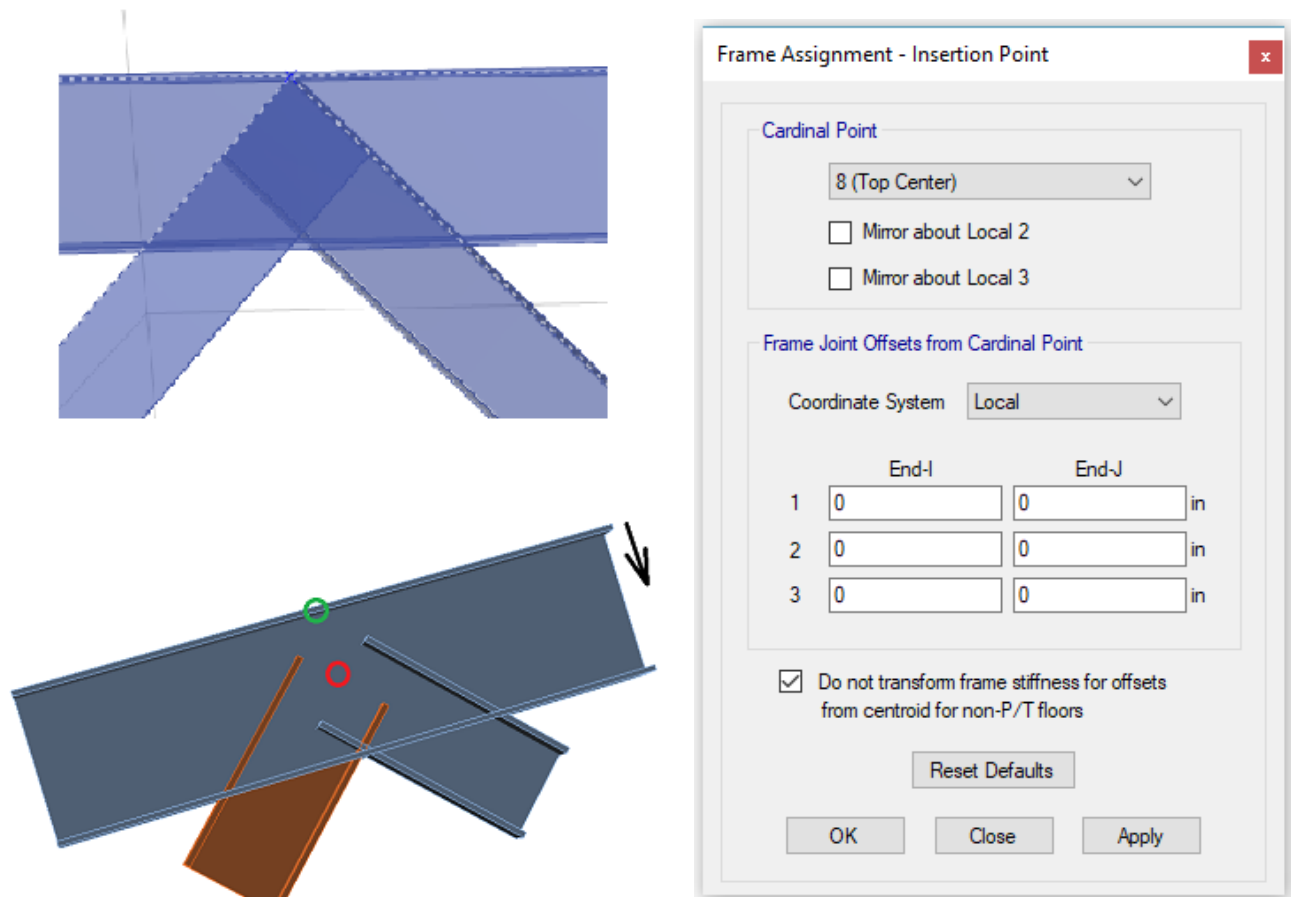
As you can see, the cross-section of the Members 371 and 372 has changed, but all previous operations remained.



## 7 Known limitations

Link now works for a wide variety of connections/joints. However, please take into account yet unsupported functionality:

### Eccentricity - Centroid is not set as Cardinal point



**Workaround:** Import the whole joint and manually move the beams with eccentricity to the proper position.

*Keywords:*

*connection, joint, Eurocode, bevel, cut, stub, SAP2000, BIM, BIM link, code-check manager, CBFEM*

*Related articles and tutorials:*

[IDEA StatiCa tutorial – How to combine Tekla Structures and SAP2000](#)

