



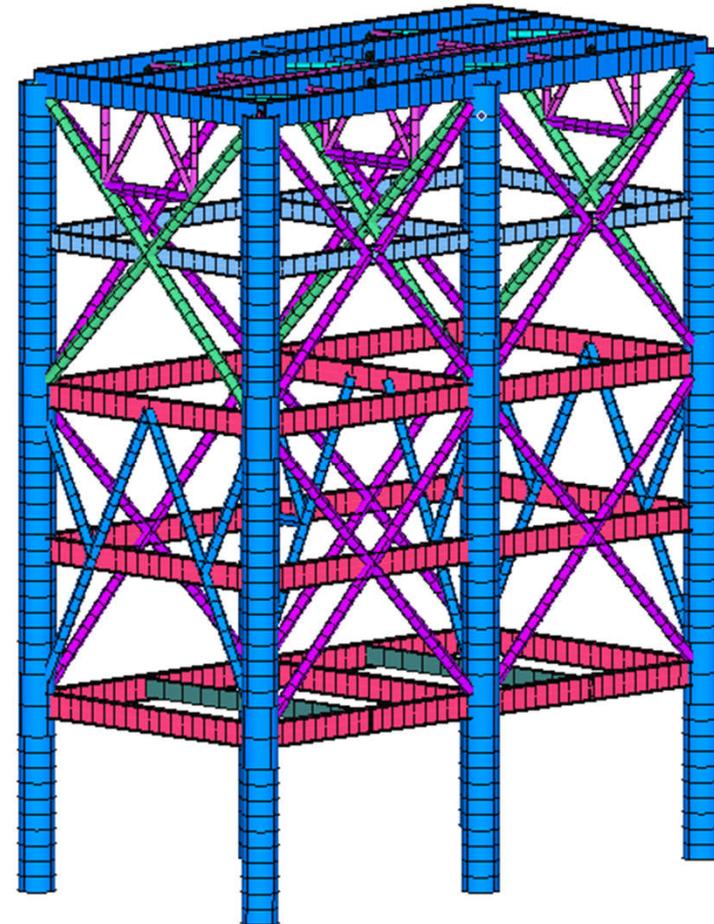
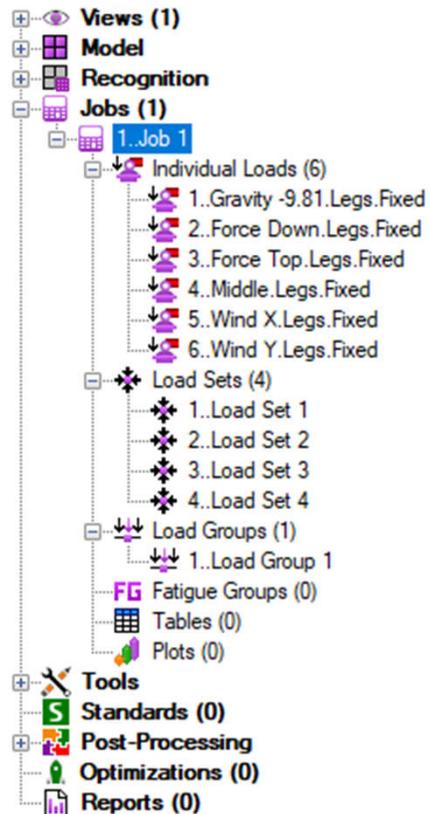
Tutorial  
**AISC 360-10 & Eurocode3**

10 Dec 2020  
version 2020.0.2

- ▶ In this tutorial, AISC 360-10 & Eurocode3 Member Check 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.
- ▶ Report was automatically generated in SDC Verifier Report Tool to represent beam checks results according AISC 360-10 and Eurocode3 standards.



# Predefined Project

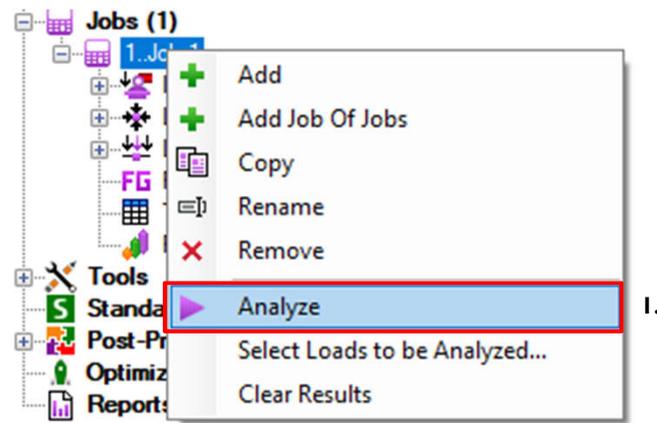


This tutorial uses project with predefined boundary condition, load combinations and load group. The model contains only beam elements of the following types: I-Beam, Circular and Rectangular Tubes

# Analyze Job

1

Execute ► **Analyze** from *Job1*  
context menu



Joint – 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;

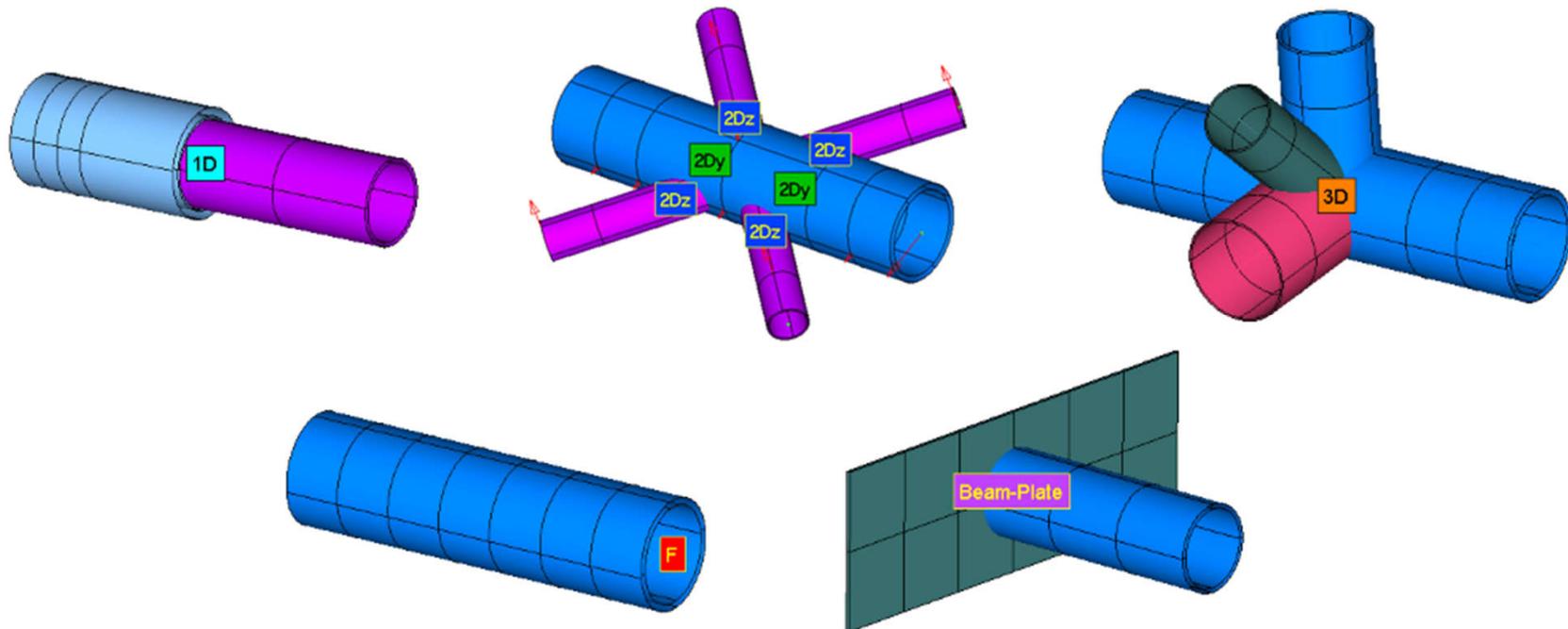
2D Joint – beam members connected in one plane;

3D Joint – beam members connected in space;

Free Joint – node which belongs only to one element (free);

Beam-Plate Joint – beam member connected to plates (perpendicularly);

User Defined;



