



Tutorial

# AISC 360-10 and Eurocode3

Updated on: January 17th 2024

Tested with: SDC Verifier 2023 R2

Simcenter3D 2306

SDC Verifier is a powerful Simcenter add-on that helps verify structures according to standards and generates full calculations reports.

- In this tutorial, AISC 360-10 Members (14th, 2010) & Eurocode3 Members (EN 1993-1-1, 2005) are added;
- Beam Design Checks are reviewed in details;
- A beam model structure has been used as a start FEM model;
- Beam member finder was used to recognize beam member dimensions;
- The functionality of SDC Verifier Report Designer can be checked via the link to a separate tutorial (Slide 31).

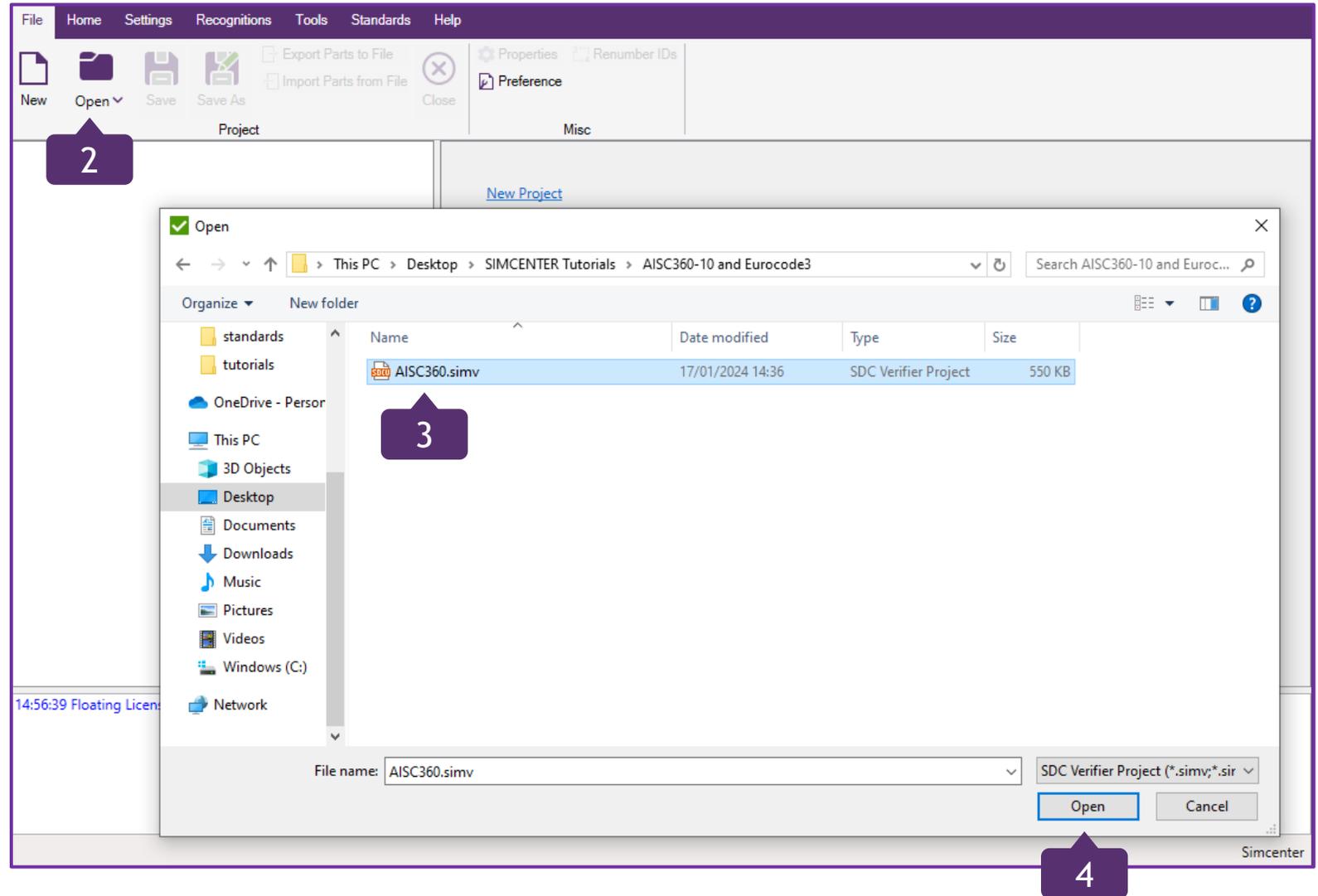
# Open the Starter Model

1 Launch SDC Verifier for Simcenter 3D

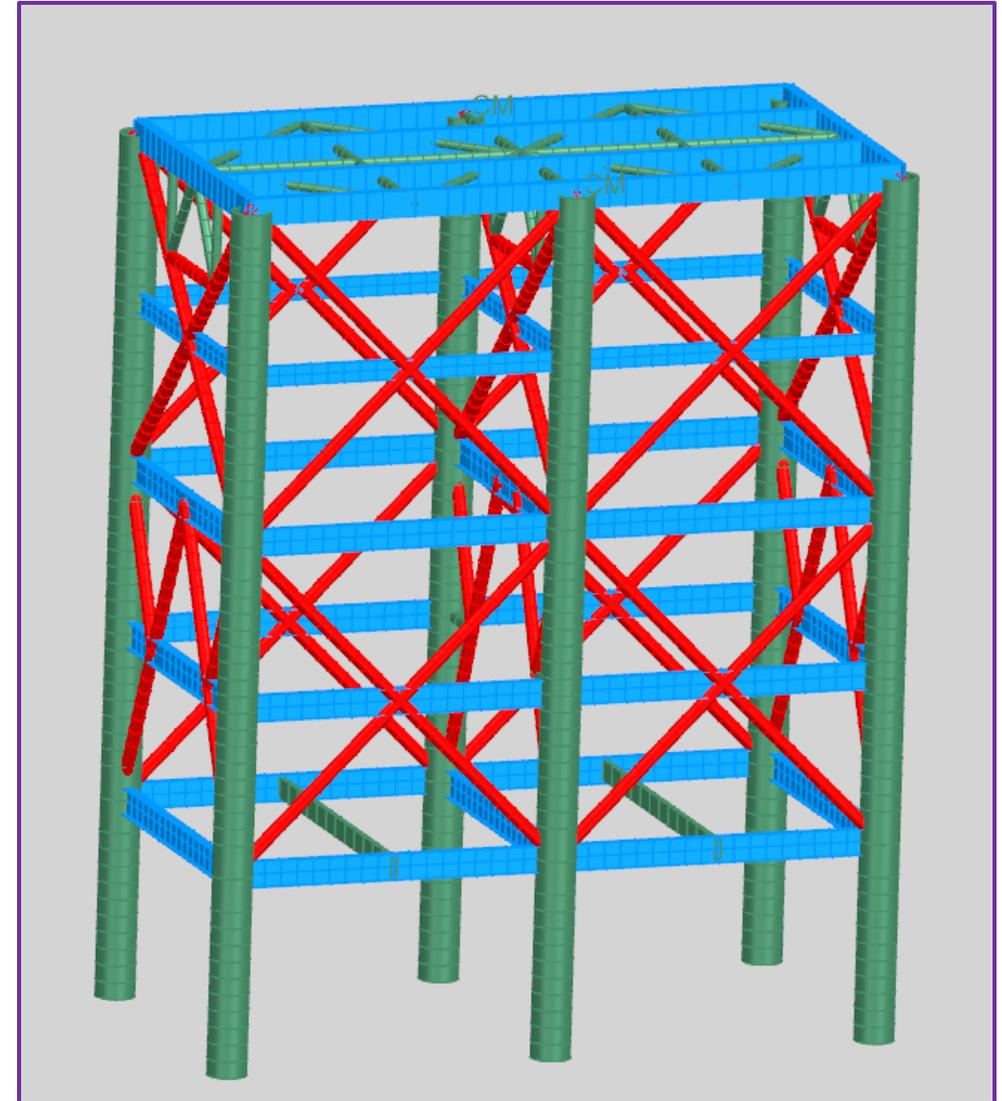
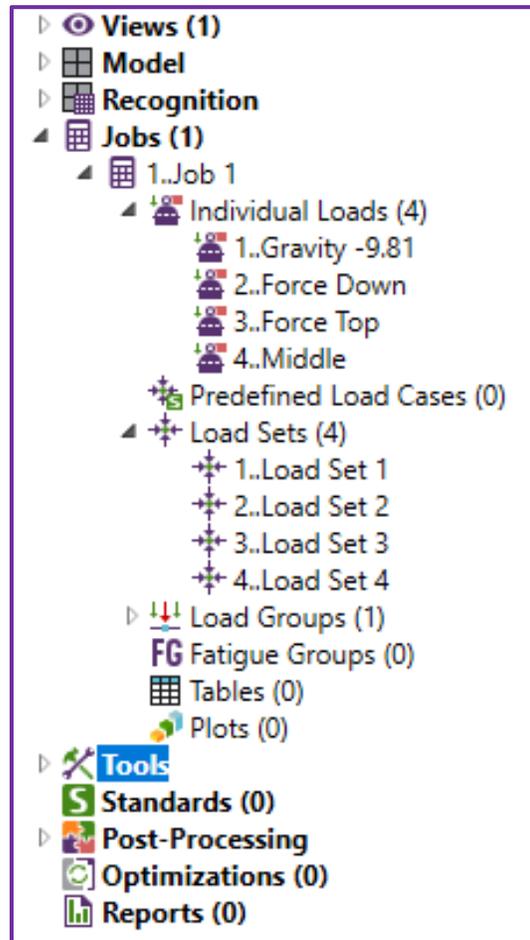
2 In *File* section, press *Open*

3 Select a project *AISC360.simv*

4 Press *Open*



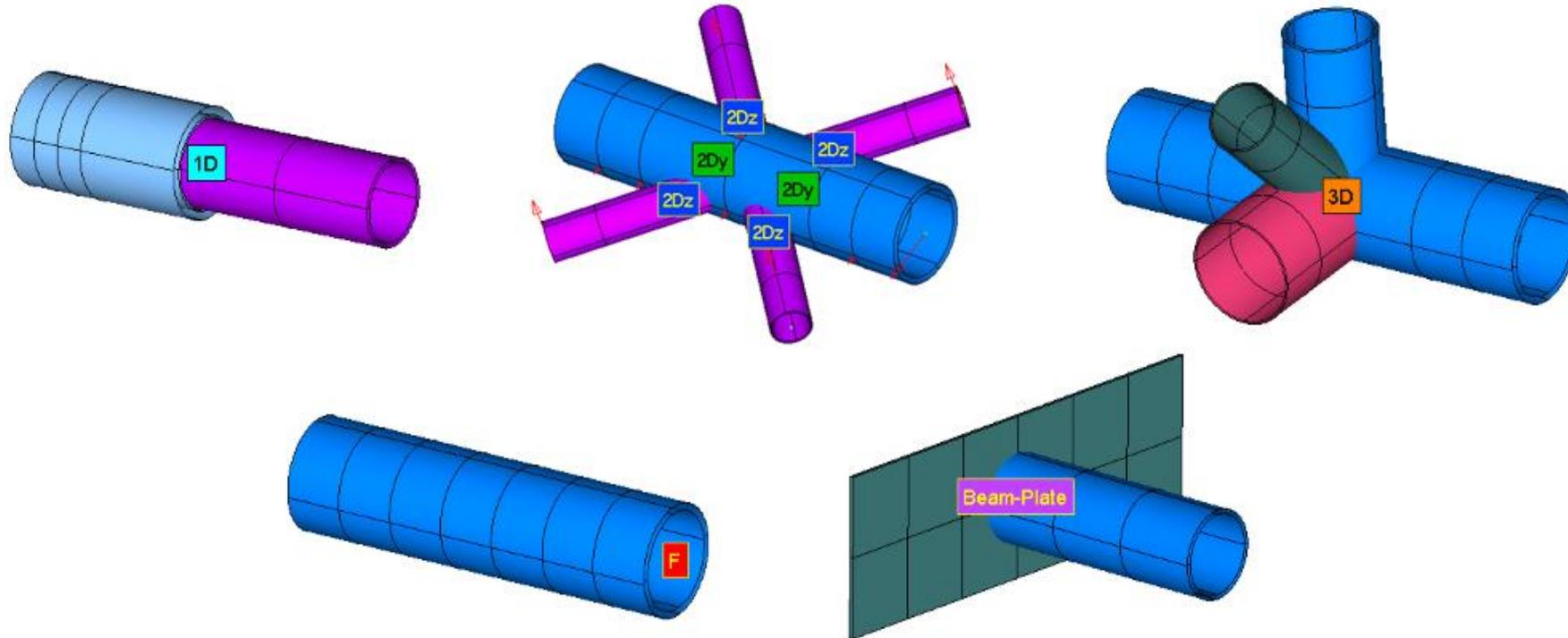
This tutorial presents the project with predefined Boundary Conditions, Load Combinations and Load Group.  
The model contains only beam elements of the following types: I-Beam, Circular and Rectangular Tubes.



Joint is a location where different Beam Members connect.  
They are used to recognize beam member length by Beam Member Finder Tool.

