



Tutorial

AISC 360-10 & Eurocode3

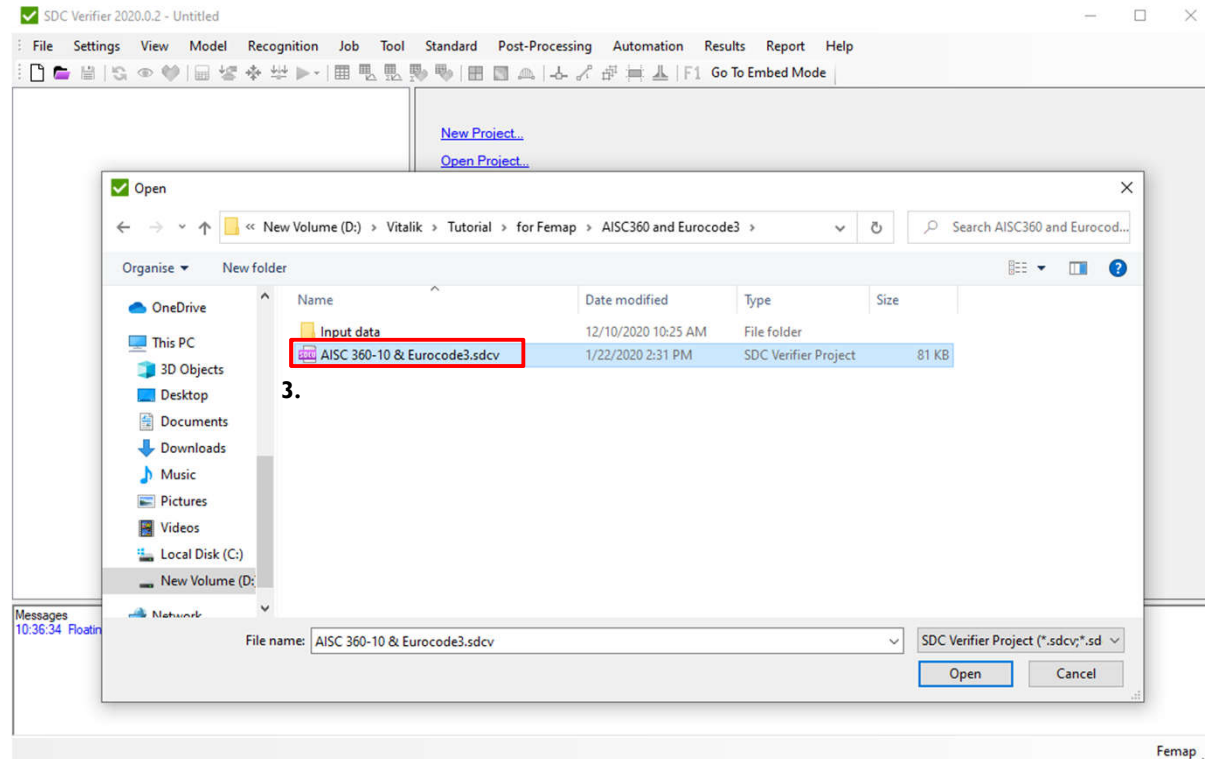
10 Dec 2020
version 2020.0.2

- ▶ 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.