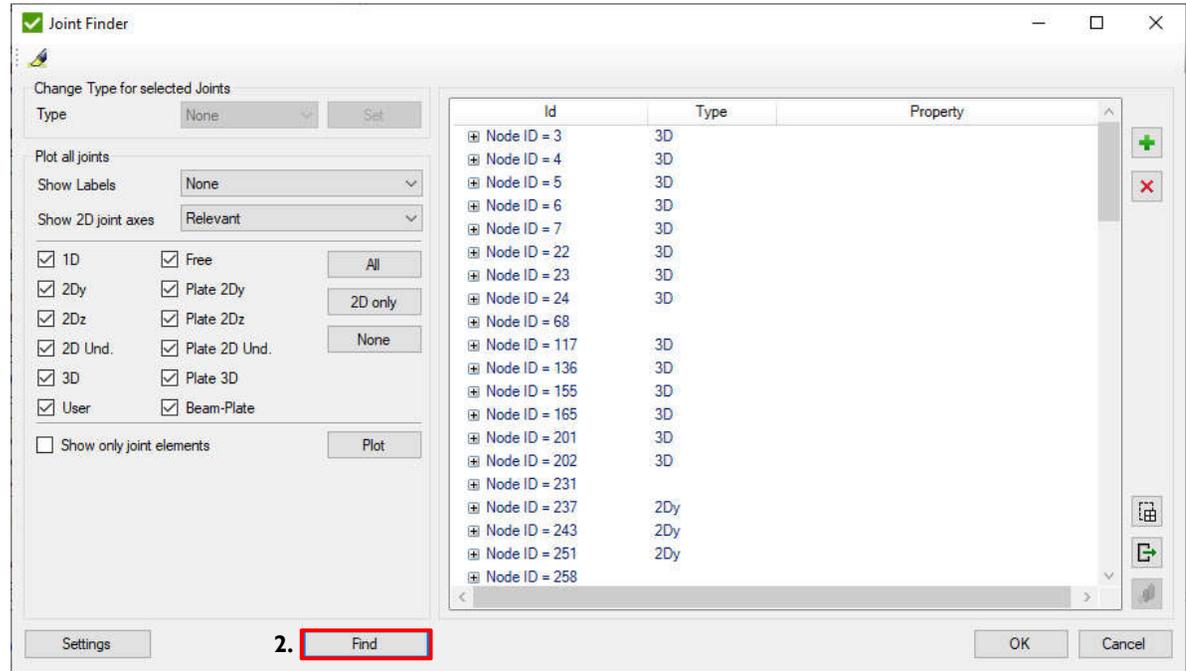
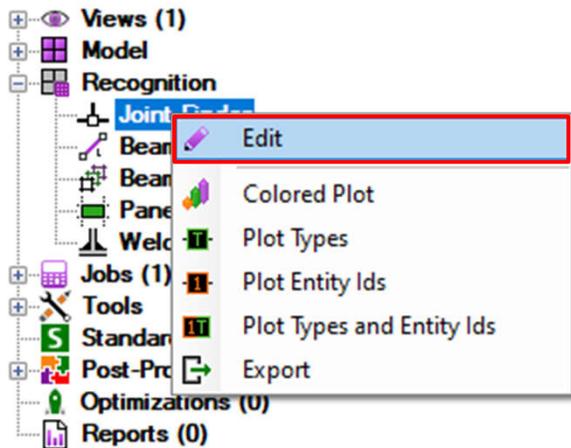
# Joint Recognition

1

Execute *Edit* from *Joint Finder* context menu

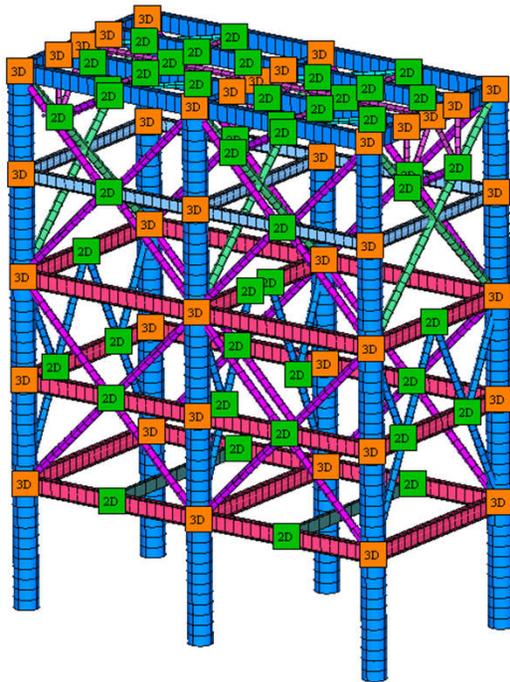
2

Press *Find*.



# Joints Plot

- 1 Select All Joints (Ctrl+A).
- 2 Press
- 3 Press Plot Joint Type Labels
- 4 Press OK



**Joint Finder**

Change Type for selected Joints  
 Type: None [Set]

Plot all joints  
 Show Labels: None  
 Show 2D joint axes: Relevant

1D     Free    All  
 2Dy     Plate 2Dy    2D only  
 2Dz     Plate 2Dz    None  
 2D Und.     Plate 2D Und.  
 3D     Plate 3D  
 User     Beam-Plate

Show only joint elements    Plot

Id	Type	Property
Node ID = 3	3D	
Node ID = 4	3D	
Node ID = 5	3D	
Node ID = 6	3D	
Node ID = 7	3D	
Node ID = 22	3D	
Node ID = 23	3D	
Node ID = 24	3D	
Node ID = 68	3D	
Node ID = 117	3D	
Node ID = 136	3D	
Node ID = 155	3D	
Node ID = 165	3D	
Node ID = 201	3D	
Node ID = 202	3D	
Node ID = 231	3D	
Node ID = 237	2Dy	
Node ID = 243	2Dy	
Node ID = 251	2Dy	
Node ID = 258	2Dy	

Settings    Find    4. OK    Cancel

Plot Joints of specific type:

Plot all joints  
 Show Labels: None  
 Show 2D joint axes: Relevant

1D     Free    All  
 2Dy     Plate 2Dy    2D only  
 2Dz     Plate 2Dz    None  
 2D Und.     Plate 2D Und.  
 3D     Plate 3D  
 User     Beam-Plate

Show only joint elements    Plot

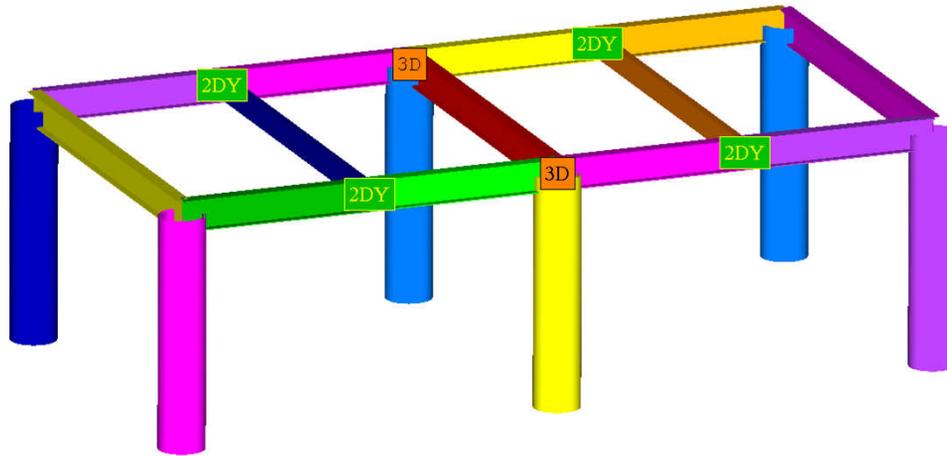
3. Plot Joint Type Labels  
 Plot Joint Type in colors

Modify Joint Type:

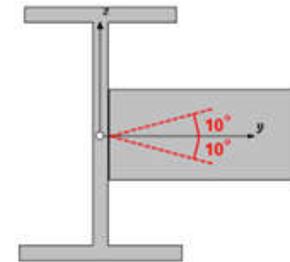
Change Type for selected Joints  
 Type: None [Set]

# Beam Member Finder. Members Length

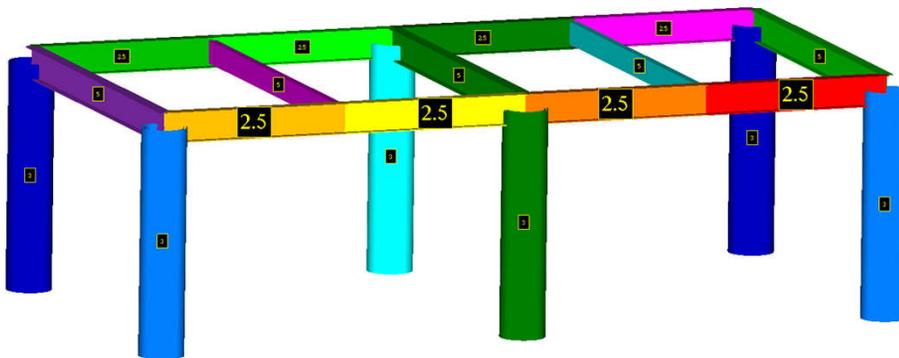
Beam Member Finder recognizes beam members and (buckling) lengths for different directions (Y, Z and Torsional).