There are 6 types of Joints:

- 1D Joint - 2 beam members that lie on the curve, but with different properties;
- 2D Joint - beam members connected in one plane;
- 3D Joint - beam members connected in space;
- Free Joint - a node which belongs only to one element (free);
- Beam-Plate Joint - a beam member connected to plates (perpendicularly);
- User Defined;



- 1 In the *Model Tree*, expand *Recognition* and select *Joint Finder*
- 2 Execute right click on *Joint Finder* and select *Edit*
- 3 Press *Find*
- 4 Press *OK*

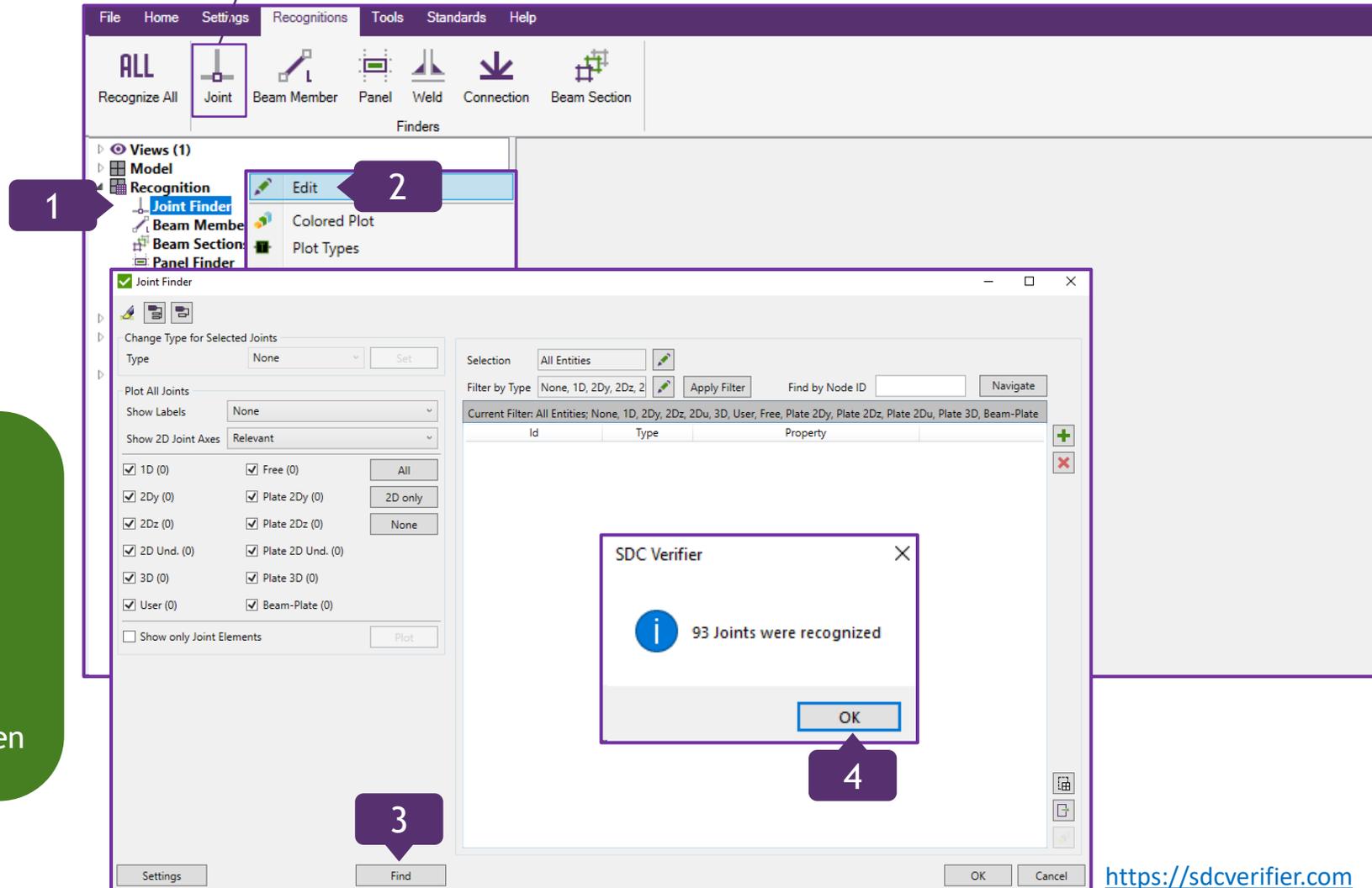
When performing Joint Recognition, there are 3 options for existing joints:

Default option - Keep only modified;

Remove All joints (except for those, edited by a user);

Keep All Existing options - it should be used, when additional elements were added to the model.

An alternative method of using a Joint Finder Tool is to press Joint in the Recognition section of the Toolbar.



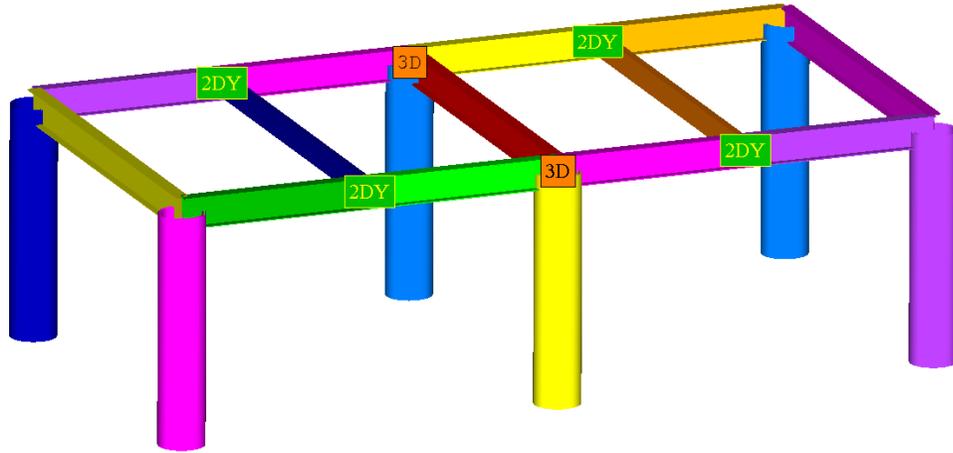
1 Select all Joints (*Ctrl+A*)

2 Press  and select *Plot Joint Type in Colors*

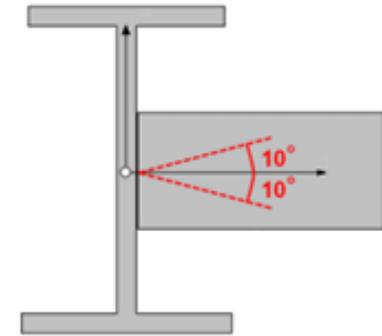
3 Press *OK*

Plot Joint Type Labels  
Plot Joint Type in Colors

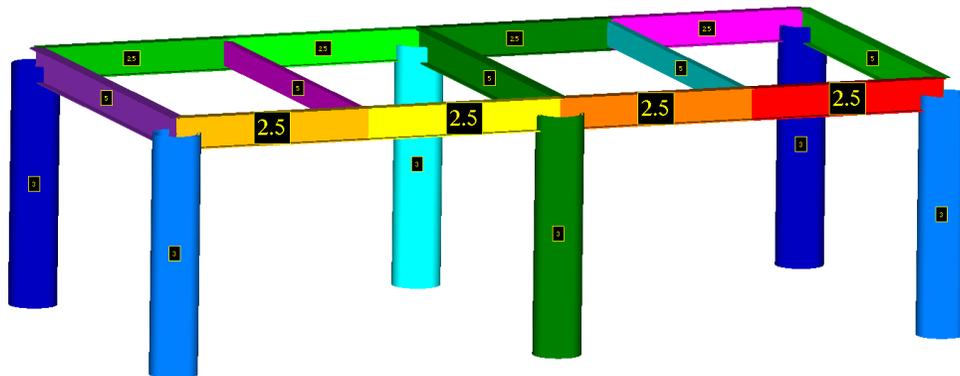
Beam Member Finder recognizes Beam members and (buckling) Lengths for different directions (Y, Z and Torsional).



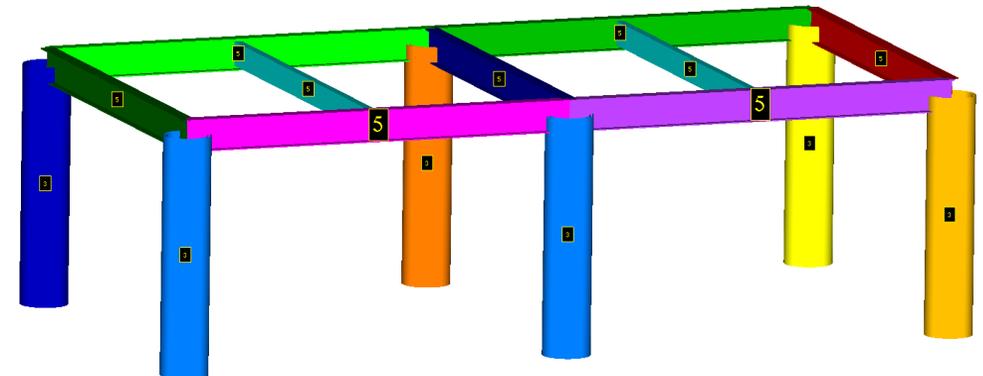
2DY  
Joint



Length Y – 4 Beam Members with  $L = 2.5$



Length Z – 2 Beam Members with  $L = 5$



# Recognize Length Y

1

In *Recognition* section of the *Model Tree*, execute right click on *Beam Member Finder* and press *Edit*

2

*Length Y* - 2Dy, 3D, Plate 2Dy, Plate 3D  
*Length Z* - 2Dz, 3D, Plate 2Dz, Plate 3D  
*Torsion (Lb)* - 2Dy, 2Dz, 2D Und., 3D

3

Press *Find*

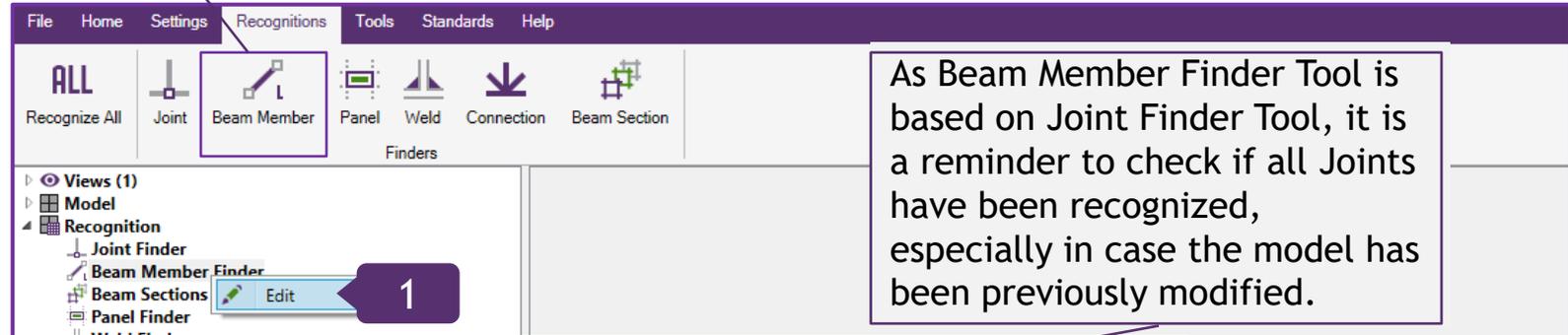
4

Press *No*

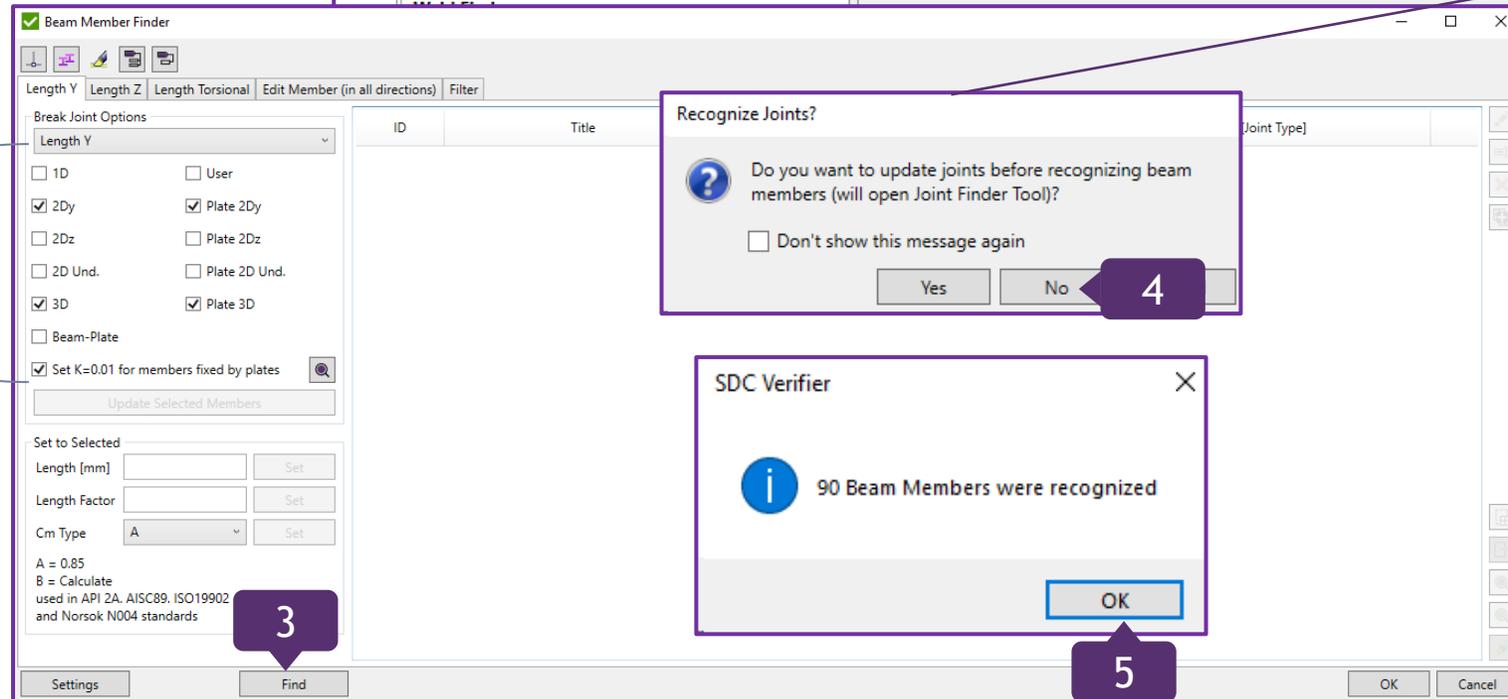
5

Press *OK remove*

An alternative method of using a Beam Member Finder Tool is to press Beam Member in the Recognition section of the Toolbar.