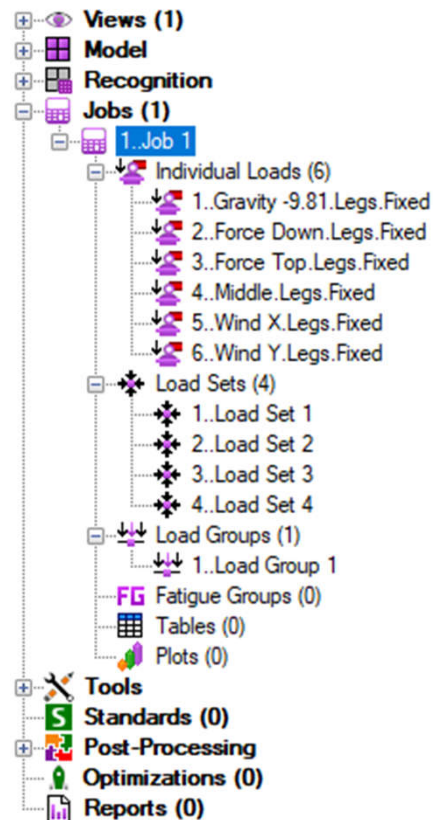
Open Project



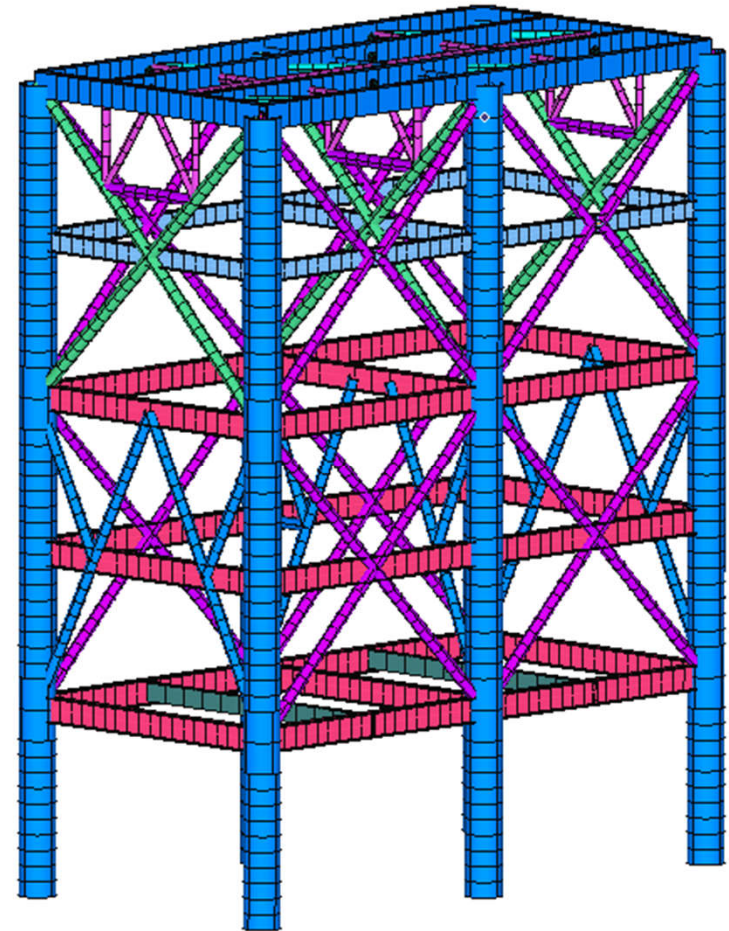
- 1 Launch **SDC Verifier** ✓
- 2 Execute *File - Open Project*.
- 3 Project: **AISC 360-10 & Eurocode3.sdcv**



Predefined Project




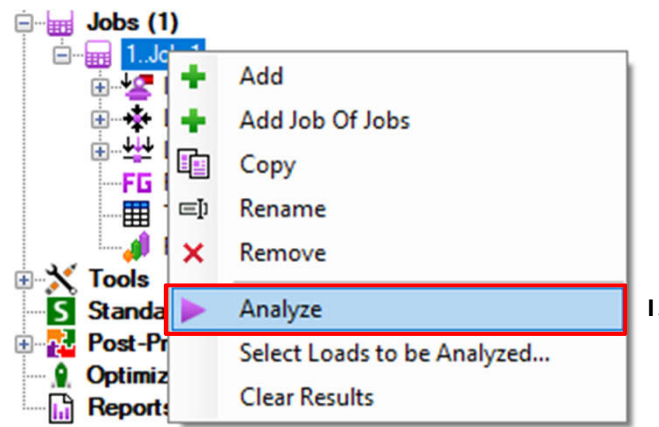
This tutorial uses project with predefined boundary condition, load combinations and load group. The model contains only beam elements of the following types: I-Beam, Circular and Rectangular Tubes



Analyze Job

1

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



Joints

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;

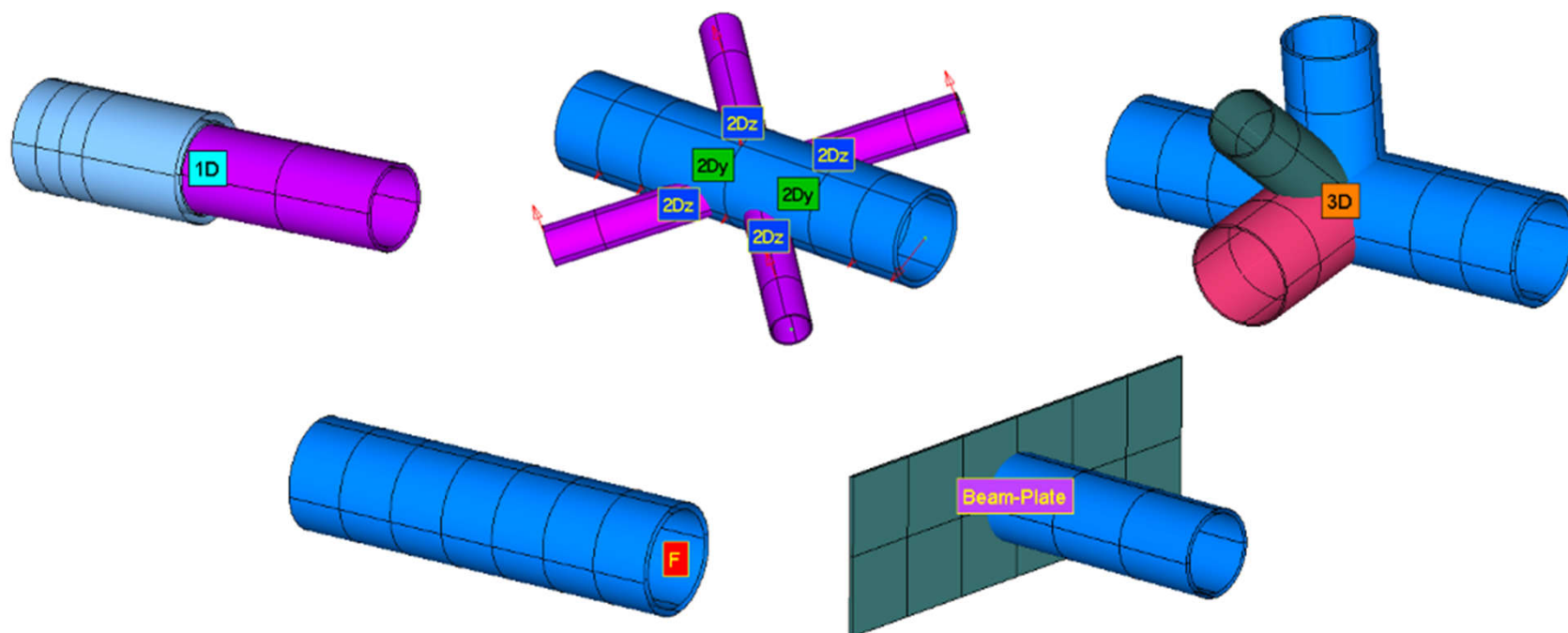
2D Joint – beam members connected in one plane;