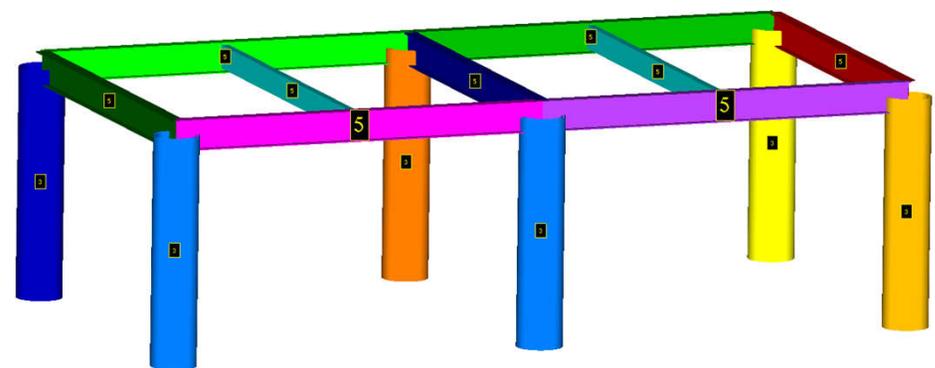
2DY  
Joint



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

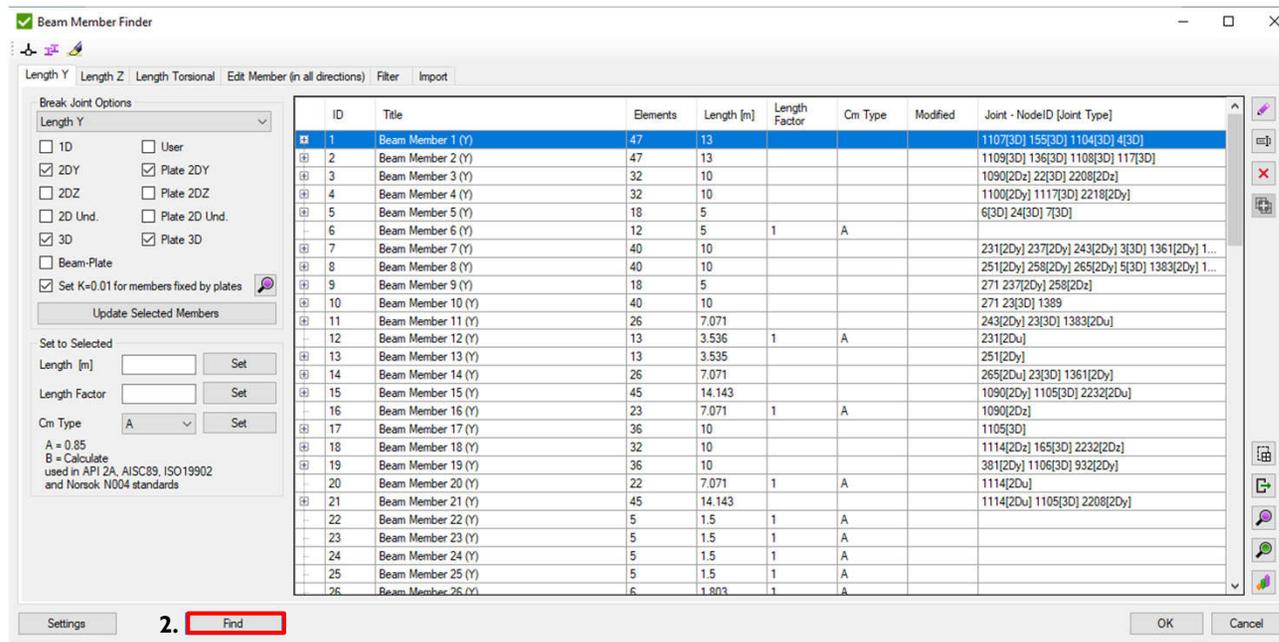
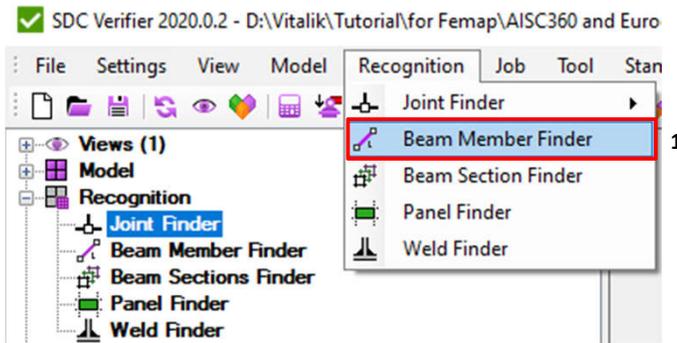


Length Z – 2 Beam Members with  $L = 5$



# Recognize Length Y

- 1 Execute Recognition – Beam Member Finder
- 2 Press Find



# Beam Member Finder Explanation

ID	Title	Elements	Length [m]	Length Factor	Cm Type	Modified	Joint - NodeID [Joint Type]
1	Beam Member 1 (Y)	47	13				1107[3D] 155[3D] 1104[3D] 4[3D]
2	Beam Member 2 (Y)	47	13				1109[3D] 136[3D] 1108[3D] 117[3D]
3	Beam Member 3 (Y)	32	10				1090[2Dz] 22[3D] 2208[2Dz]
4	Beam Member 4 (Y)	32	10				1100[2Dy] 1117[3D] 2218[2Dy]
5	Beam Member 5 (Y)	18	5				6[3D] 24[3D] 7[3D]
6	Beam Member 6 (Y)	12	5	1	A		
7	Beam Member 7 (Y)	40	10				231[2Dy] 237[2Dy] 243[2Dy] 3[3D] 1361[2Dy] 1...
8	Beam Member 8 (Y)	40	10				251[2Dy] 258[2Dy] 265[2Dy] 5[3D] 1383[2Dy] 1...
9	Beam Member 9 (Y)	18	5				271 237[2Dy] 258[2Dz]
10	Beam Member 10 (Y)	40	10				271 23[3D] 1389
11	Beam Member 11 (Y)	26	7.071				243[2Dy] 23[3D] 1383[2Du]
12	Beam Member 12 (Y)	13	3.536	1	A		231[2Du]
13	Beam Member 13 (Y)	13	3.535				251[2Dy]
14	Beam Member 14 (Y)	26	7.071				265[2Du] 23[3D] 1361[2Dy]
15	Beam Member 15 (Y)	45	14.143				1090[2Dy] 1105[3D] 2232[2Du]
16	Beam Member 16 (Y)	23	7.071	1	A		1090[2Dz]
17	Beam Member 17 (Y)	36	10				1105[3D]
18	Beam Member 18 (Y)	32	10				1114[2Dy] 165[3D] 2232[2Dz]
19	Beam Member 19 (Y)	36	10				381[2Dy] 1106[3D] 932[2Dy]
20	Beam Member 20 (Y)	22	7.071	1	A		1114[2Du]
21	Beam Member 21 (Y)	45	14.143				1114[2Du] 1105[3D] 2208[2Dy]
22	Beam Member 22 (Y)	5	1.5	1	A		
23	Beam Member 23 (Y)	5	1.5	1	A		
24	Beam Member 24 (Y)	5	1.5	1	A		
25	Beam Member 25 (Y)	5	1.5	1	A		
26	Beam Member 26 (Y)	6	1.803	1	A		

ID	Title	Elements	Length [m]	Length Factor	Cm Type	Modified	Joint - NodeID [Joint Type]
48	Beam Member 48 (Y)	36	10				1111[3D] 520[2Dy] 68[2Dy]
48.1	Beam Member 48.1 (Y)	9	2.5	1	A		
48.2	Beam Member 48.2 (Y)	9	2.5	1	A		
48.3	Beam Member 48.3 (Y)	9	2.5	1	A		
48.4	Beam Member 48.4 (Y)	9	2.5	1	A		

Break Options define what joints are used to split beam members

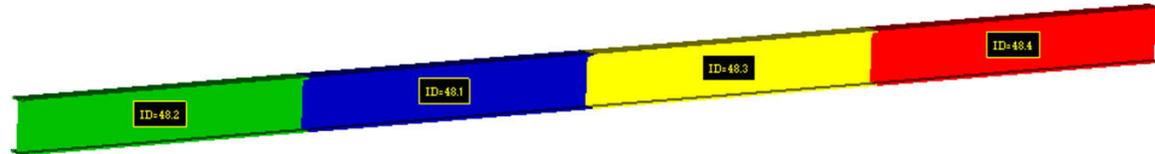
Change Length/Factor for selected beam members

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

Colored Plot of members with labels (ID, Length, Factor or Cm Type).