As Beam Member Finder Tool is based on Joint Finder Tool, it is a reminder to check if all Joints have been recognized, especially in case the model has been previously modified.



# Beam Member Finder Interface Explanation

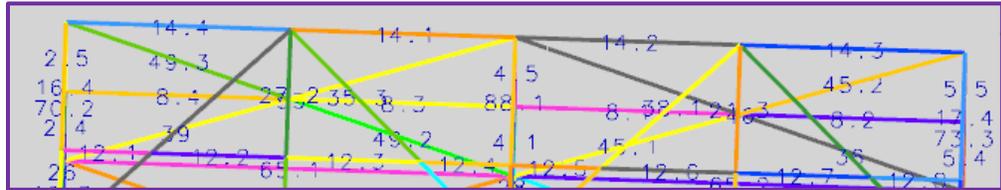
Beam Member is a straight line. If it contains joints, it is split on sub members.

Break Joint Options define what joints are used to split Beam Members.

Change Length/Factor for selected beam members.

Cm Type is used in API 2A, ISO 19902 and Norsok N004 standards.

Select all Beam Members and press Select Plot Members ID Labels.



- Select Plot Members ID Labels
- Plot Length Criteria
- Plot Full Members ID Labels
- Plot Length Labels
- Plot Cm Type Labels
- Plot Length Factor Labels
- Plot Joints for Selected Members
- Plot Members Y and Z axes
- Plot Length Labels in Y and Z axes

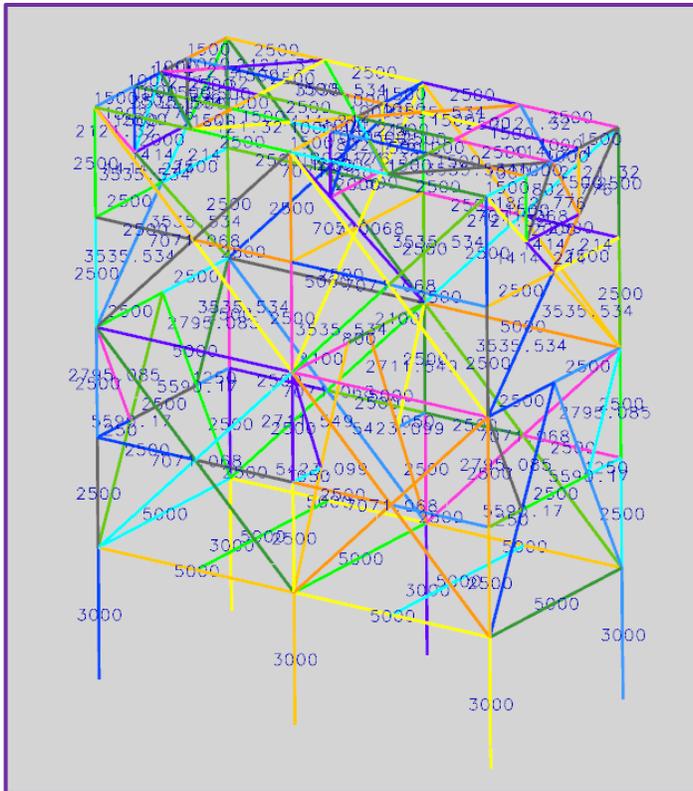
14	Beam Member 14 (Y)	32	10000			1100[2Dy] 1117[3D] 2218[2Dy]
14.1	Beam Member 14.1 (Y)	8	2500	1	A	
14.2	Beam Member 14.2 (Y)	8	2500	1	A	
14.3	Beam Member 14.3 (Y)	8	2500	1	A	
14.4	Beam Member 14.4 (Y)	8	2500	1	A	

# Beam Member's Length Plot

1 Select all Beam Members (**Ctrl+A**)

2 Press  and select **Plot Length Labels**

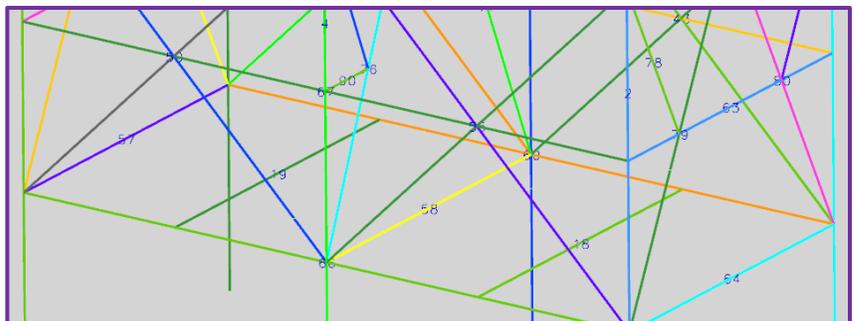
3 Press **OK**



The screenshot shows the 'Beam Member Finder' dialog box. On the left, there are 'Break Joint Options' and 'Set to Selected' fields. The 'Break Joint Options' section has 'Length Y' selected. The 'Set to Selected' section has 'Length (mm)' and 'Length Factor' fields. The main area is a table with columns: ID, Title, Elements, Length, Length Factor, Cm Type, Modified, and Joint - NodeID [Joint Type]. The table lists 22 beam members with their respective properties.

ID	Title	Elements	Length	Length Factor	Cm Type	Modified	Joint - NodeID [Joint Type]
1	Beam Member 1 (Y)	47	13000				201[3D] 1110[3D] 202[3D] 1444[3D]
2	Beam Member 2 (Y)	47	13000				1107[3D] 155[3D] 1104[3D] 4[3D]
3	Beam Member 3 (Y)	47	13000				1109[3D] 136[3D] 1108[3D] 117[3D]
4	Beam Member 4 (Y)	47	13000				1105[3D] 165[3D] 1106[3D] 22[3D]
5	Beam Member 5 (Y)	47	13000				2225[3D] 1273[3D] 2222[3D] 1122[3D]
6	Beam Member 6 (Y)	47	13000				2226[3D] 1235[3D] 1254[3D] 2227[3D]
7	Beam Member 7 (Y)	16	5000	1	A		
8	Beam Member 8 (Y)	32	10000				2208[2Dy] 22[3D] 1090[2Dy]
9	Beam Member 9 (Y)	16	5000				2211[2Dy]
10	Beam Member 10 (Y)	32	10000				2221[2Dy] 201[3D] 1103[2Dy]
11	Beam Member 11 (Y)	16	5000				1093[2Dy]
12	Beam Member 12 (Y)	40	10000				231[2Dy] 237[2Dy] 243[2Dy] 3[3D] 1361[2Dy] 1355[2Dy] 1349[2Dy]
13	Beam Member 13 (Y)	40	10000				251[2Dy] 258[2Dy] 265[2Dy] 5[3D] 1383[2Dy] 1376[2Dy] 1369[2Dy]
14	Beam Member 14 (Y)	32	10000				1100[2Dy] 1117[3D] 2218[2Dy]
15	Beam Member 15 (Y)	32	10000				1101[2Dy] 1116[3D] 2219[2Dy]
16	Beam Member 16 (Y)	18	5000				6[3D] 24[3D] 7[3D]
17	Beam Member 17 (Y)	18	5000				1124[3D] 1142[3D] 1125[3D]
18	Beam Member 18 (Y)	12	5000	1	A		
19	Beam Member 19 (Y)	12	5000	1	A		
20	Beam Member 20 (Y)	40	10000				23[3D] 271 1389
21	Beam Member 21 (Y)	18	5000				1376[2Dz] 1389 1355[2Dy]
22	Beam Member 22 (Y)	5	1500	1	A		

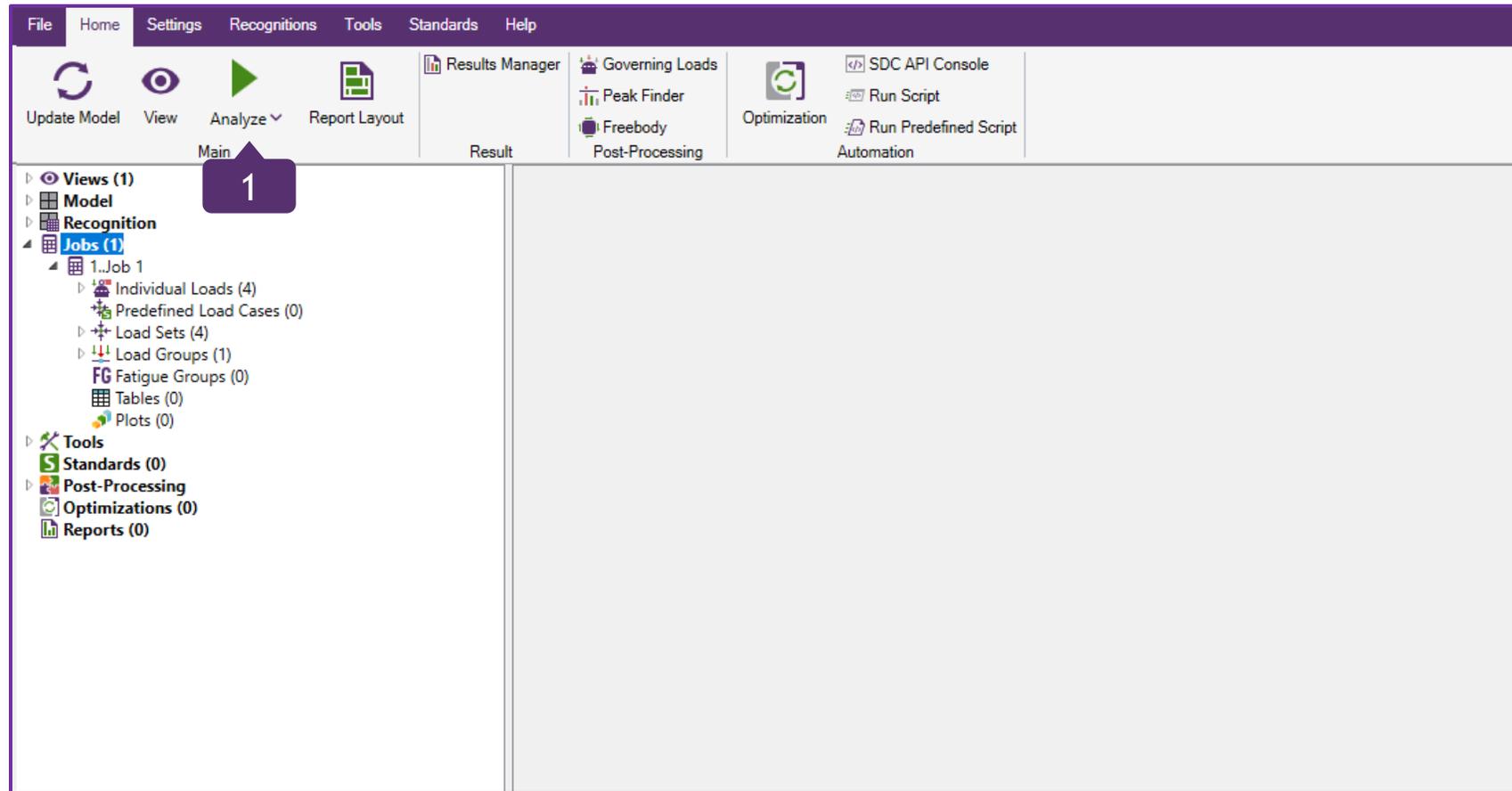
Also, it is possible to display Beam Members IDs by pressing 



-  Plot selected members
-  Plot Length Criteria
-  Plot Members ID Labels
-  Plot Full Members ID Labels
-  Plot Length Labels
-  Plot Cm Type Labels
-  Plot Length Factor Labels
-  Plot Joints for Selected Members
-  Plot Members Y and Z axes
-  Plot Length Labels in Y and Z axes

1

In *Home* section, press *Analyze*



ANSI/AISC 360-10 is an American national standard "Specification for Structural Steel Buildings", released on June 22, 2010. Checks are performed according to the provisions for load and resistance factor design (LRFD) and allowable strength design (ASD).