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;



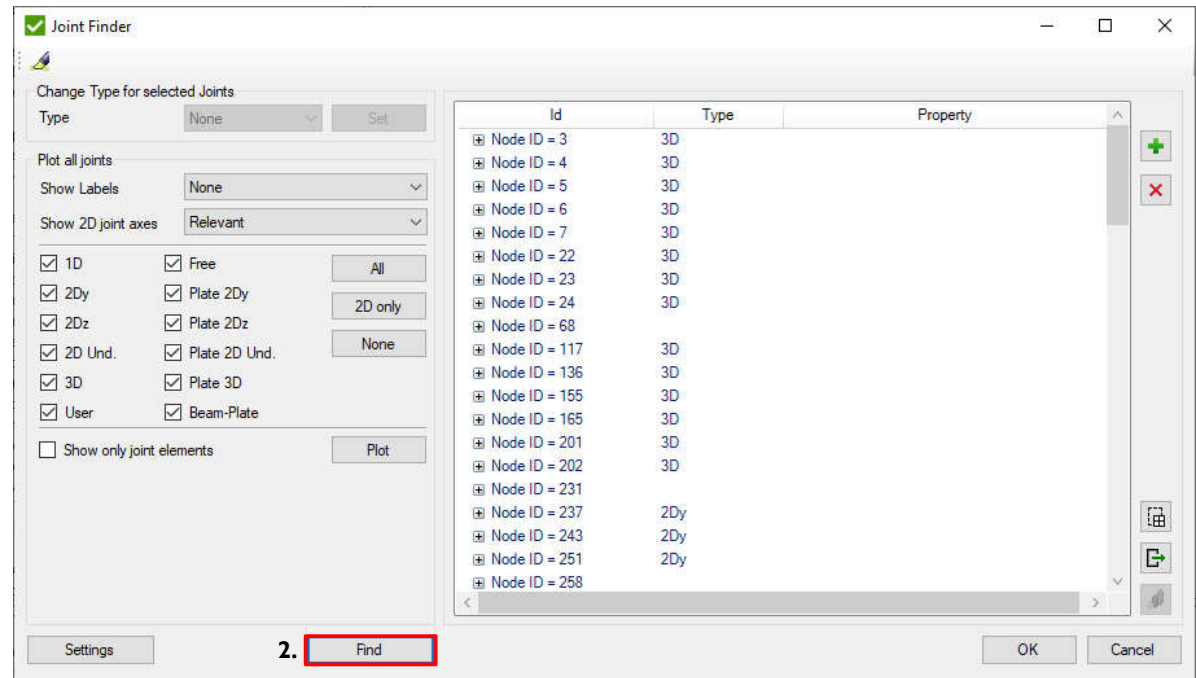
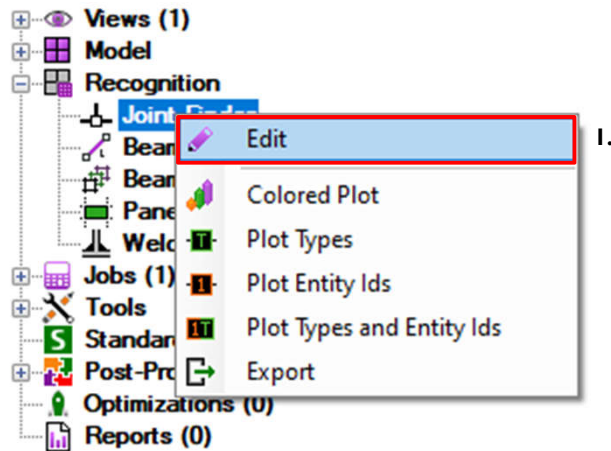
Joint Recognition

1

Execute *Edit* from *Joint Finder* context menu

2


Press *Find*.