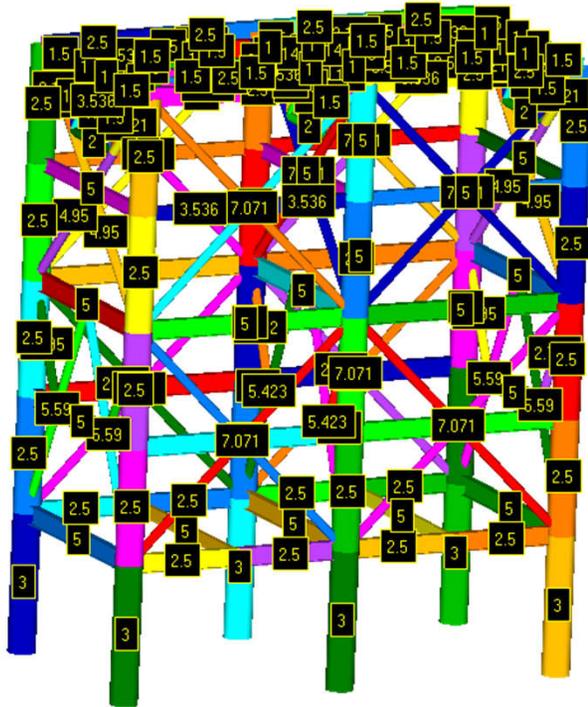
- Plot selected members
- Plot Members ID labels
- Plot Full Members ID labels
- Plot Length labels
- Plot Cm Type labels
- Plot Length Factor labels
- Plot Joints for Selected Members
- Plot Members Y and Z axes

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



# Beam Member Finder Plots

- 1 Select All Beam Members (Ctrl+A)
- 2 Press and Execute Plot Length labels to display members Length.
- 3 Press and Execute Plot Members ID labels to display beam members IDs.



**Beam Member Finder**

Length Y | Length Z | Length Torsional | Edit Member (in all directions) | Filter | Import

Break Joint Options

Length Y:  1D,  2D,  2D Und.,  3D,  Beam-Plate

Length [m]:  Set

Length Factor:  Set

Cm Type: A

A = 0.85  
B = Calculate  
used in API 2A, AISC89, ISO19902 and Norsok N004 standards

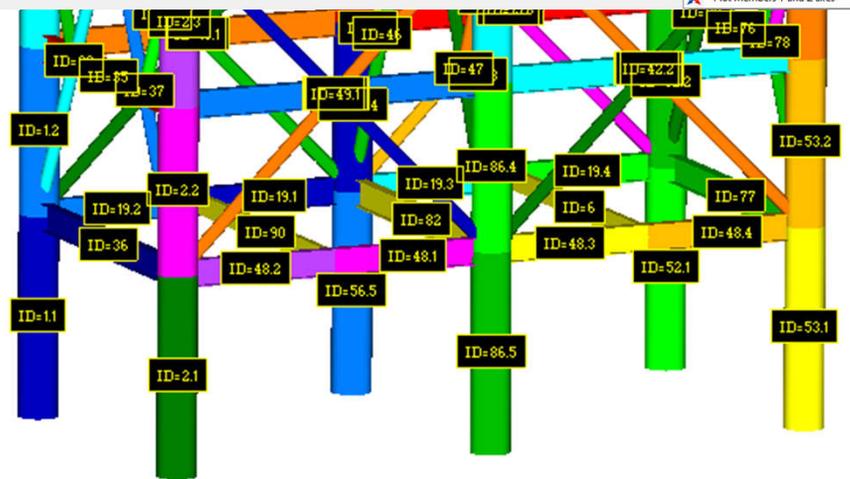
Settings Find

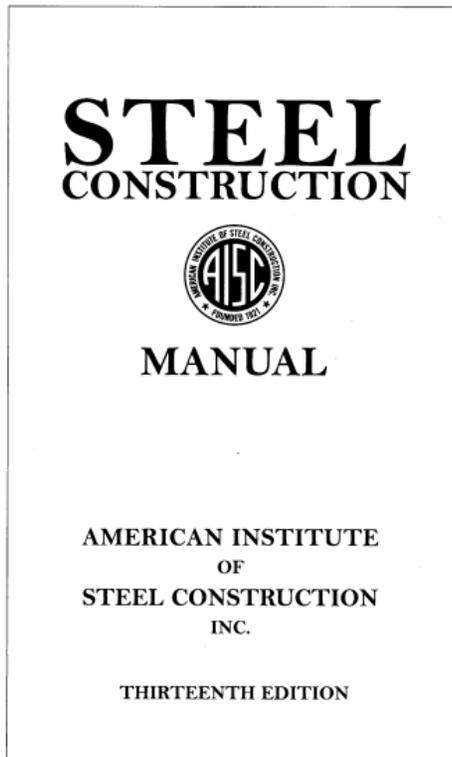
ID	Title	Elements	Length [m]	Length Factor	Cm Type	Modified	Joint - NodeID [Joint Type]
31	Beam Member 31 (Y)	16	5	1	A		
32	Beam Member 32 (Y)	23	7.071				610[2Dy]
33	Beam Member 33 (Y)	23	7.071				640[2Dy]
34	Beam Member 34 (Y)	15	5	1	A		1097[2Dz]
35	Beam Member 35 (Y)	14	5	1	A		1098[2Dz] 1098[2Dz]
36	Beam Member 36 (Y)	18	5	1	A		
37	Beam Member 37 (Y)	16	5.59	1	A		1099[2Dz]
38	Beam Member 38 (Y)	16	5.59	1	A		1098[2Dz]
39	Beam Member 39 (Y)	7	2.795	1	A		
40	Beam Member 40 (Y)	7	2.795	1	A		
41	Beam Member 41 (Y)	32	10				1101[2Dy] 1116[3D] 2219[2Dy]
42	Beam Member 42 (Y)	45	14.142				1103[2Dy] 1110[3D] 2233[2Dz]
43	Beam Member 43 (Y)	32	10				1103[2Dy] 201[3D] 2221[2Dz]
44	Beam Member 44 (Y)	23	7.071	1	A		1103[2Dy]
45	Beam Member 45 (Y)	36	10				1110[3D]
46	Beam Member 46 (Y)	18	5.423	1	A		879[2Dz]
47	Beam Member 47 (Y)	18	5.423	1	A		886[2Dz]
48	Beam Member 48 (Y)	36	10				1111[3D] 520[2Dy] 682[2Dy]
48.1	Beam Member 48.1 (Y)	9	2.5	1	A		
48.2	Beam Member 48.2 (Y)	9	2.5	1	A		
48.3	Beam Member 48.3 (Y)	9	2.5	1	A		
48.4	Beam Member 48.4 (Y)	9	2.5	1	A		
49	Beam Member 49 (Y)	45	14.142				1115[2Dy] 1110[3D] 2221[2Dz]
50	Beam Member 50 (Y)	22	7.071	1	A		1115[2Dy]
51	Beam Member 51 (Y)	32	10				1115[2Dy] 202[3D] 2233[2Dz]
52	Beam Member 52 (Y)	47	11				2229[2Dy] 1272[3D] 2229[2Dy] 1122[3D]

Plot selected members

- 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

Also it is possible to display beam members IDs by pressing





ANSI/AISC 360-10 - 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



AMERICAN INSTITUTE OF STEEL CONSTRUCTION, INC.  
One East Wacker Drive, Suite 700  
Chicago, Illinois 60601-1802

# ASD vs LRFD

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		Resistance Factors	
<input checked="" type="radio"/> LRFD	<input type="radio"/> ASD	<input type="radio"/> LRFD	<input checked="" type="radio"/> ASD
Tension (F <sub>t</sub> )	0.9	Tension (F <sub>t</sub> )	0.6
Tensile Rupture (F <sub>tr</sub> )	0.75	Tensile Rupture (F <sub>tr</sub> )	0.5
Compression (F <sub>c</sub> )	0.9	Compression (F <sub>c</sub> )	0.6
Shear (F <sub>v</sub> )	0.9	Shear (F <sub>v</sub> )	0.6
Bending (F <sub>b</sub> )	0.9	Bending (F <sub>b</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 ASD factor is converted to  $1 / S_f$  (ASD). For example: tensile resistance factor ( $F_t$ ) =  $1 / 1.67 = 0.6$ .

# AISC 360-10 LRDF

1 Execute *Standards-Add-AISC-AISC 360-10 Members (14<sup>th</sup>, 2010)*.

2 Resistance Factors: **LRFD**

3 Press **I** to set *Section Build Type*

4 Execute - **Rolled**

5 Press *To All*

6 Press *Ok*

Go to the next slide to Continue

The screenshot shows the SDC Verifier interface. The 'Standards' menu is open, and 'AISC 360-10 Members (14th, 2010)' is selected. The 'Properties Characteristics' dialog is open, showing the following settings:

- Resistance Factors: **LRFD**
- Section Build Type: **Rolled**
- Apply To Selected: **To All**

The 'Properties Characteristics' dialog also shows a table of properties and their values:

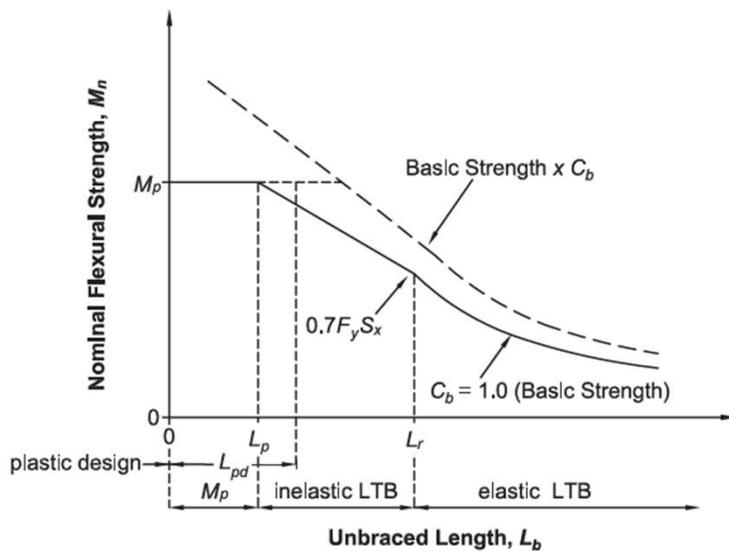
Property	Value
1. 150x8	Rolled
2. 130x7	Rolled
3. 400x200x20	Rolled
4. 160x8	Rolled
5. Main Vertical 480x30	Rolled
6. 382x19	Rolled
7. 400x19	Rolled
8. IPE 400	Rolled
9. 220x12	Rolled
11. 300x10	Rolled
12. 200x10	Rolled
13. 180x9	Rolled
14. IPE 300	Rolled
15. 100x10	Rolled

Section Build Type:  
**Rolled/Build Up**

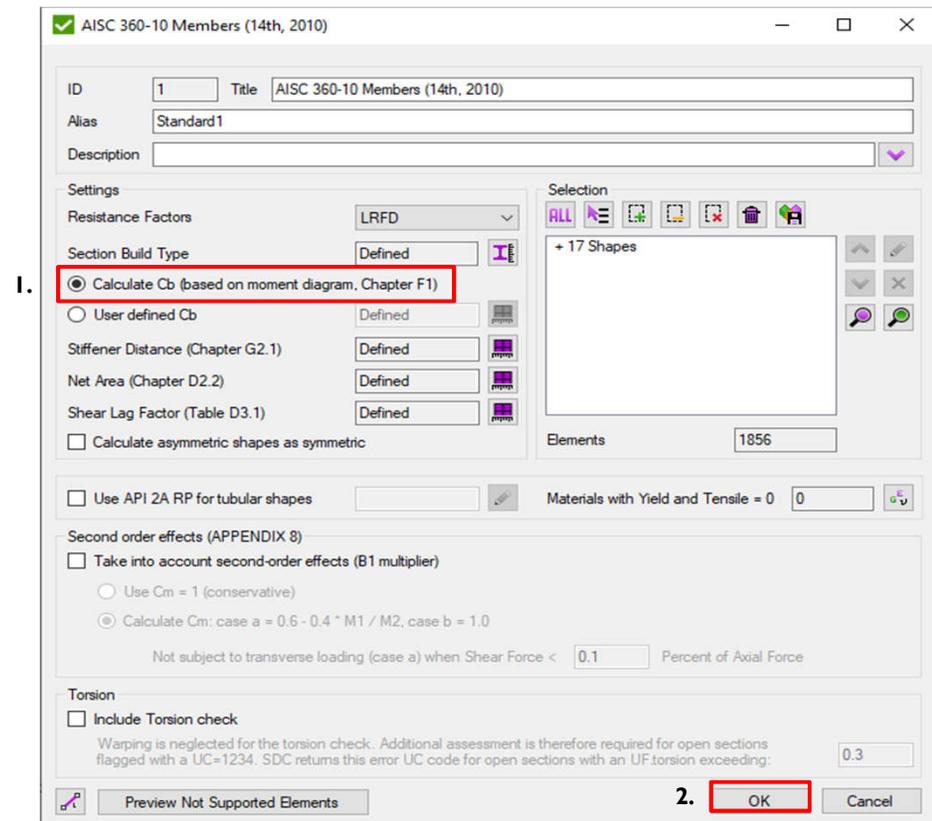
# Lateral-torsional buckling modification factor ( $C_b$ )

1 Select – Calculate  $C_b$

2 Press *Ok*



SDC Verifier follows 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



# Standard is created

It is possible to modify Safety Factors in Constants section.

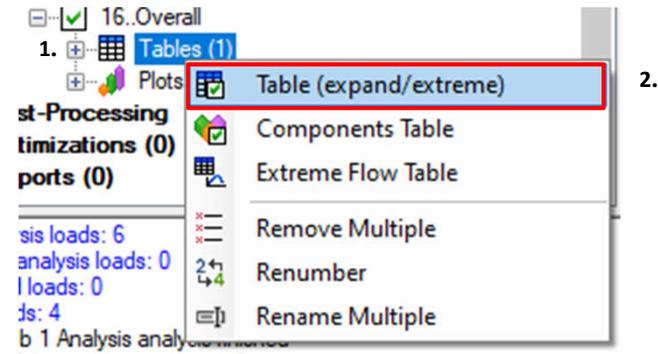
Standard contains 16 checks:  
 1 - Beam member characteristics;  
 2-6 - calculation dimensions and factors for 5 different shapes;  
 7-11 – strength for different shapes ;  
 12 – tension and compression check;  
 13 – additional shear check;  
 14 – additional bending check;  
 15 – torsion check;  
 16 - All Checks together with combined.

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

- Standards (1)
  - 1..AISC 360-10 Members (14th, 2010)
    - Input
    - π Constants (22)
    - Types (2)
    - Characteristic (5)
    - Classifications (0)
    - Standard Tables (0)
    - Checks (16)**
      - 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

# Preview Table Results

- 1 Select Tables
- 2 Execute Table (expand/extreme) in context menu
- 3 Select Extreme Options - Detailed
- 4 Press Fill Table
- 5 Press Ok



Utilization Factor on element ID = 64 doesn't pass the check  $1.01 > 1$ .

3.  Detailed (extreme locations - element and load for Load Groups)

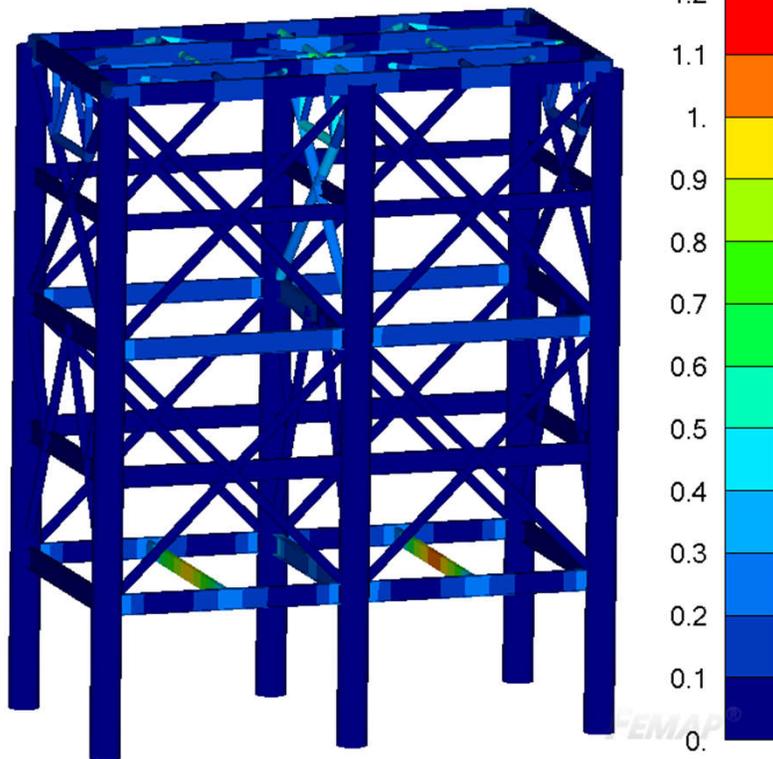
4.

5.

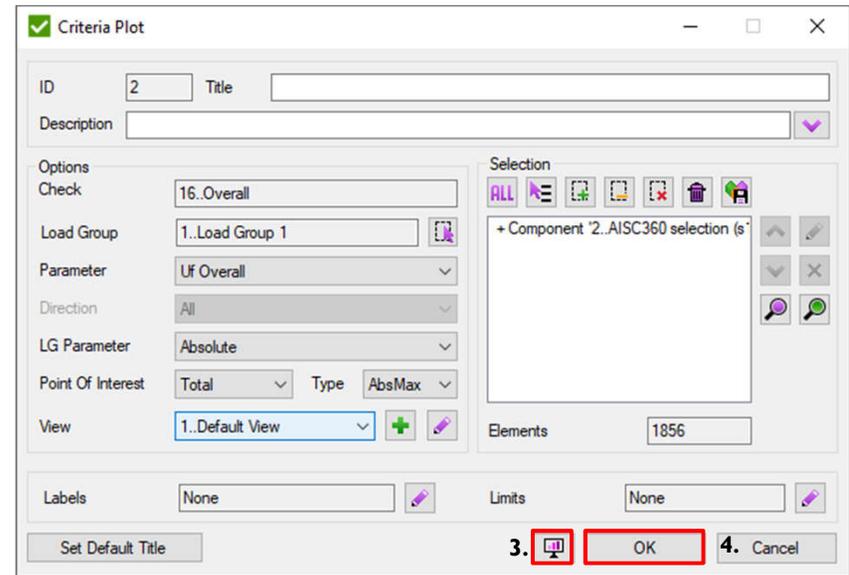
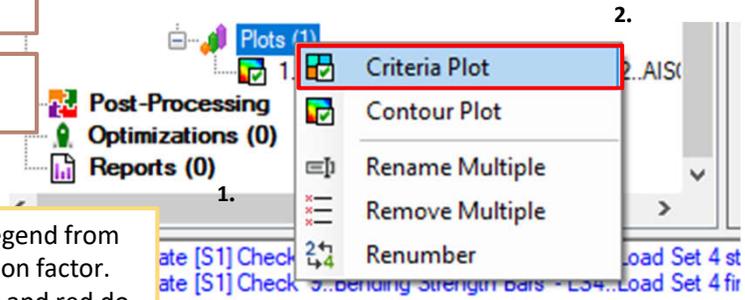
Extreme	UF Axial	UF Bending Major	UF Bending Minor	UF Shear	UF Axial and Bending	UF Overall
<b>Minimum</b>						
Value	0.00	0.00	0.00	0.00	0.00	0.00
Element ID	59	1134	1577	1626	304	1908
Load	LS2	LS1	LS3	LS1	LS1	LS2
<b>Maximum</b>						
Value	0.44	1.00	0.57	0.21	1.01	1.01
Element ID	955	64	174	146	64	64
Load	LS4	LS4	LS1	LS1	LS2	LS2
<b>Absolute</b>						
Value	0.44	1.00	0.57	0.21	1.01	1.01
Element ID	955	64	174	146	64	64
Load	LS4	LS4	LS1	LS1	LS2	LS2