The standard implements Checks for design of members for tension, compression, bending, shear and combined.

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## Specification for Structural Steel Buildings

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March 9, 2005

Supersedes the *Load and Resistance Factor Design Specification for Structural Steel Buildings* dated December 27, 1999, the *Specification for Structural Steel Buildings—Allowable Stress Design and Plastic Design* dated June 1, 1989, including Supplement No. 1, the *Specification for Allowable Stress Design of Single-Angle Members* dated June 1, 1989, the *Load and Resistance Factor Design Specification for Single-Angle Members* dated November 10, 2000, and the *Load and Resistance Factor Design Specification for the Design of Steel Hollow Structural Sections* dated November 10, 2000, and all previous versions of these specifications.

Approved by the AISC Committee on Specifications and issued by the  
AISC Board of Directors



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It is possible to check a design according to Load and Resistance Factor Design (LRFD) or Allowable Strength Design (ASD). The difference between 2 designs is in load combinations and resistance factors:

Resistance Factors

LRFD       ASD

Tension (F <sub>t</sub> )	0.9
Tensile Rupture (F <sub>tr</sub> )	0.75
Compression (F <sub>c</sub> )	0.9
Shear (F <sub>v</sub> )	0.9
Bending (F <sub>b</sub> )	0.9
Torsion (F <sub>tor</sub> )	0.9

Resistance Factors

LRFD       ASD

Tension (F <sub>t</sub> )	0.6
Tensile Rupture (F <sub>tr</sub> )	0.5
Compression (F <sub>c</sub> )	0.6
Shear (F <sub>v</sub> )	0.6
Bending (F <sub>b</sub> )	0.6
Torsion (F <sub>tor</sub> )	0.6

Design for Strength Using Load and Resistance Factor Design (LRFD)  
Design will be performed in accordance with Equation B3-1:

$$R_u \leq \phi R_n \text{ (B3-1)},$$

where:

$R_u$  = required strength using LRFD load combinations;

$R_n$  = nominal strength, specified in Chapters B through K;

$\phi$  = resistance factor, specified in Chapters B through K;

$\phi R_n$  = design strength

Design for Strength Using Allowable Strength Design (ASD)  
Design will be performed in accordance with Equation B3-2:

$$R_a \leq R_n / \Omega \text{ (B3-2)},$$

where:

$R_a$  = required strength using ASD load combinations;

$R_n$  = nominal strength, specified in Chapters B through K;

$\Omega$  = safety factor, specified in Chapters B through K;

$R_n / \Omega$  = allowable strength

According to the standard, Design Strength is multiplied by LRFD factor and divided by ASD factor.

For tensile yielding in the gross section:

$$P_n = F_y A_g \quad \text{(D2-1)}$$

$\phi_t = 0.90 \text{ (LRFD)} \quad \Omega_t = 1.67 \text{ (ASD)}$

In SDC Verifier, multiplication is always used and ASD factor is converted to  $1 / S_f \text{ (ASD)}$ . For example: tensile resistance factor (F<sub>t</sub>) =  $1 / 1.67 = 0.6$

1

Execute right click on *Standards* and select *Add => AISC => AISC 360-10 Members (14th, 2010)*

An alternative method of adding Standards is to select AISC (in this case) in the Standards section of the Toolbar.

The screenshot shows the SDC Verifier software interface. The top menu bar includes File, Home, Settings, Recognitions, Tools, Standards, and Help. Below the menu bar is a toolbar with icons for various standards: ABS, AISC, API, ASME, DNV, EN, EC3, FKM, ISO, Other, and Custom. The AISC icon is highlighted with a purple box. Below the toolbar is a tree view on the left showing Views (1), Model, Recognition, Jobs (1), and Tools. The Tools section is expanded, showing Standards (0), Post-Processing, Optimizations (0), and Reports (0). A context menu is open over the Standards icon, listing options: Add, Rename Multiple, Remove Multiple, Renumber, and Clear Results. The Add option is selected, opening a sub-menu of standards. The AISC standard is selected in this sub-menu, opening a list of AISC standards. The AISC 360-10 Members (14th, 2010) standard is highlighted with a purple box and a callout '1'.

Standard	Standard
ABS	AISC ASD 89 (9th, 1989)
AISC	AISC 360-10 Members (14th, 2010)
API	AISC 360-22 Members (2022)
AJ (2005 Edition, 2017)	AISC 360-10 Bolts (14th, 2010)
AS 3990 (1993)	
ASME	
DIN 15018 (1984)	
DNV	
DVS 1608 and 1612	
EN 13001	
Eurocode3	
F.E.M 1.001 (3rd, 1998)	
FKM	
ISO	
Norsok N004 (rev.3, 2013)	
VDI 2230 (Part 1, 2015)	
Comparison Standard	
Deflection	
Custom	
Load from Library	

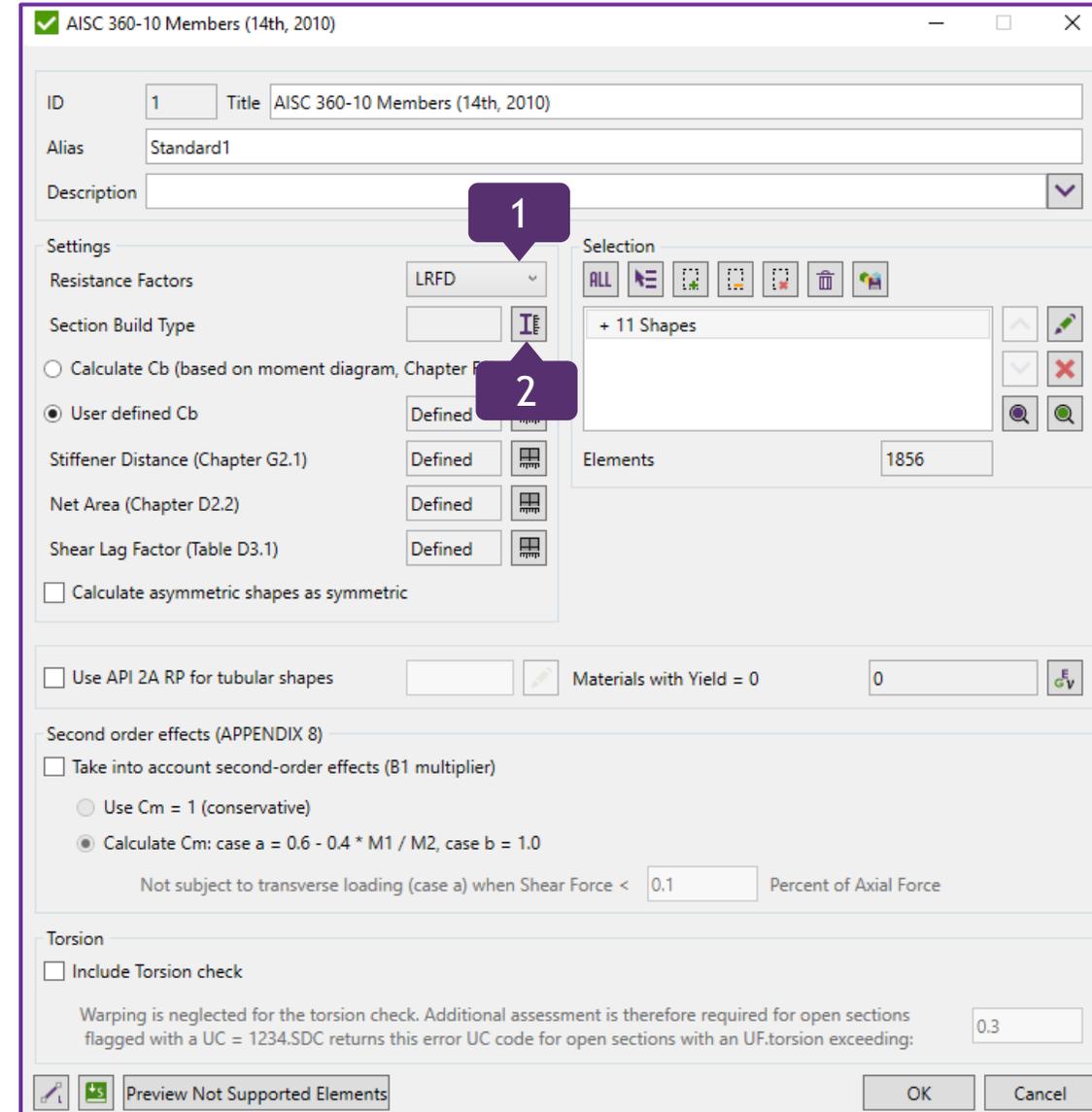
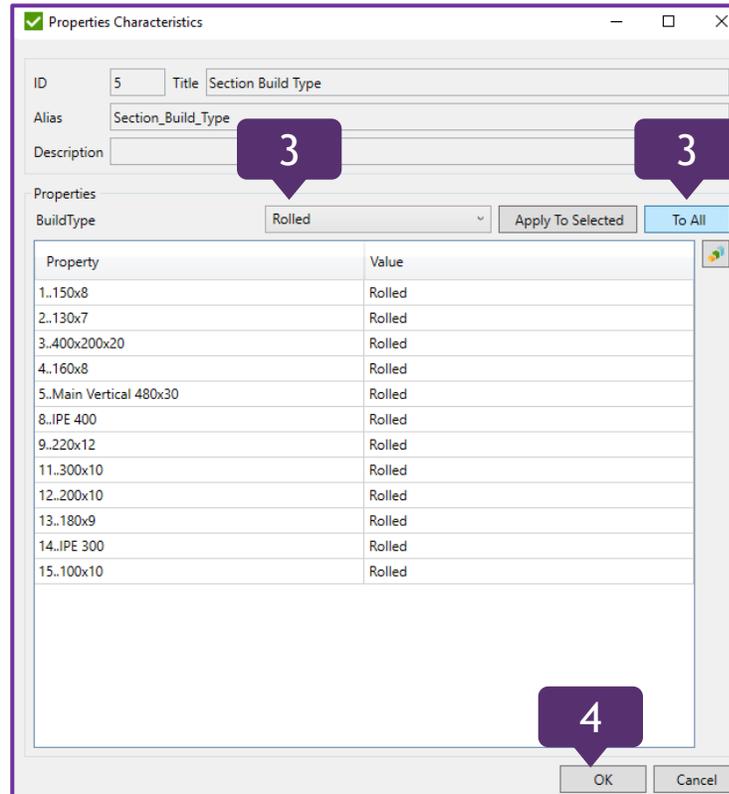
# Define AISC 360-10 LRFD Standard

1 Resistance Factors: *LRFD*

2 Press  to set *Section Build Type*

3 BuildType: *Rolled*;  
Press *To All*

4 Press *OK*



# Lateral-Torsional Buckling Modification Factor ( $C_b$ )

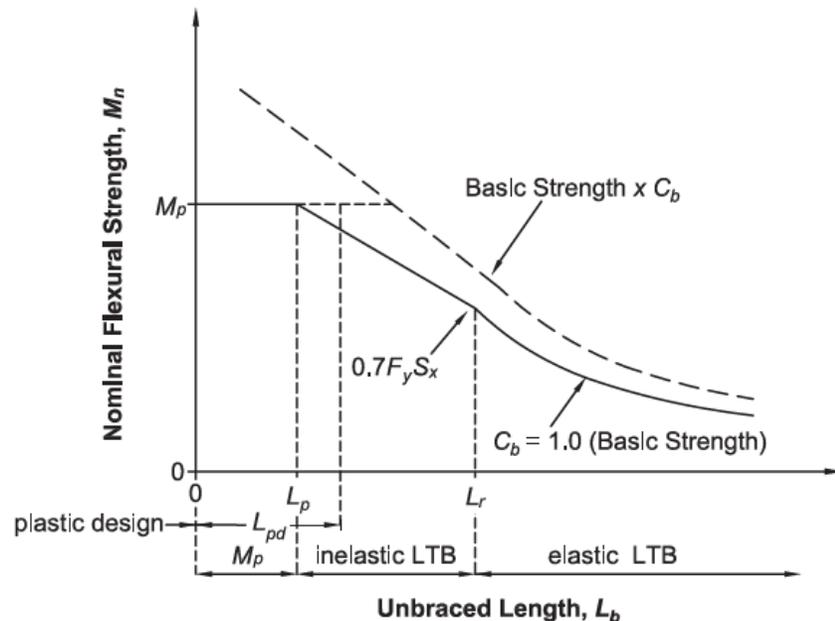
1

Select *Calculate  $C_b$  (based on moment diagram, Chapter F1)*

2

Press OK

SDC Verifier follows a conservative approach and uses  $C_b = 1.0$ .  $C_b$  is implemented as a characteristic which can be modified. For the details, see Chapter F “Design of members for Flexure”, F1 General Provisions.



1

The screenshot shows the 'AISC 360-10 Members (14th, 2010)' dialog box. The 'Settings' section is highlighted with a purple box and a '1' callout. The 'Calculate  $C_b$  (based on moment diagram, Chapter F1)' option is selected. The 'Selection' section shows '+ 11 Shapes' and 'Elements' count of 1856. The 'OK' button is highlighted with a purple box and a '2' callout.