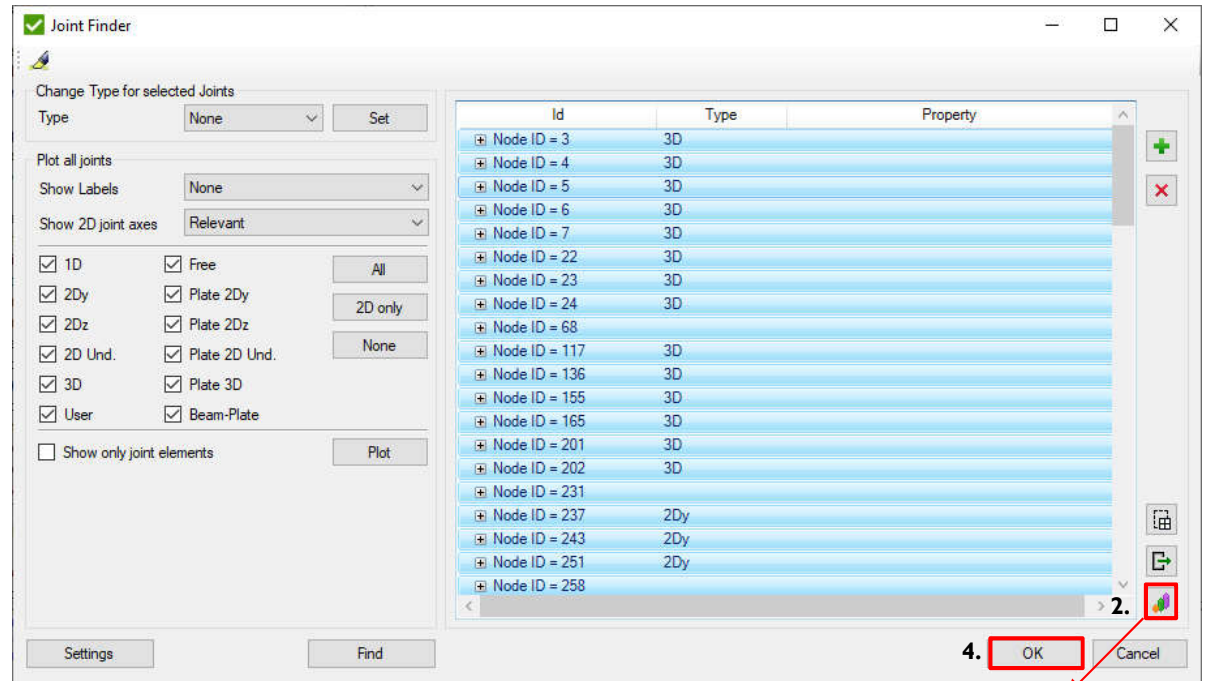
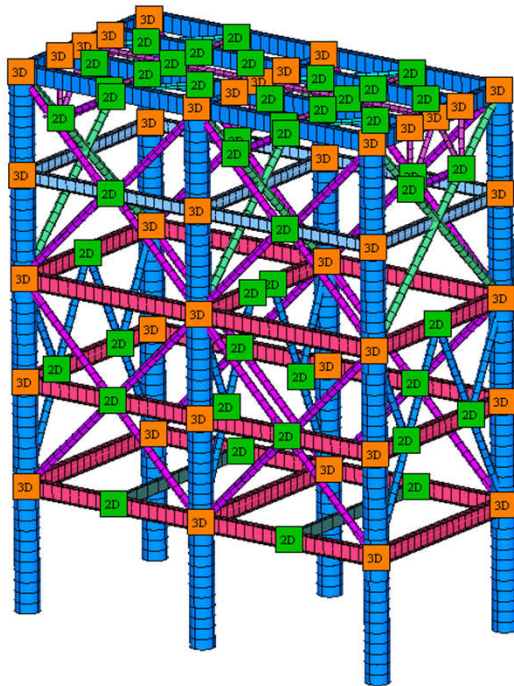
Joints Plot

1 Select All Joints (Ctrl+A).

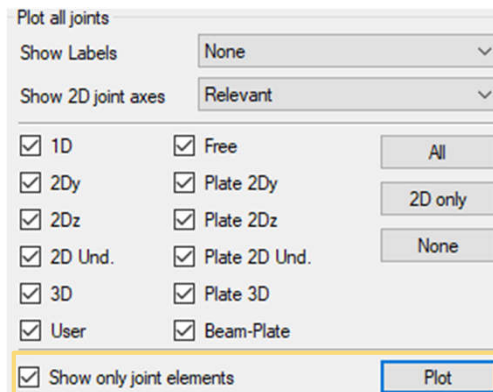
2 Press 



3 Press  Plot Joint Type Labels

4 Press OK



Plot Joints of specific type:



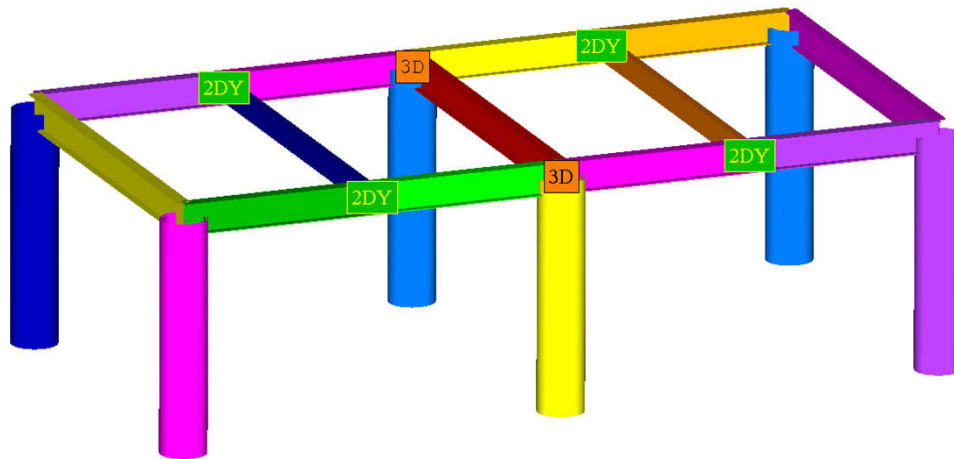
3.  Plot Joint Type Labels
 Plot Joint Type in colors