# Utilization Factor Plot

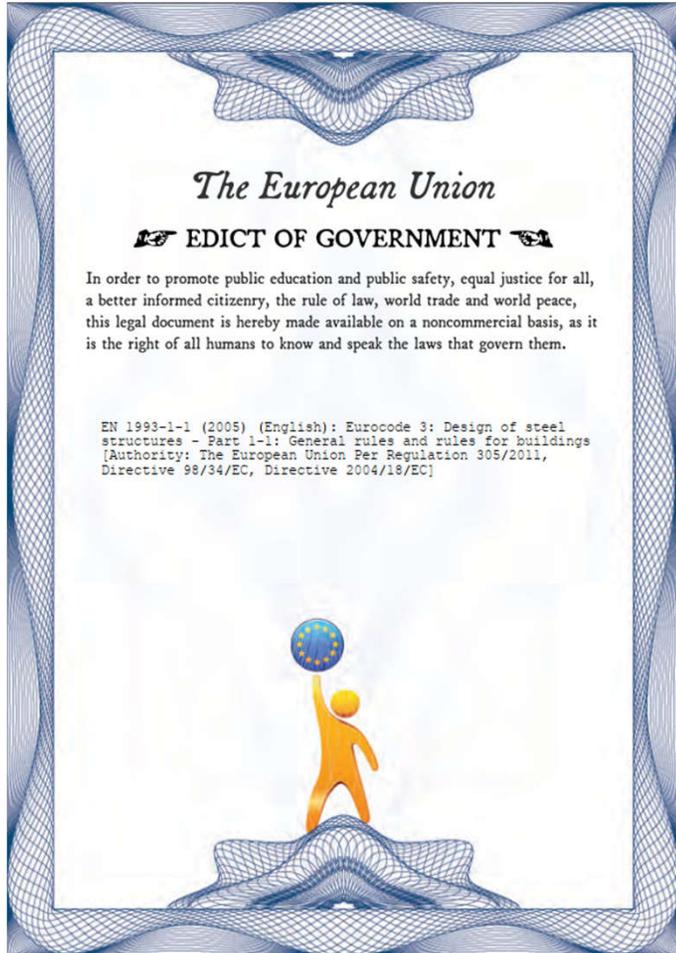
- 1 Select *Plots*
- 2 Execute *Criteria Plot* in context menu
- 3 Press  to preview Plot
- 4 Press *Ok*



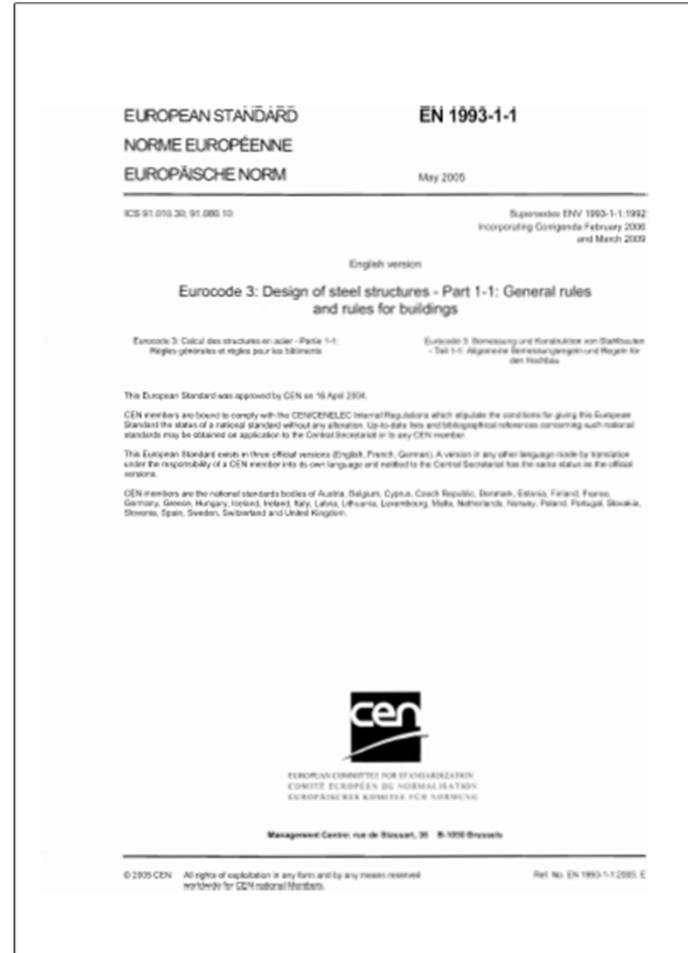
SDC Verifier uses legend from 0 to 1.2 for Utilization factor. Elements in orange and red do not pass the check



# Eurocode3



Eurocode 3: Design of steel structures - Part 1-1: General rules and rules for buildings



# Description of Eurocode3 (EN1993-1-1, 2005)

**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;  
 **$\beta$**  - 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

Factors

Partial Factor Gm0	1.0
Partial Factor Gm1	1.0
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

Calculate asymmetric shapes as symmetric

Materials with Yield and Tensile = 0 0

Selection 14 Properties

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

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:**  
Rolled/Welded;  
**Manufacture Type:** Hot Finished/Cold Formed  
**Fillet** 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.

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):

# Description of Eurocode3 (EN1993-1-1, 2005) (Continue)

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

The screenshot shows the 'Eurocode3 Members (EN 1993-1-1, 2005)' dialog box. It contains various input fields for member properties. A red box highlights the 'Correction Factor  $k_c$ ' section, which includes the option 'Calculate according to Table 6.6' (selected) and 'Set  $k_c = 1$  for all members'. Another red box highlights the 'Lengths for Torsional-Flexural and Lateral Torsional Buckling' section, with 'LT = max(Ly, Lz)' selected. The 'Lateral Torsional Buckling Method' is set to 'General Case (6.3.2.2)'.

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 user.

The screenshot shows the 'Beam Member Finder' dialog box. The 'Length Torsional' tab is selected and highlighted with a red box. Below the dialog is a table showing the results of the search.

ID	Title	Elements	Length [m]	Length Factor	Cm Type	Modified
1	Beam Member 1 (T)	47	13			
1.1	Beam Member 1.1 (T)	11	3	1	A	
1.2	Beam Member 1.2 (T)	9	2.5	1	A	
1.3	Beam Member 1.3 (T)	9	2.5	1	A	

# Eurocode3. Fabrication Type

- 1 Execute *Standards-Add-Eurocode3-Eurocode3 Members*
- 2 Press to set *Fabrication Type*
- 3 Execute - **Rolled**
- 4 Press *To All*
- 5 Press *Ok*

Go to the next slide to Continue

The screenshot shows the SDC Verifier interface with several dialog boxes open. At the top, a 'Standards' tree has a context menu open with 'Add' selected, leading to a list of standards where 'Eurocode3' is chosen and 'Eurocode3 Members (EN 1993-1-1, 2005)' is highlighted. Below this, the 'Eurocode3 Members (EN 1993-1-1, 2005)' dialog box is open, showing 'ID' set to 2 and 'Title' as 'Eurocode3 Members (EN1993-1-1, 2005)'. The 'Properties Characteristics' dialog box is also open, with 'Fabrication' set to 'Rolled' and 'Apply To Selected' set to 'To All'. A table lists 15 properties, all with 'Rolled' as the value. The 'Properties Characteristics' dialog has 'OK' highlighted. On the right, another dialog box shows 'Fabrication Type' with a dropdown menu icon highlighted.