# Standard has been created

1

To check *Constants*, expand *Standards*  
=> 1.. AISC 360-10 Members (14th, 2010) => *Input* and select *Constants*

2

Execute right click on *Constants* and select *Edit*;  
Press *OK*

It is possible to modify Safety Factors in Constants section.

The screenshot shows the SDC Verifier interface. On the left, the 'Standards' tree is expanded to '1.. AISC 360-10 Members (14th, 2010)' > 'Input' > 'Constants (23)'. A right-click context menu is open over 'Constants', with 'Edit' selected. A callout '1' points to the 'Constants' folder, and a callout '2' points to the 'Edit' menu item. In the center, the 'Constants' dialog box is open, displaying a table of constants. A callout '2' points to the 'OK' button at the bottom of the dialog.

Id	Title (Alias)	Value	Description
1	CalculateCb	1	Set 1 to calculate Cb based on formula (F1-1). Set 0 to t
2	SecondOrderEffect	0	Set 1 to take into account second order analysis effect (
3	PercentOfAxial	0.1	if shear force is lower than percent of axial force than m
4	CalculateCm	1	Cm will be calculated only when second analysis order e
5	IncludeTorsionCheck	0	Include torsion check with neglected warping?
6	CalculateAsymmetricAsSymmetric	0	Calculate asymmetric shapes as symmetric. Min width a
7	F_t	0.9	Tension Resistance Factor
8	F_c	0.9	Compression Resistance Factor
9	F_v	0.9	Shear Resistance Factor
10	F_b	0.9	Shear Resistance Factor
11	F_tr	0.75	Tensile Rupture Resistance Factor
12	F_vl	1	Shear rolled IBeam Resistance Factor
13	F_tor	0.9	Torsional Resistance Factor
14	Alpha	1	LRFD force level adjustment factor. Used in (A-8-1)
15	UFTorsionLimit	0.3	Additional assessment on torsion is required for open s
16	UFTorsionCode	1234	Code is used for Torsional Utilization Factor when it is h
17	rolled	1	
18	built_up	2	
19	nonslender	3	
20	slender	4	
21	NotSupported	12345678	
22	compact	5	

The screenshot shows the 'Standards (1)' tree expanded to '1.. AISC 360-10 Members (14th, 2010)' > 'Input' > 'Constants (23)' > 'Checks (16)'. All 16 checks are checked, indicating they have been created.

- 1..Beam Characteristics
- 2..Circular Tube
- 3..Rectangular Tube
- 4..Bars
- 5..Section C
- 6..Section I
- 7..Axial Strength
- 8..Shear Strength
- 9..Bending Strength Bars
- 10..Bending Strength I-beams
- 11..Bending Strength Channels
- 12..Axial
- 13..Shear
- 14..Bending
- 15..Torsion
- 16..Overall

16 Checks have been created.

# Preview Table Results

1

In Checks section, expand 16..Overall and select Tables

2

Execute right click on Tables and select Table (expand/extreme)

3

In Load Group, press

4

Select Load Group => 1..Overall and press OK

5

Detailed (extreme locations - element and loads (for Loads Groups)) is ON

6

Press Fill Table

7

Press OK

The screenshot shows the SDC Verifier interface with several windows and dialog boxes. The 'Custom Check Table' window is the primary focus, showing a table of utilization factors for various elements and load groups. The table has columns for 'Extreme', 'Uf Axial', 'Uf Bending Major', 'Uf Bending Minor', 'Uf Shear', 'Uf Axial and Bending', and 'Uf Overall'. The 'Minimum' row shows all values at 0.00. The 'Maximum' row shows values: 0.32, 0.65, 1.82, 0.22, 1.82, 1.82. The 'Detailed' section shows element ID 1854 with a utilization factor of 1.82. The 'Select Load' dialog shows '1..Overall' selected. The 'Checks (16)' tree is expanded to '16..Overall', and the 'Tables (1)' sub-tree is expanded to 'Table (expand/extreme)'. The 'Fill Table' button is highlighted. The 'OK' button in the 'Select Load' dialog is highlighted.

Extreme	Uf Axial	Uf Bending Major	Uf Bending Minor	Uf Shear	Uf Axial and Bending	Uf Overall
<b>Minimum</b>						
Value	0.00	0.00	0.00	0.00	0.00	0.00
Element ID	59	1528	1134	1877	1180	201
Load	LS3	LS2	LS2	LS4	LS2	LS2
<b>Maximum</b>						
Value	0.32	0.65	1.82	0.22	1.82	1.82
Element ID	955	171	1854	1125	1854	1854
Load	LS3	LS3	LS3	LS3	LS4	LS4
<b>Absolute</b>						
Value	0.32	0.65	1.82	0.22	1.82	1.82
Element ID	955	171	1854	1125	1854	1854
Load	LS3	LS3	LS3	LS3	LS4	LS4

Utilization Factor on element ID=1854 does not pass the check:  $1.82 > 1$

# Utilization Factor Plot

1

In Checks section, expand 16..Overall and select *Plots*

2

Execute right click on *Plots* and select *Criteria Plot*

3

In Load Group, press

4

Select *Load Group* => *1..Overall* and press *OK*

5

Parameter: *Uf Overall*

6

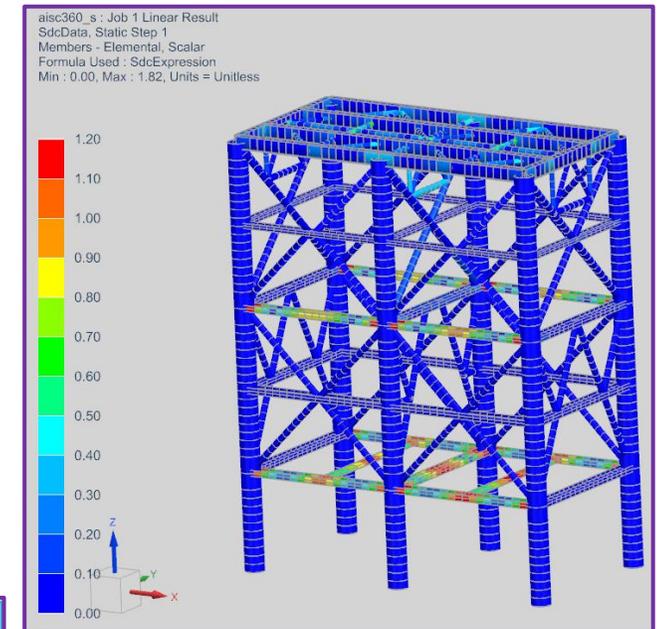
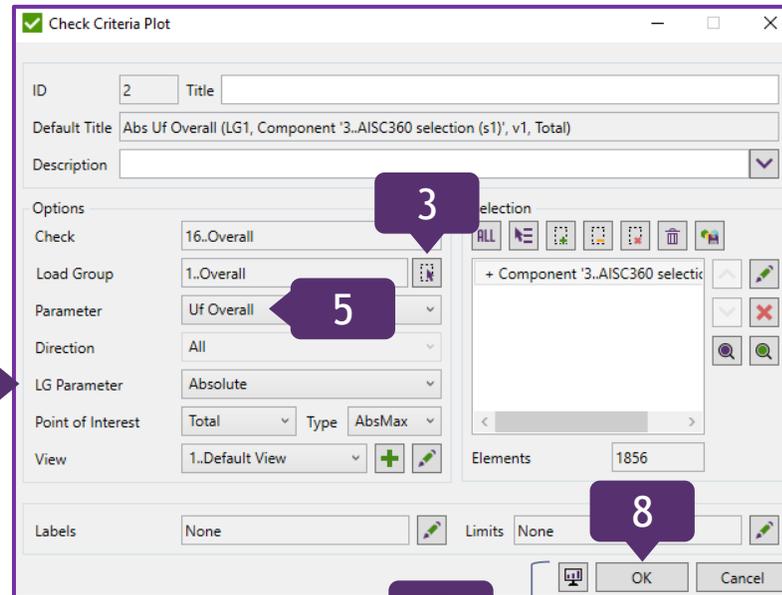
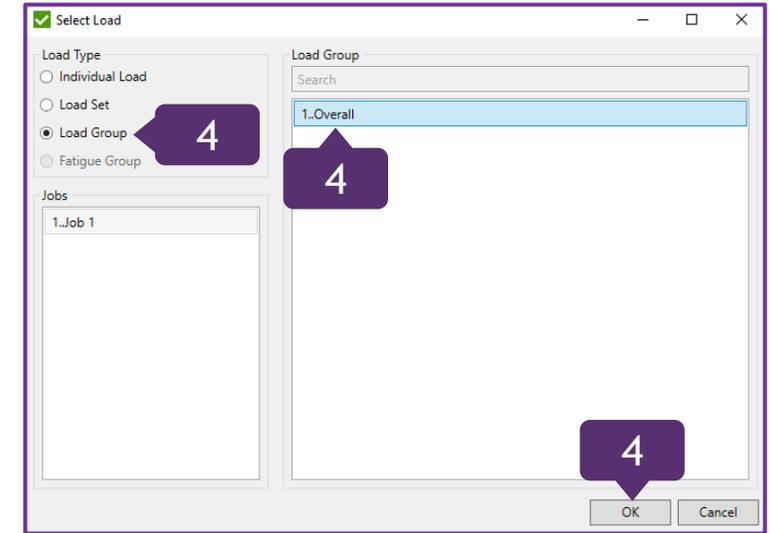
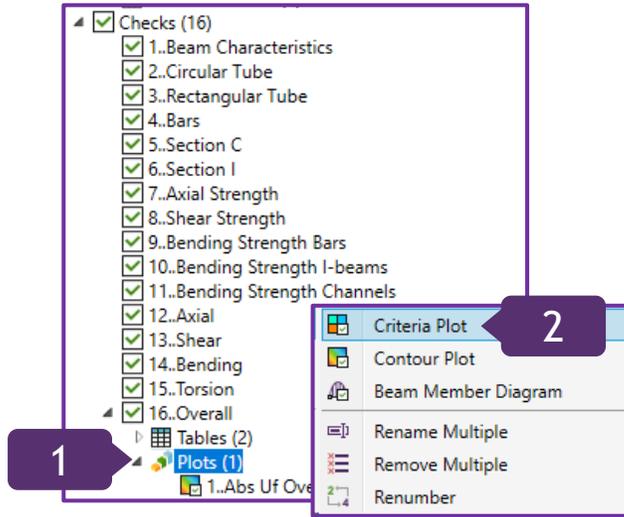
LG Parameter: *Absolute*

7

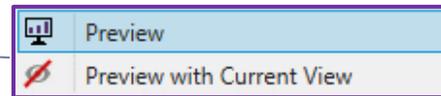
Press , and then *Preview*

8

Press *OK*



SDC Verifier uses Legend from 0.00 to 1.20 for Utilization Factor. Elements in orange and red do not pass the check.

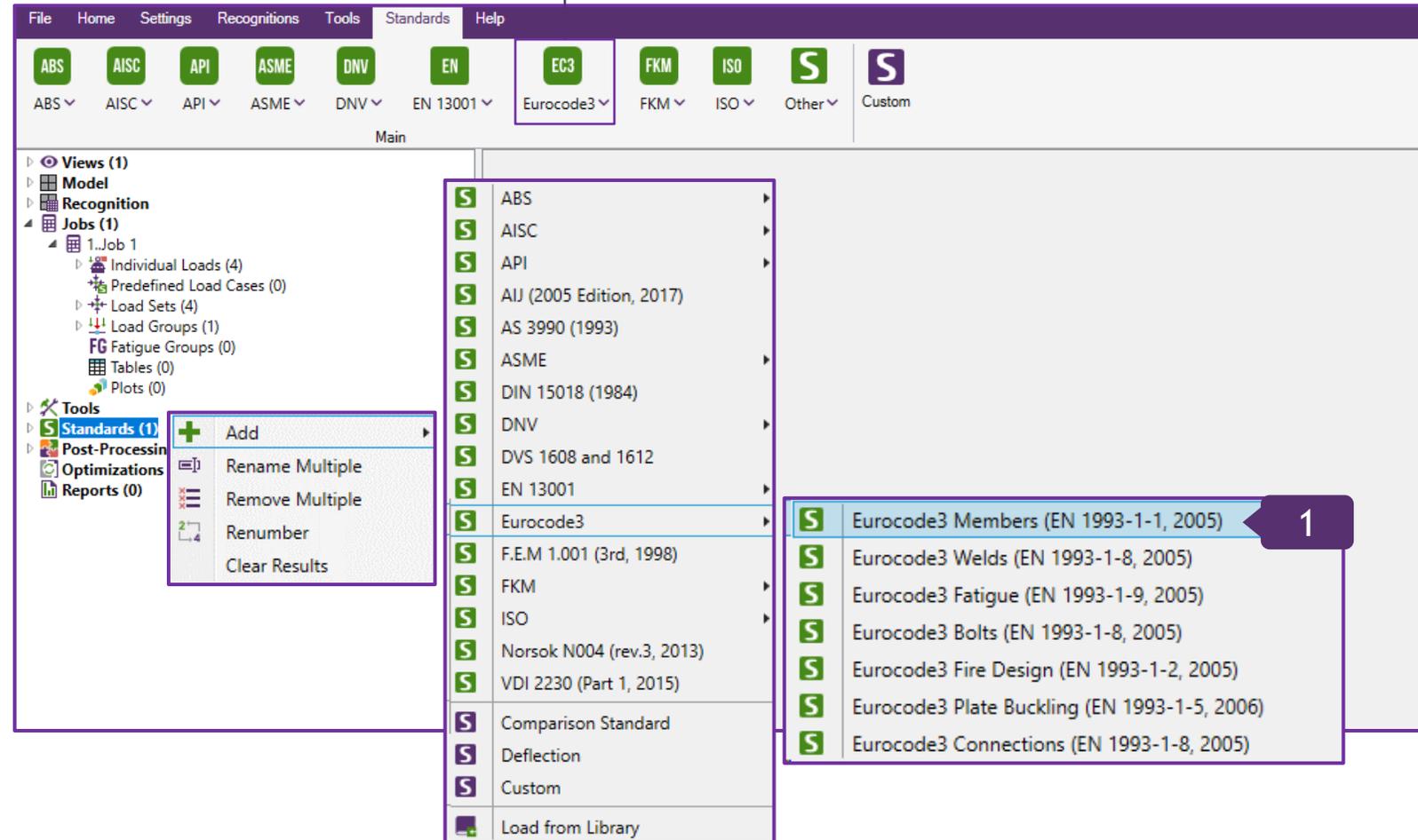


# Add Eurocode3 Members (EN1993-1-1, 2005) Standard

1

Execute right click on *Standards* and select *Add => Eurocode3 => Eurocode3 Members (EN 1993-1-1, 2005)*

An alternative method of adding Standards is to select Eurocode3 (in this case) in the Standards section of the Toolbar.