Modify Joint Type:

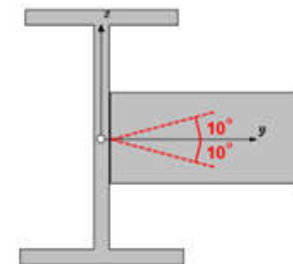


Beam Member Finder. Members Length

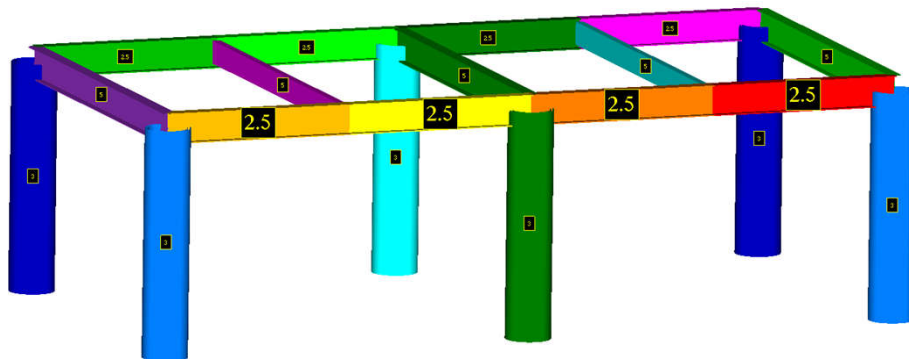
Beam Member Finder recognizes beam members and (buckling) lengths for different directions (Y, Z and Torsional).



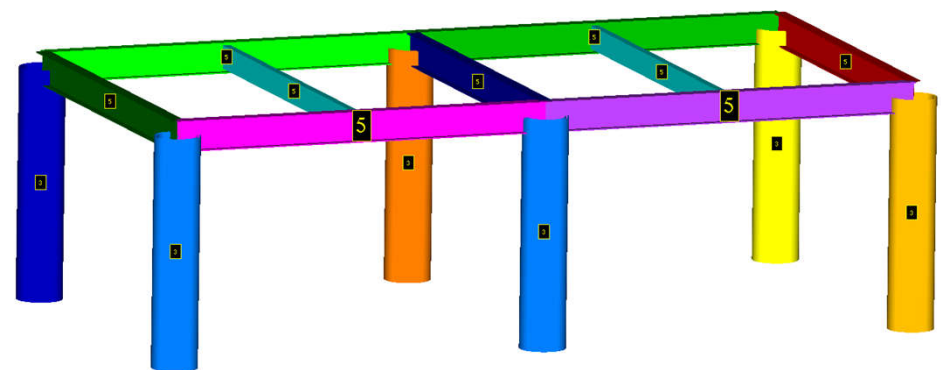
2DY
Joint



Length Y – 4 Beam Members with L = 2.5



Length Z – 2 Beam Members with L = 5



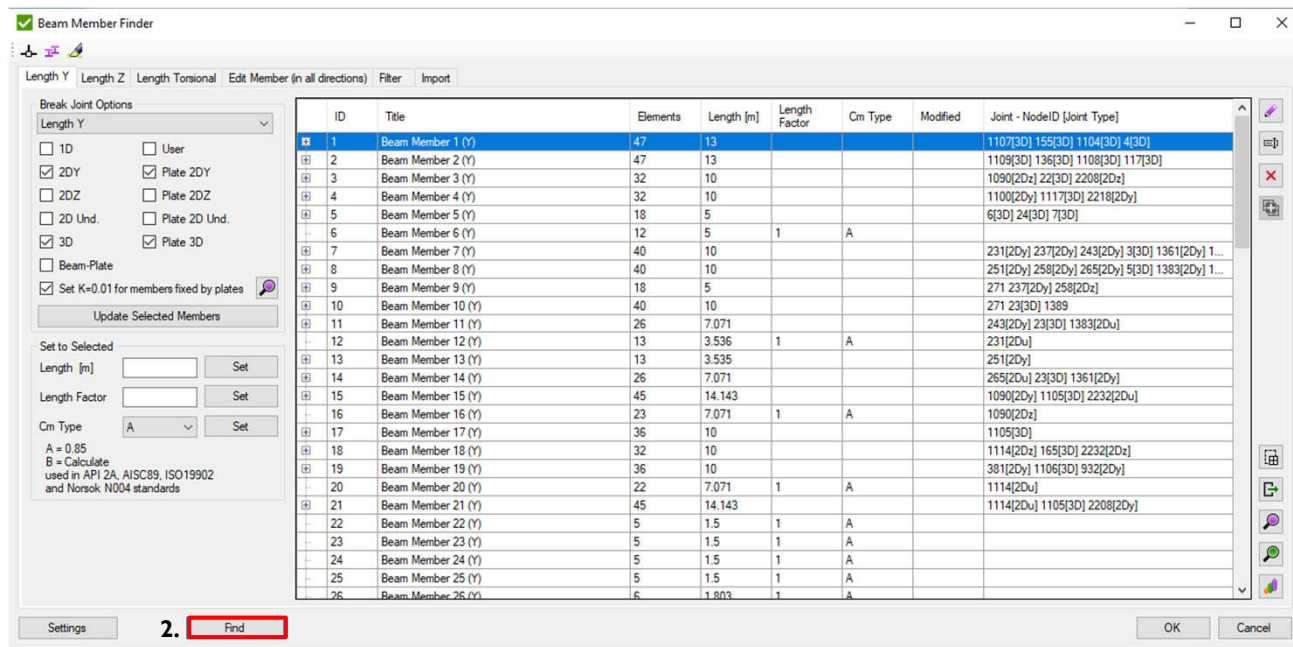
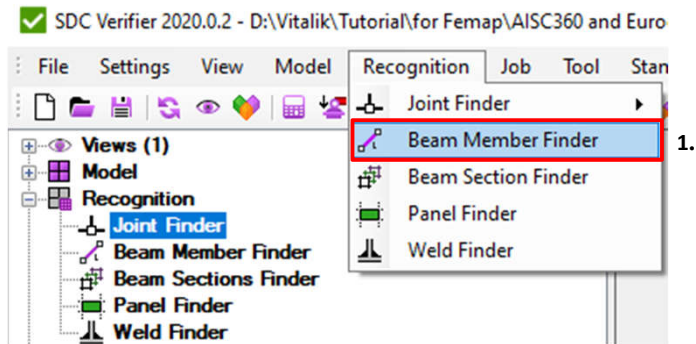
Recognize Length Y