Property	Value
1.150x8	Rolled
2.130x7	Rolled
3.400x200x20	Rolled
4.160x8	Rolled
5.Main Vertical 480x30	Rolled
6.382x19	Rolled
7.400x19	Rolled
8.IPE 400	Rolled
9.220x12	Rolled
11.300x10	Rolled
12.200x10	Rolled
13.180x9	Rolled
14.IPE 300	Rolled
15.100x10	Rolled

# Eurocode3. Manufacture Method

- 1 Press **I** to set *Manufacture Method*
- 2 Execute – *Hot Finished*
- 3 Press *To All*
- 4 Press *Ok*

Go to the next slide to Continue

The screenshot shows two overlapping dialog boxes. The top one is titled "Eurocode3 Members (EN 1993-1-1, 2005)" and contains fields for ID (2), Title, Alias (Standard2), and Description. It also has sections for Factors (Partial Factor Gm0, Gm1, Gm2, Lambda LT.0) and Fabrication Type (Defined). The bottom dialog is "Properties Characteristics" with a table of properties and values. In this dialog, "Hot Finished" is selected in the "Hollow Manufacturing Method" dropdown, and "To All" is selected in the "Apply To Selected" dropdown. The "OK" button is highlighted.

Property	Value
1..150x8	Hot Finished
2..130x7	Hot Finished
3..400x200x20	Hot Finished
4..160x8	Hot Finished
5..Main Vertical 480x30	Hot Finished
6..382x19	Hot Finished
7..400x19	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

# Eurocode3. Fillet

1 Press to set *Fillet*

2 Properties Value - **0**

3 Press *To All*

4 Press *Ok*

Repeat Steps 1-4 for *Section Net Area*

Go to the next slide to Continue

The image shows two overlapping dialog boxes from the SDC Verifier software. The top dialog is titled "Eurocode3 Members (EN 1993-1-1, 2005)". It has fields for ID (2), Title (Eurocode3 Members (EN1993-1-1, 2005)), Alias (Standard2), and Description. Below these are "Factors" for Partial Factor Gm0 (1.0), Gm1 (1.0), and Gm2 (1.25). On the right side, there are dropdown menus for Fabrication Type (Defined), Manufacture Method (Defined), Fillet (empty), Section Net Area (empty), and Material Type (empty). The bottom dialog is titled "Properties Characteristics" and is for the "Fillet" property. It has ID (3) and Alias (Fillet). A table lists properties and their values, with the first row highlighted. The "Value" field is set to 0. There are "Apply To Selected" and "To All" buttons. At the bottom, there are "OK" and "Cancel" buttons.

Property	Value
1..150x8	0
2..130x7	0
3..400x200x20	0
4..160x8	0
5..Main Vertical 480x30	0
6..382x19	0
7..400x19	0
8..IPE 400	0
9..220x12	0
11..300x10	0
12..200x10	0
13..180x9	0
14..IPE 300	0
15..100x10	0

# Eurocode3. Material Type

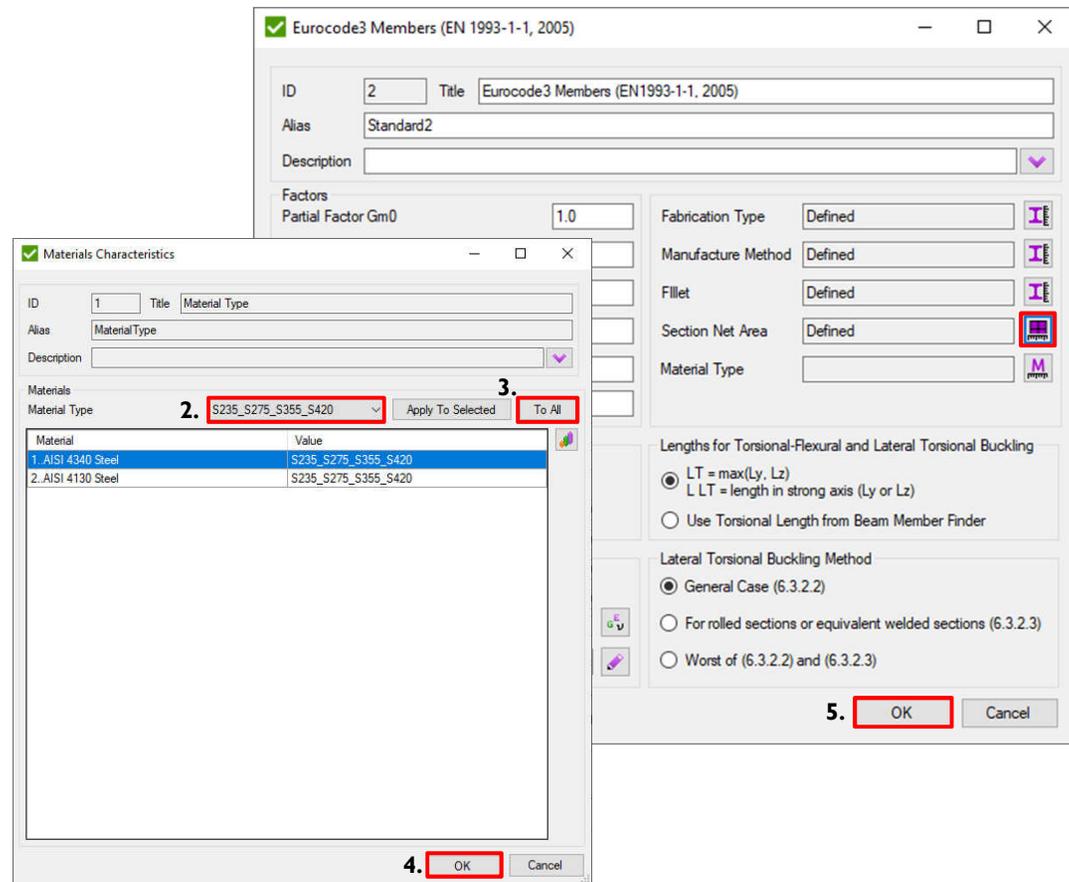
1 Press  to set *Material Type*

2 Execute – S235\_S275\_S355\_S420

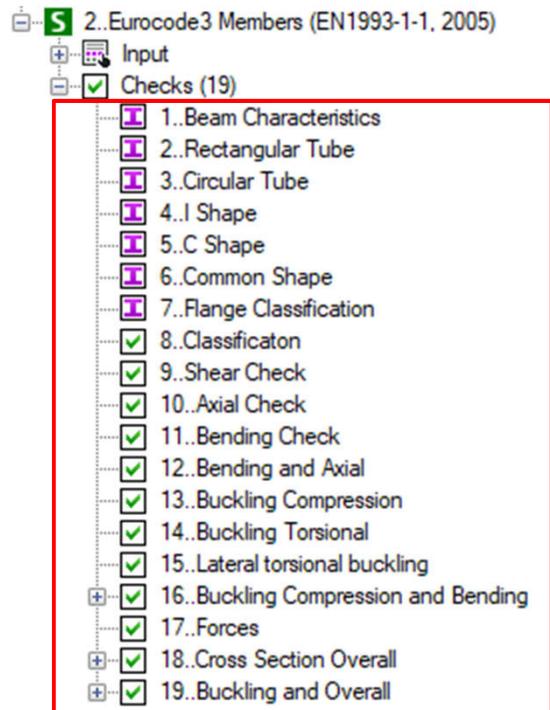
3 Press *To All*

4 Press *Ok*

5 Press *Ok*



# Standard is created

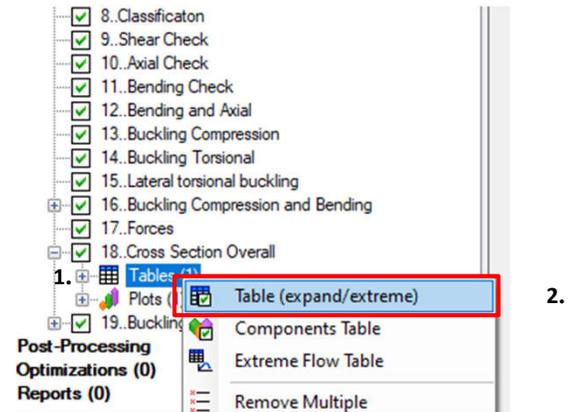


Standard contains 19 checks:

- 1 – Beam Characteristics
- 2-7 - calculation dimensions and factors for 5 different shapes;
- 8 – cross section resistance;
- 9 – shear strength check;
- 10 – tension and compression strength check;
- 11 – bending strength check;
- 12 – bending, tension and compression strength check;
- 13-15 – buckling strength checks ;
- 16 – additional buckling compression and bending check;
- 17 – forces;
- 18 - cross section overall strength check;
- 19 – buckling and overall strength check.