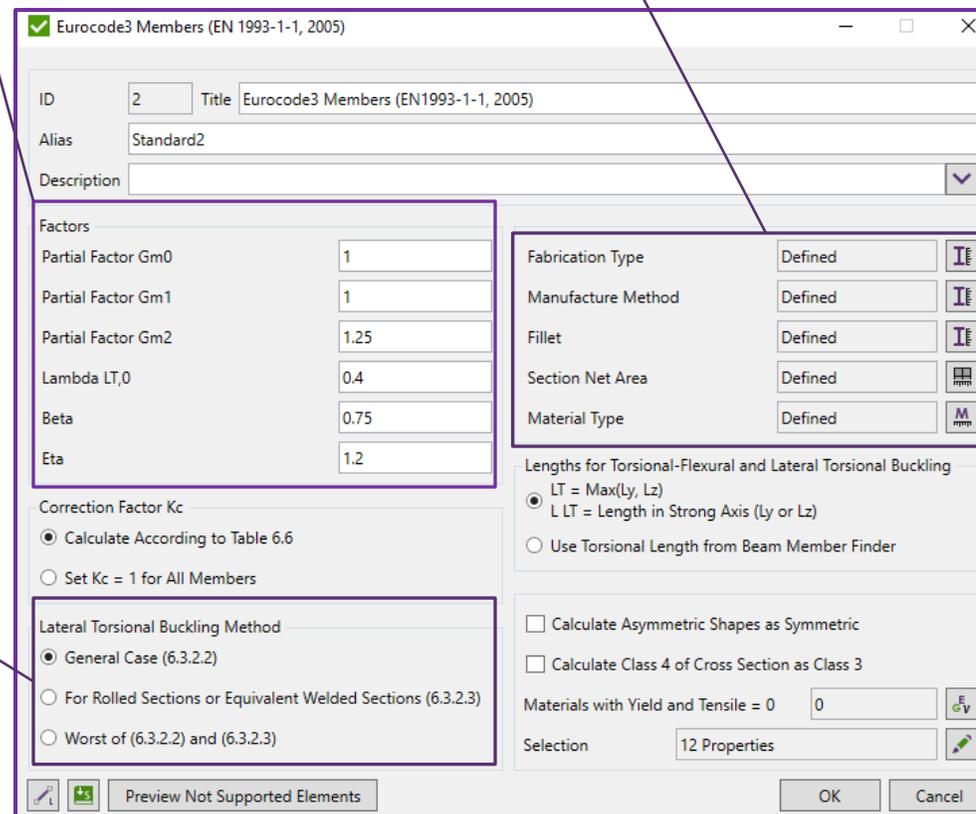


**Gm0** - resistance of cross-sections whatever the class is;  
**Gm1** - resistance of members to instability assessed by member checks;  
**Gm2** - resistance of cross-sections in tension to fracture;  
 $\lambda_{LT,0}$  - plateau length of the lateral torsional buckling curves for rolled sections;  
**B** - correction factor for the lateral torsional buckling curves for rolled sections;  
 $\eta$  - is used in the shear area calculations.

**Note:** All parameters may be taken from the National Annex.

It is possible to choose the calculation method for Lateral Torsional Buckling: General Case (chapter 6.3.2.2), For rolled sections or equivalent welded sections (chapter 6.3.2.3) or the worst of two (min reduction factor is used from 2 methods).

**Fabrication Type:** Rolled/Welded;  
**Manufacture Type:** Hot Finished/Cold Formed;  
**Fillets** has to be defined in the characteristic (they are missing in the model);  
**Section Net Area** - for fasteners with holes net area has to be defined;  
**Material Type** - the buckling curve (Table 6.2) depends on the material type.



The screenshot shows the 'Eurocode3 Members (EN 1993-1-1, 2005)' dialog box. The 'Factors' section contains the following values:

Parameter	Value
Partial Factor Gm0	1
Partial Factor Gm1	1
Partial Factor Gm2	1.25
Lambda LT,0	0.4
Beta	0.75
Eta	1.2

The 'Correction Factor Kc' section has the following options:

- Calculate According to Table 6.6
- Set Kc = 1 for All Members

The 'Lateral Torsional Buckling Method' section has the following options:

- General Case (6.3.2.2)
- For Rolled Sections or Equivalent Welded Sections (6.3.2.3)
- Worst of (6.3.2.2) and (6.3.2.3)

The 'Fabrication Type' section has the following options:

- Fabrication Type: Defined
- Manufacture Method: Defined
- Fillet: Defined
- Section Net Area: Defined
- Material Type: Defined

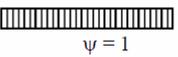
The 'Lengths for Torsional-Flexural and Lateral Torsional Buckling' section has the following options:

- LT = Max(Ly, Lz)
- L LT = Length in Strong Axis (Ly or Lz)
- Use Torsional Length from Beam Member Finder

The 'Materials with Yield and Tensile = 0' field is set to 0. The 'Selection' field shows 12 Properties.

A correction Factor  $K_c$  can be calculated, using the  $C_m$  Tool for each member. Also it is possible to set the  $K_c$  equal to 1.

Table 6.6: The Correction Factor:

Moment distribution	$k_c$
 $\psi = 1$	1.0
 $-1 \leq \psi \leq 1$	$\frac{1}{1,33 - 0,33\psi}$
	0,94
	0,90
	0,91

The following cases are NOT recognized and are skipped:

	0,86
	0,77
	0,82

Member Length for Torsional and Torsional-Flexural Buckling Check (LT) by default is max among  $L_y$  and  $L_z$  lengths. For lateral torsional buckling (L LT) is length in strong axis.

It is possible to use Torsional Length from Beam Member Finder. In this case, it can be modified manually by a user.

ID	Title	Elements	Length	Length Factor	Cm Type	Modified	Joint - NodeID [Joint Type]
1	Beam Member 1 (T)	47	13000				201[3D] 1110[3D] 202[3D] 1111[3D]
1.1	Beam Member 1.1 (T)	9	2500	1	A		
1.2	Beam Member 1.2 (T)	9	2500	1	A		
1.3	Beam Member 1.3 (T)	9	2500	1	A		

# Define Fabrication Type

1

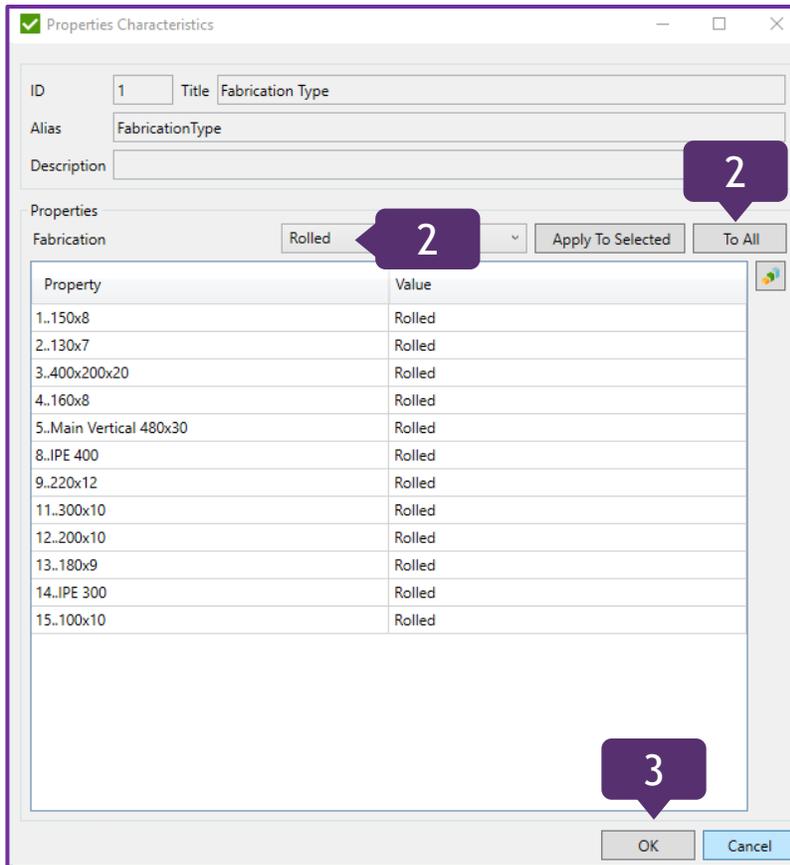
Press  in *Fabrication Type*

2

Fabrication: *Rolled* and press *To All*

3

Press *OK*



Properties Characteristics

ID: 1 Title: Fabrication Type

Alias: FabricationType

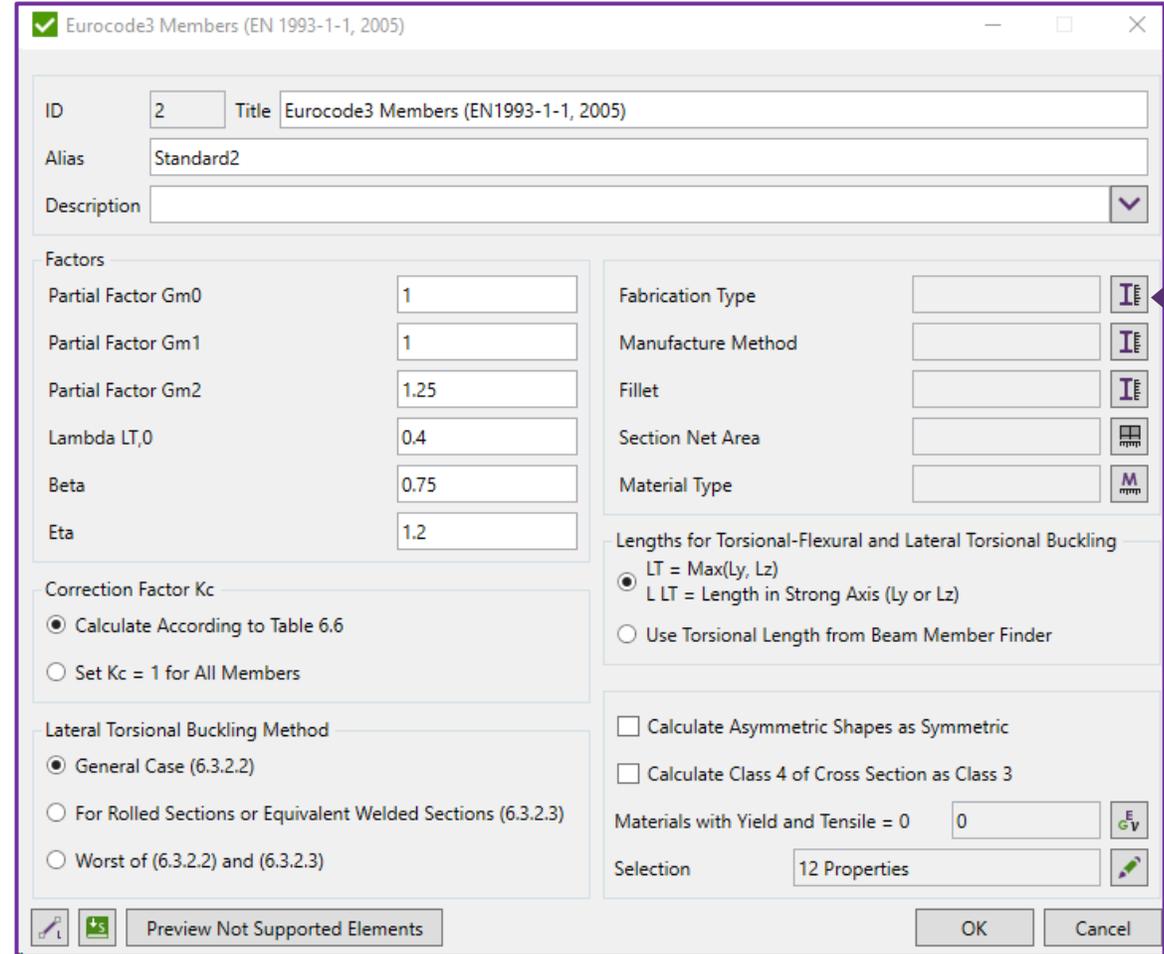
Description:

Properties

Fabrication: Rolled Apply To Selected To All

Property	Value
1..150x8	Rolled
2..130x7	Rolled
3..400x200x20	Rolled
4..160x8	Rolled
5..Main Vertical 480x30	Rolled
8..IPE 400	Rolled
9..220x12	Rolled
11..300x10	Rolled
12..200x10	Rolled
13..180x9	Rolled
14..IPE 300	Rolled
15..100x10	Rolled

OK Cancel



Eurocode3 Members (EN 1993-1-1, 2005)

ID: 2 Title: Eurocode3 Members (EN1993-1-1, 2005)

Alias: Standard2

Description:

Factors

Partial Factor Gm0: 1

Partial Factor Gm1: 1

Partial Factor Gm2: 1.25

Lambda LT,0: 0.4

Beta: 0.75

Eta: 1.2

Correction Factor Kc

Calculate According to Table 6.6

Set Kc = 1 for All Members

Lateral Torsional Buckling Method

General Case (6.3.2.2)

For Rolled Sections or Equivalent Welded Sections (6.3.2.3)

Worst of (6.3.2.2) and (6.3.2.3)

Fabrication Type: 

Manufacture Method: 

Fillet: 

Section Net Area: 

Material Type: 

Lengths for Torsional-Flexural and Lateral Torsional Buckling

LT = Max(Ly, Lz)

L LT = Length in Strong Axis (Ly or Lz)

Use Torsional Length from Beam Member Finder

Calculate Asymmetric Shapes as Symmetric

Calculate Class 4 of Cross Section as Class 3

Materials with Yield and Tensile = 0: 0 

Selection: 12 Properties 

Preview Not Supported Elements

OK Cancel

1

Press  in *Manufacture Method*

2

Hollow Manufacturing Method: *Hot Finished* and press *To All*

3

Press *OK*

**Properties Characteristics**

ID: 2 Title: Manufacture Method

Alias: Hollow

Description:

Properties

Hollow Manufacturing Method: **Hot Finished** **To All**

Property	Value
1..150x8	Hot Finished
2..130x7	Hot Finished
3..400x200x20	Hot Finished
4..160x8	Hot Finished
5..Main Vertical 480x30	Hot Finished
8..IPE 400	Hot Finished
9..220x12	Hot Finished
11..300x10	Hot Finished
12..200x10	Hot Finished
13..180x9	Hot Finished
14..IPE 300	Hot Finished
15..100x10	Hot Finished

**OK** **Cancel**

**Eurocode3 Members (EN 1993-1-1, 2005)**

ID: 2 Title: Eurocode3 Members (EN1993-1-1, 2005)

Alias: Standard2

Description:

Factors

Partial Factor Gm0: 1

Partial Factor Gm1: 1

Partial Factor Gm2: 1.25

Lambda LT,0: 0.4

Beta: 0.75

Eta: 1.2

Fabrication Type: **Defined**

Manufacture Method: **Defined**

Fillet:

Section Net Area:

Material Type:

Lengths for Torsional-Flexural and Lateral Torsional Buckling

LT = Max(Ly, Lz)

L LT = Length in Strong Axis (Ly or Lz)

Use Torsional Length from Beam Member Finder

Correction Factor Kc

Calculate According to Table 6.6

Set Kc = 1 for All Members

Lateral Torsional Buckling Method

General Case (6.3.2.2)

For Rolled Sections or Equivalent Welded Sections (6.3.2.3)

Worst of (6.3.2.2) and (6.3.2.3)

Calculate Asymmetric Shapes as Symmetric

Calculate Class 4 of Cross Section as Class 3

Materials with Yield and Tensile = 0

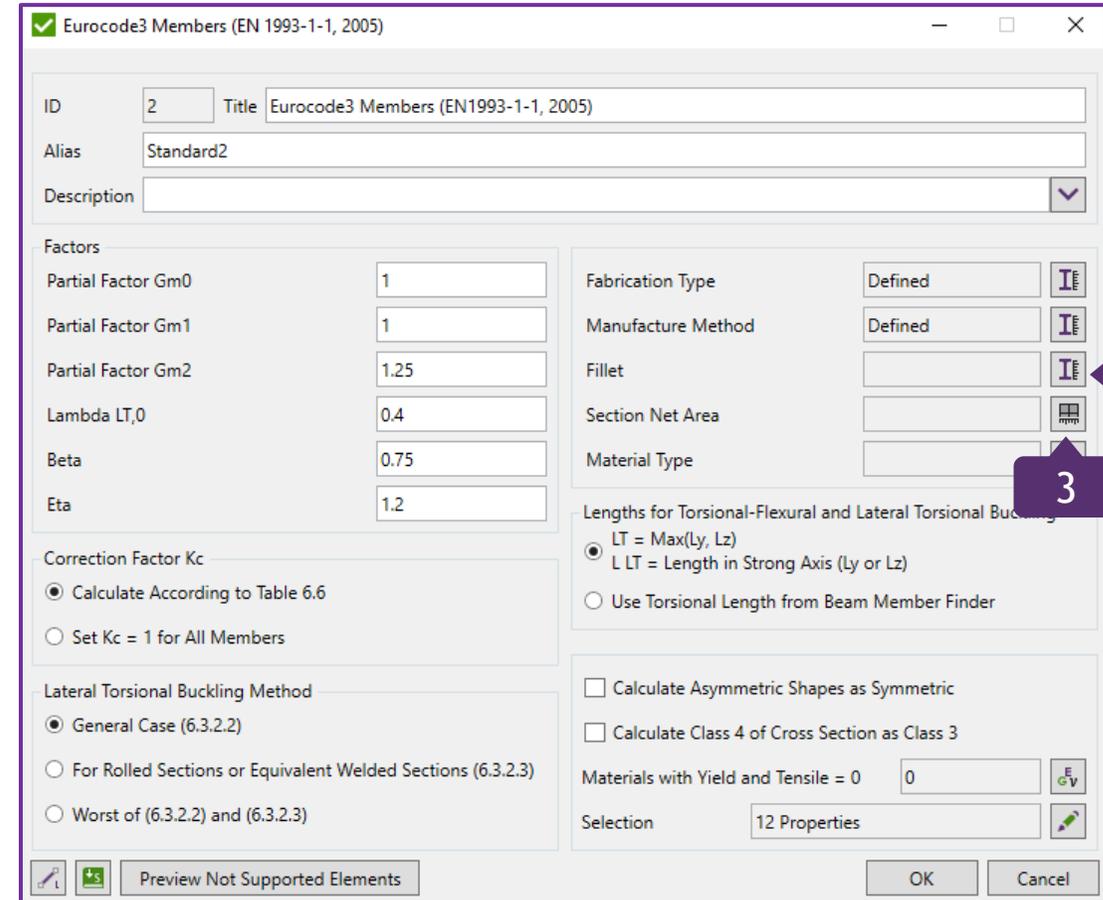
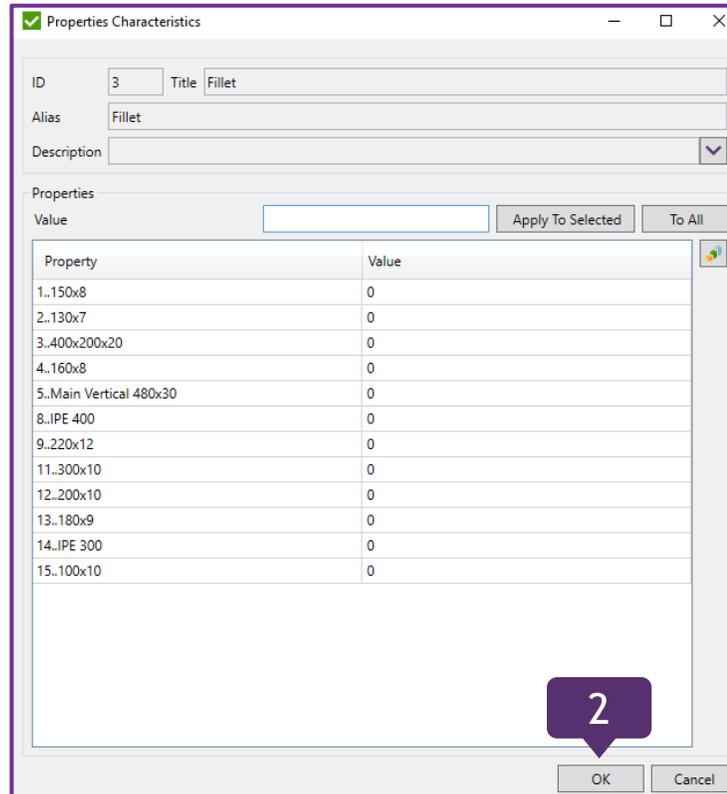
Selection: 12 Properties

**Preview Not Supported Elements** **OK** **Cancel**

1 Press  in *Fillet*

2 Press *OK*

3 Repeat steps 1-2 for *Section Net Area*



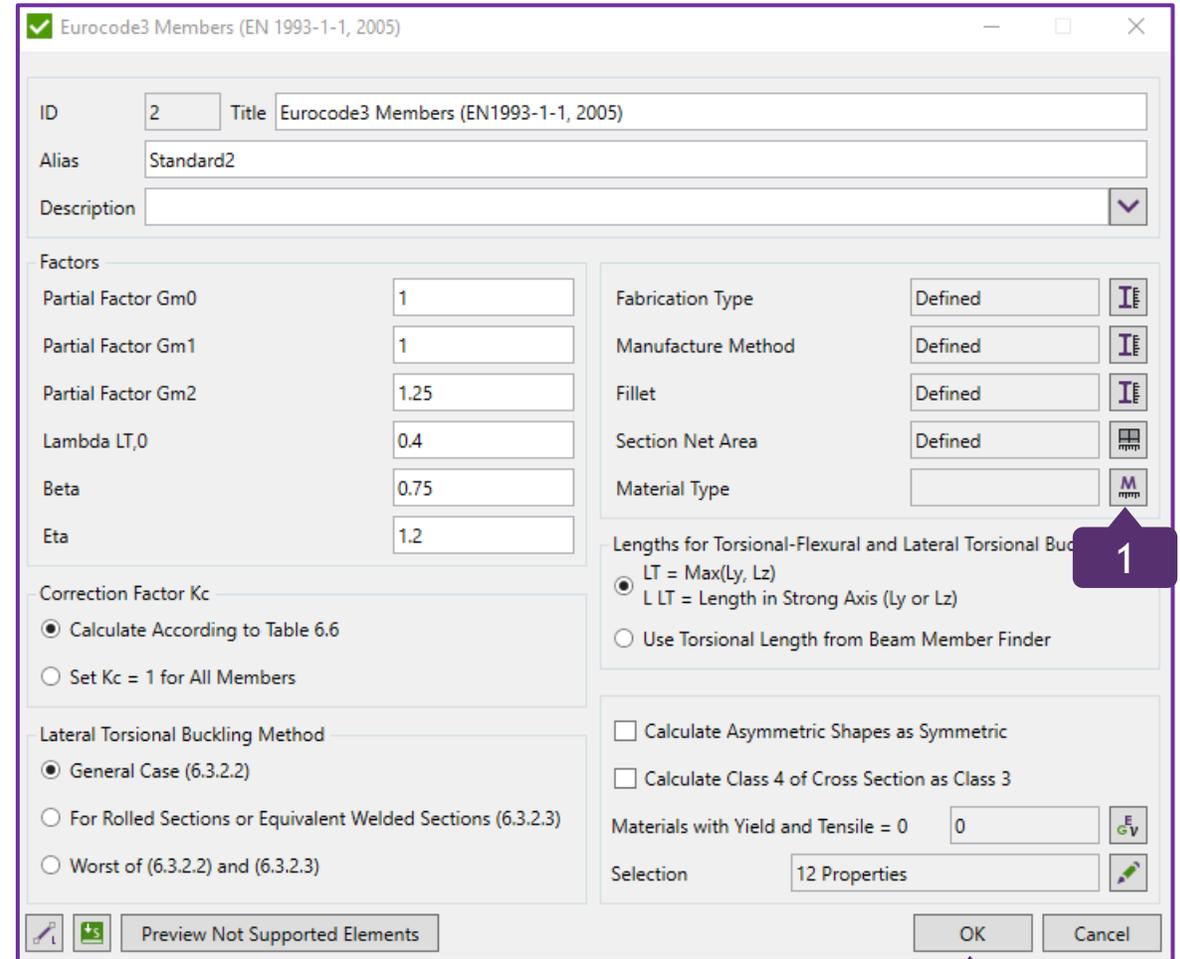
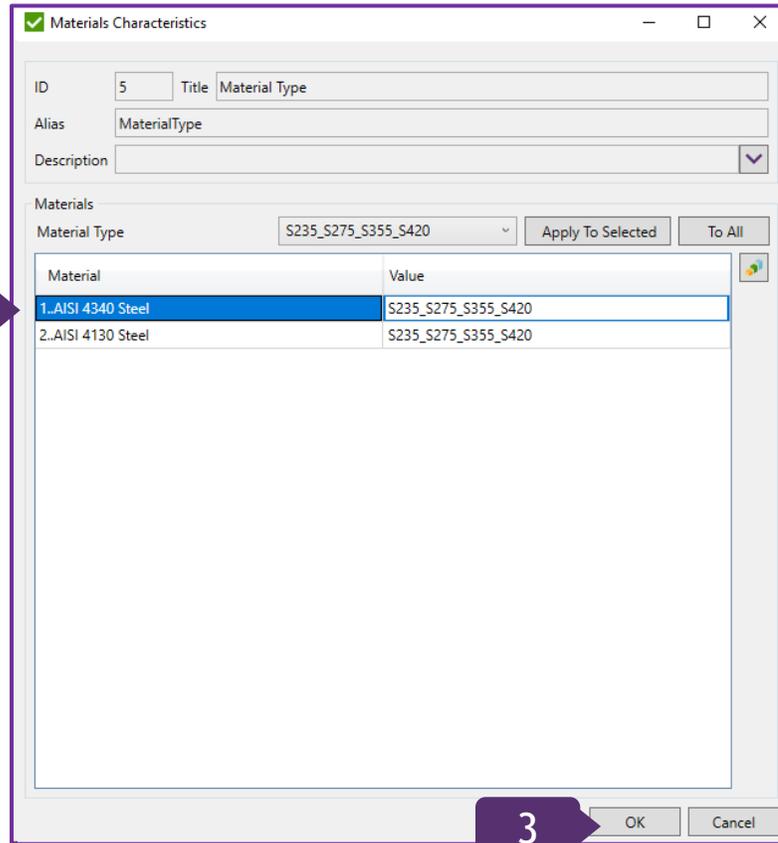
# Define Material Type