1

Execute Recognition – Beam Member Finder

2

Press Find



Beam Member Finder Explanation

Break Options define what joints are used to split beam members

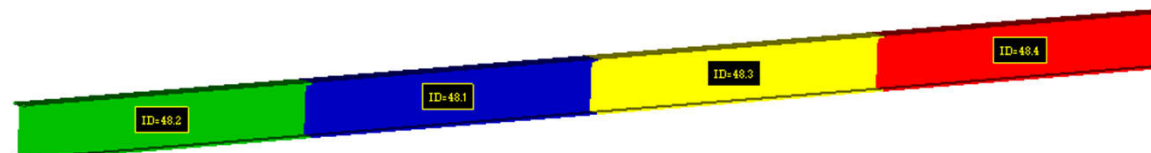
Change Length/Factor for selected beam members

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).

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



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		





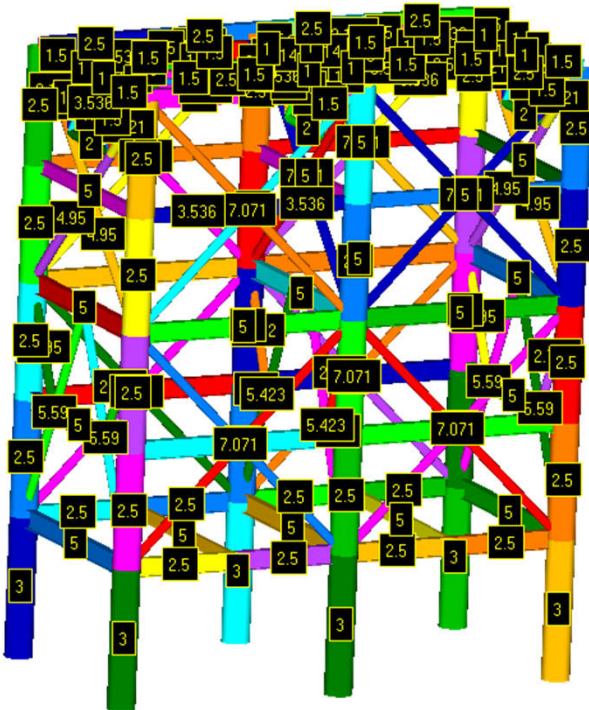
- Plot selected members
- Plot Members ID labels
- Plot Full Members ID labels
- Plot Length labels
- Plot Cm Type labels
- Plot Length Factor labels
- Plot Joints for Selected Members
- Plot Members Y and Z axes

Beam Member Finder Plots

1 Select All Beam Members (Ctrl+A)

2 Press  and Execute  to display members Length.


3 Press  and Execute  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 ☐ User ☐ Plate 2D Y ☐ Plate 2D Z ☐ 2D Und. ☐ Plate 2D Und. ☒ 3D ☒ Plate 3D ☒ Beam-Plate ☒ Set K=0.01 for members fixed by plates 

Update Selected Members

Set to Selected

Length [m] Set

Length Factor Set

Cm Type A Set

A = 0.85
B = Calculate
used in API 2A, AISCS89, 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		109(2Dz)
35	Beam Member 35 (Y)	14	5	1	A		1099(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) 1115(3D) 2219(2Dy)
42	Beam Member 42 (Y)	45	14.142				1103(2Dy) 1110(3D) 2233(2Dy)
43	Beam Member 43 (Y)	32	10				1103(2Dy) 201(3D) 2221(2Dy)
44	Beam Member 44 (Y)	21	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(2Dy)
50	Beam Member 50 (Y)	22	7.071	1	A		1115(2Dy)
51	Beam Member 51 (Y)	32	10				1115(2Dy) 202(3D) 2233(2Dy)
52	Beam Member 52 (Y)	47	11				2259(2Dy) 1127(2Dy) 2222(2Dy) 1122(2Dy)