# Preview Table Results

- 1 Select Tables
- 2 Execute Table (expand/extreme) in context menu
- 3 Select Extreme Options - Detailed
- 4 Press Fill Table
- 5 Press Ok



3.  Detailed (extreme locations - element and load (for Load Groups))

Short (only extremes)

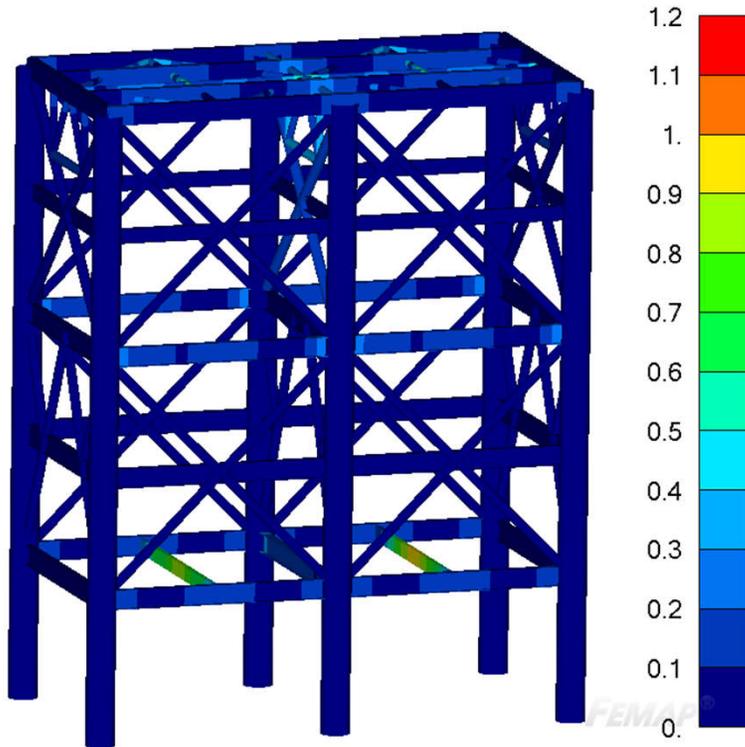
4.

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	2497	1400	64	1577	1134	1614	1908
Load	LS4	LS4	LS1	LS3	LS1	LS1	LS2
<b>Maximum</b>							
Value	0.38	0.16	0.16	0.90	0.56	0.84	0.90
Element ID	955	171	1854	64	1140	64	64
Load	LS4	LS1	LS2	LS4	LS1	LS2	LS4
<b>Absolute</b>							
Value	0.38	0.16	0.16	0.90	0.56	0.84	0.90
Element ID	955	171	1854	64	1140	64	64
Load	LS4	LS1	LS2	LS4	LS1	LS2	LS4

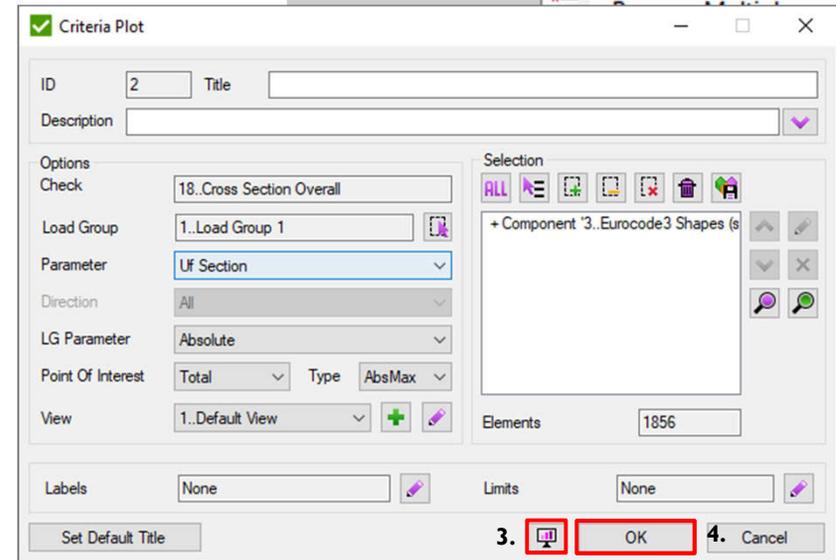
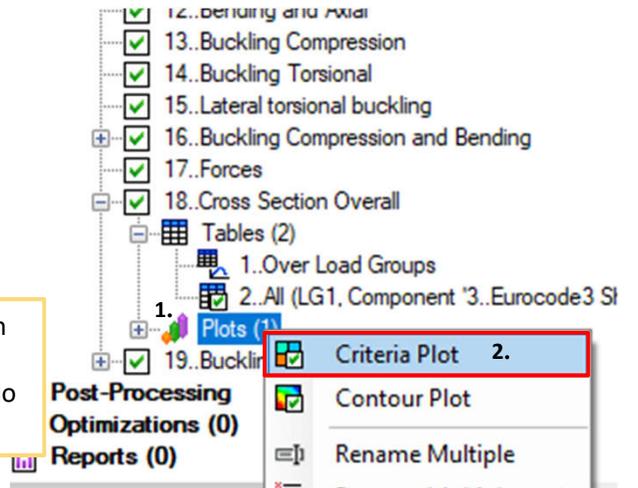
5.

# Utilization Factor Plot

- 1 Select *Plots*
- 2 Execute *Criteria Plot* in context menu
- 3 Press to preview Plot
- 4 Press *Ok*



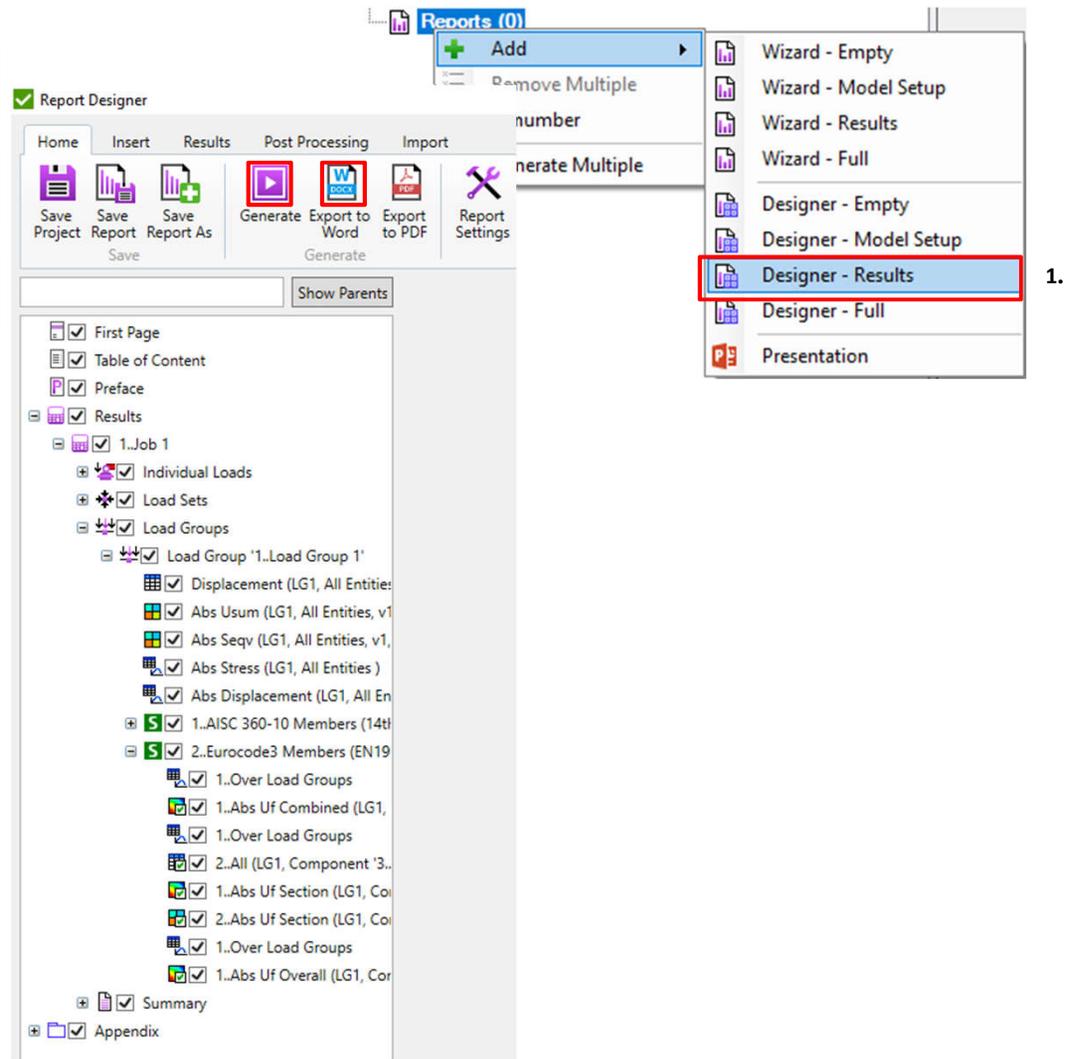
SDC Verifier uses legend from 0 to 1.2 for Utilization factor. Elements in orange and red do not pass the check



# Create Predefined Report

- 1 Execute *Reports - Add - Designer-Results*.
- 2 Press  to generate report
- 3 When report is generated press 

Results report includes an overview of the displacements and stresses for all loads and standards with all predefined tables and plots



# Generated Report