1 Press  **Material Type**

2 Select **1..AISI 4340 Steel with Value: S235\_S275\_S355\_S420**

3 Press **OK**

4 Press **OK**



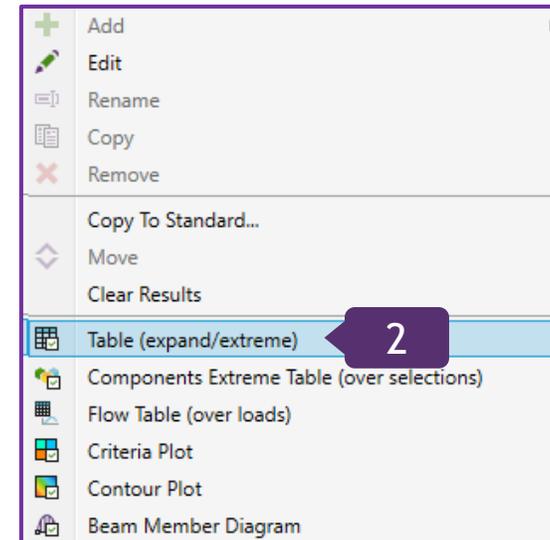
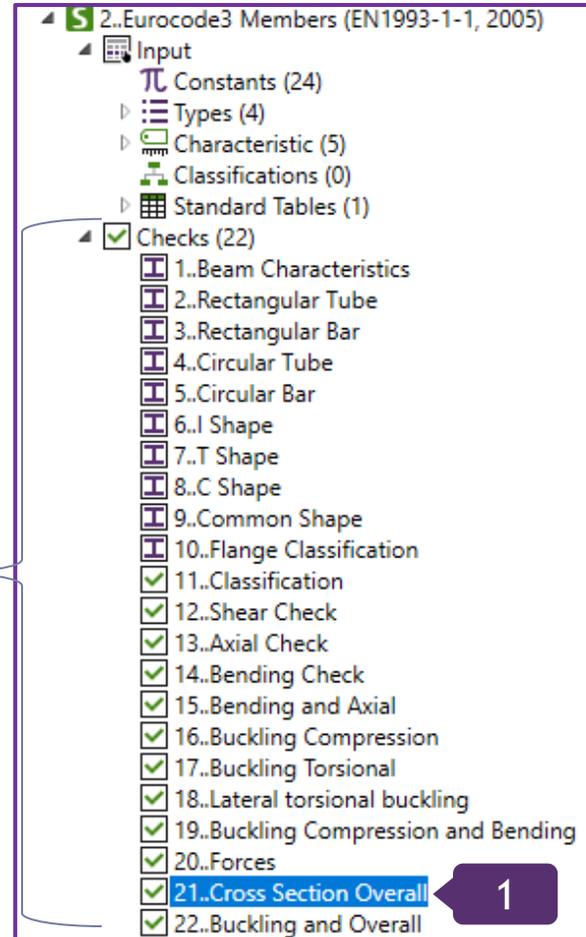
1

In *Checks* section of 2..Eurocode3 Members, execute right click on 21..Cross Section Overall

2

Select *Table (expand/extreme)*

22 Checks have been created.



# Preview Table Results (Continuation)

3 Press  to select Load

4 Select Load Group => 1..Overall;  
Press OK

5 Detailed (extreme locations - element and loads (for Loads Groups)) is ON

6 Press Fill Table

7 Press OK

The screenshot shows the 'Custom Check Table' window with the following settings:

- ID: 1, Title: [empty]
- Default Title: All (LG1, Component '4.Eurocode3 Shapes (s2)')
- Description: [empty]
- Options: Check: 21..Cross Section Overall, Load Group: 1..Overall, Direction/Parameter: All
- Expand/Extreme Options: Table Type: Extreme (worst result on selection),  Detailed (extreme locations - element and loads (for Loads Groups)),  Short (only extremes)
- Parameter: None, Value >: 1
- Sort by: Parameter: None, Order: Ascending
- Selection: + Component '4.Eurocode3 Shapes (s2)', Elements: 1856
- Buttons: Fill Table, OK, Cancel

The 'Table Info' window displays the following table:

Extreme	Uf Axial	Uf ShearY	Uf ShearZ	Uf BendY	Uf BendZ	Uf Comb	Uf Section
<b>Minimum</b>							
Value	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Element ID	59	1147	1411	1528	1251	265	1178
Load	LS3	LS4	LS3	LS2	LS2	LS1	LS2
<b>Maximum</b>							
Value	0.28	0.16	0.16	0.58	1.63	1.63	1.63
Element ID	955	171	1125	1125	1854	1854	1854
Load	LS3	LS3	LS3	LS3	LS3	LS3	LS3
<b>Absolute</b>							
Value	0.28	0.16	0.16	0.58	1.63	1.63	1.63
Element ID	955	171	1125	1125	1854	1854	1854
Load	LS3	LS3	LS3	LS3	LS3	LS3	LS3

The 'Select Load' dialog box shows:

- Load Type:  Load Group
- Load Group: 1..Overall (selected)
- Buttons: OK, Cancel

Numbered callouts (3-7) indicate the sequence of actions: 3 points to the 'Fill Table' button in the 'Custom Check Table' window; 4 points to the 'Load Group' selection in the 'Select Load' dialog; 5 points to the 'Detailed' radio button; 6 points to the 'Fill Table' button; 7 points to the 'OK' button in the 'Select Load' dialog.

# Utilization Factor Plot

1

In *Checks* section of 2..Eurocode3 Members, execute right click on 21..Cross Section Overall

2

Select *Criteria Plot*

3

Press  to select *Load*

4

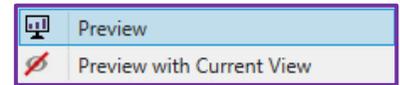
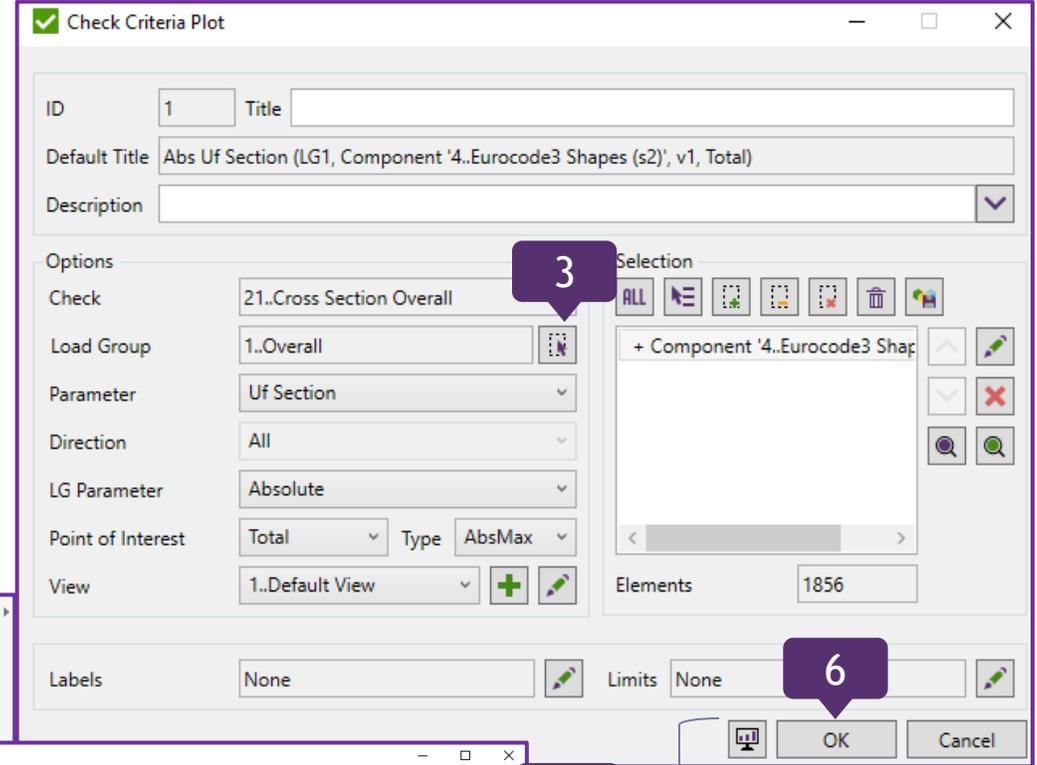
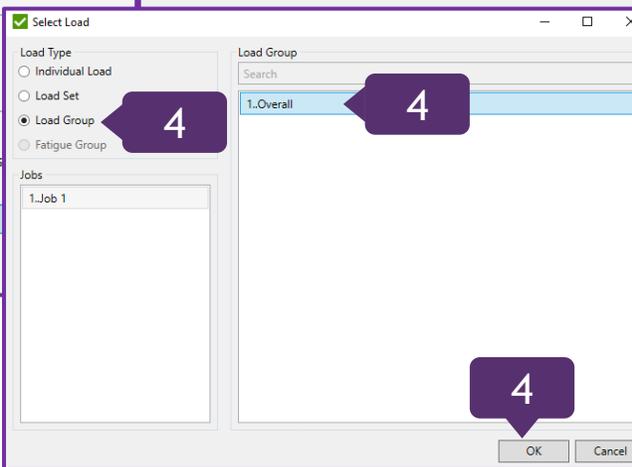
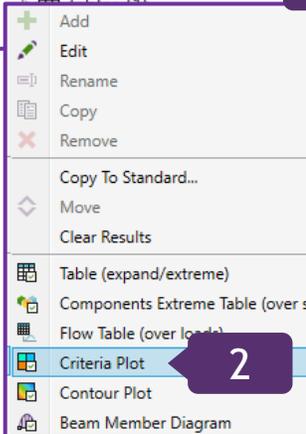
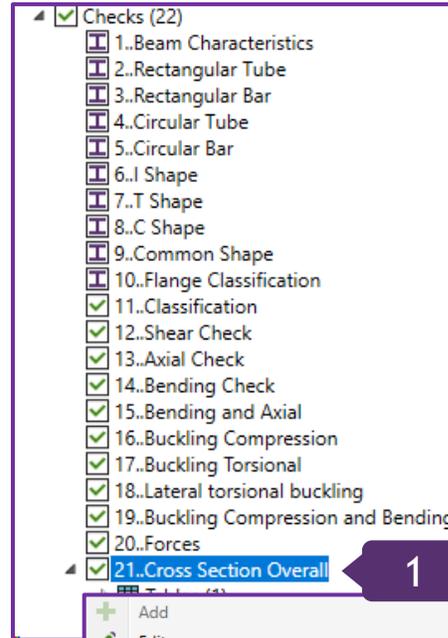
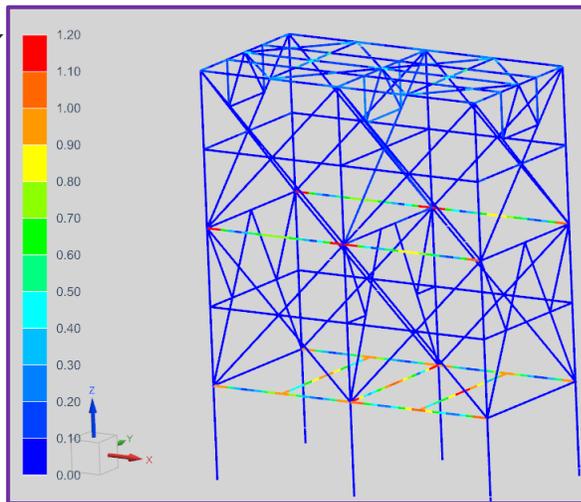
Select *Load Group* => 1..Overall; Press *OK*

5

Press , and then *Preview*

6

Press *OK*



To learn how to obtain reports, please check a separate Tutorial that depicts the functionality of SDC Verifier Report Designer. It may be downloaded via this link:

<https://sdcverifier.com/tutorials/report-designer/>