Plot selected members

Plot Members ID labels

Plot Full Members ID labels

Plot Length labels


Plot Cm Type labels

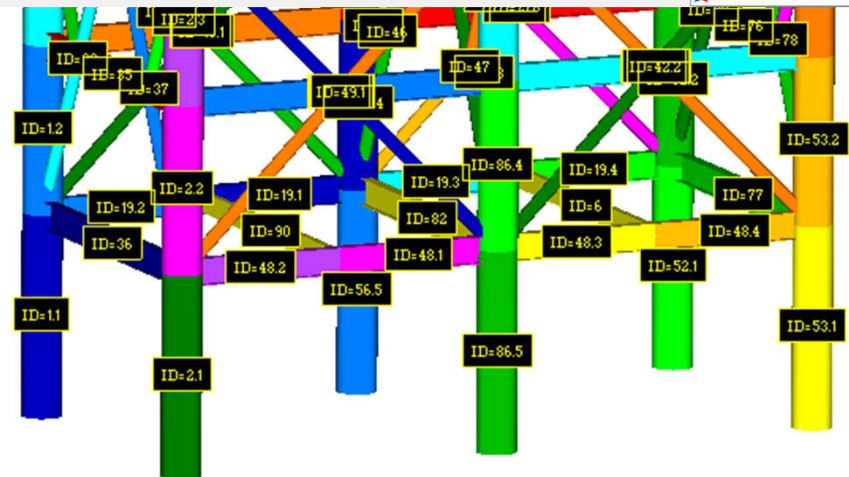
Plot Length Factor labels

Plot Joints for Selected Members

Plot Members Y and Z axes

OK Cancel

Also it is possible to display beam members IDs by pressing .



STEEL CONSTRUCTION



MANUAL

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THIRTEENTH EDITION

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.

Specification for Structural Steel Buildings

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.

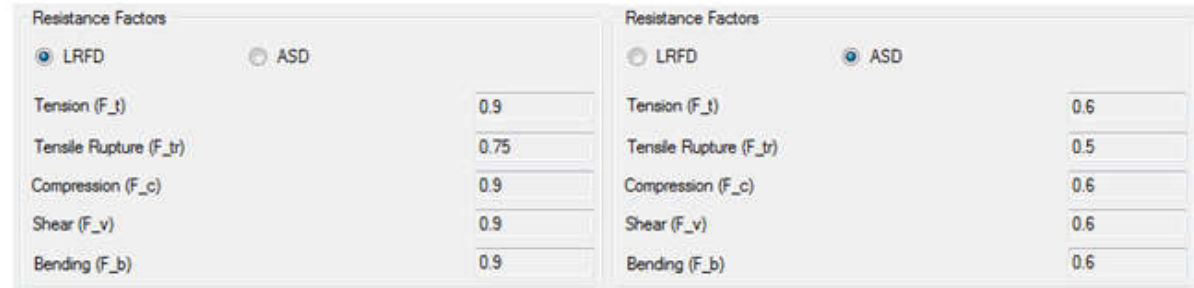
Approved by the AISC Committee on Specifications and issued by the AISC Board of Directors



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	LRFD	ASD
Tension (F _t)	0.9	0.6
Tensile Rupture (F _{tr})	0.75	0.5
Compression (F _c)	0.9	0.6
Shear (F _v)	0.9	0.6
Bending (F _b)	0.9	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;

ϕ = resistance factor, specified in Chapters B through K;

ϕR_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;

Ω = safety factor, specified in Chapters B through K;

R_n / Ω = 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:

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

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

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 (14th, 2010)*.

2 Resistance Factors: **LRFD**

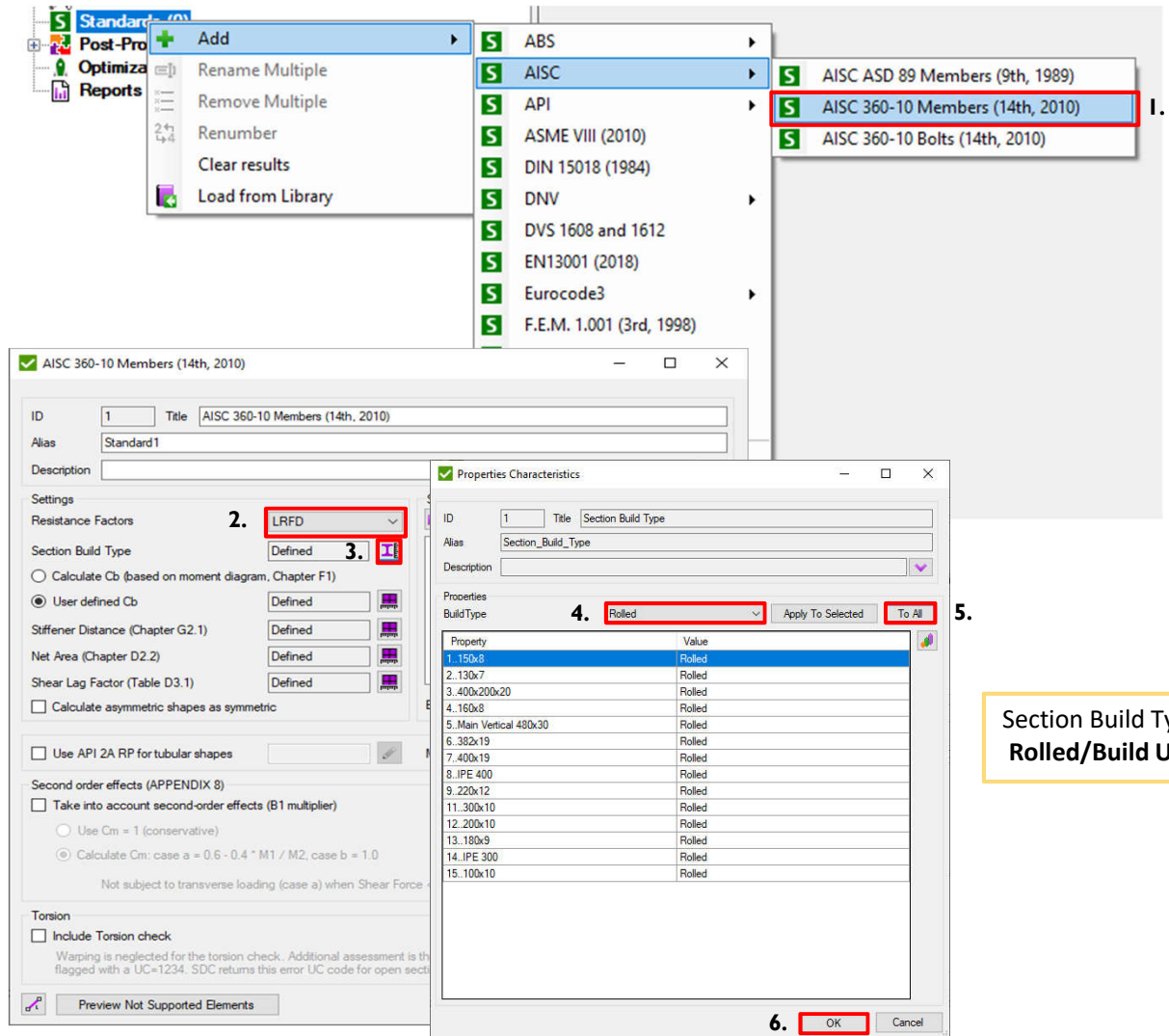
3 Press  to set *Section Build Type*

4 Execute - **Rolled**

5 Press *To All*

6 Press *Ok*


Go to the next slide to Continue



The screenshot shows the SDC Verifier interface with several windows open. The 'Standards' window is open, showing a list of standards. The 'AISC 360-10 Members (14th, 2010)' standard is selected. The 'Properties Characteristics' window is open, showing the 'Section Build Type' dropdown set to 'Rolled'. The 'Apply To Selected' dropdown is set to 'To All'. The 'OK' button is highlighted.

1. AISC 360-10 Members (14th, 2010)

2. LRFD

3. 

4. Rolled

5. To All

6. OK

Section Build Type: Rolled/Build Up

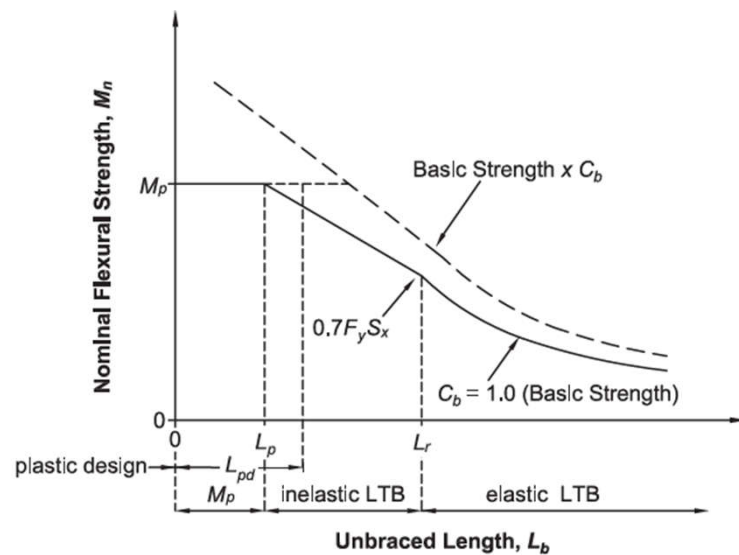
Lateral-torsional buckling modification factor (C_b)

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

AISC 360-10 Members (14th, 2010)

ID: 1 Title: AISC 360-10 Members (14th, 2010)

Alias: Standard1

Description:

Settings

Resistance Factors: LRFD

Section Build Type: Defined

☒ Calculate C_b (based on moment diagram, Chapter F1)

☐ User defined C_b : Defined

Stiffener Distance (Chapter G2.1): Defined

Net Area (Chapter D2.2): Defined

Shear Lag Factor (Table D3.1): Defined

☐ Calculate asymmetric shapes as symmetric

Selection

+ 17 Shapes

Elements: 1856

☐ Use API 2A RP for tubular shapes

Materials with Yield and Tensile = 0 0

Second order effects (APPENDIX 8)

☐ Take into account second-order effects (B1 multiplier)

☐ Use $C_m = 1$ (conservative)

☒ Calculate C_m : case a = $0.6 - 0.4 \cdot M_1 / M_2$, case b = 1.0

Not subject to transverse loading (case a) when Shear Force < 0.1 Percent of Axial Force

Torsion

☐ Include Torsion check

Warping is neglected for the torsion check. Additional assessment is therefore required for open sections flagged with a UC=1234. SDC returns this error UC code for open sections with an U_f torsion exceeding: 0.3

Preview Not Supported Elements

2.

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 highe
16	rolled	1	
17	built_up	2	
18	nonslender	3	
19	slender	4	
20	NotSupported	12345678	
21	compact	5	
22	noncompact	6	

- 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*

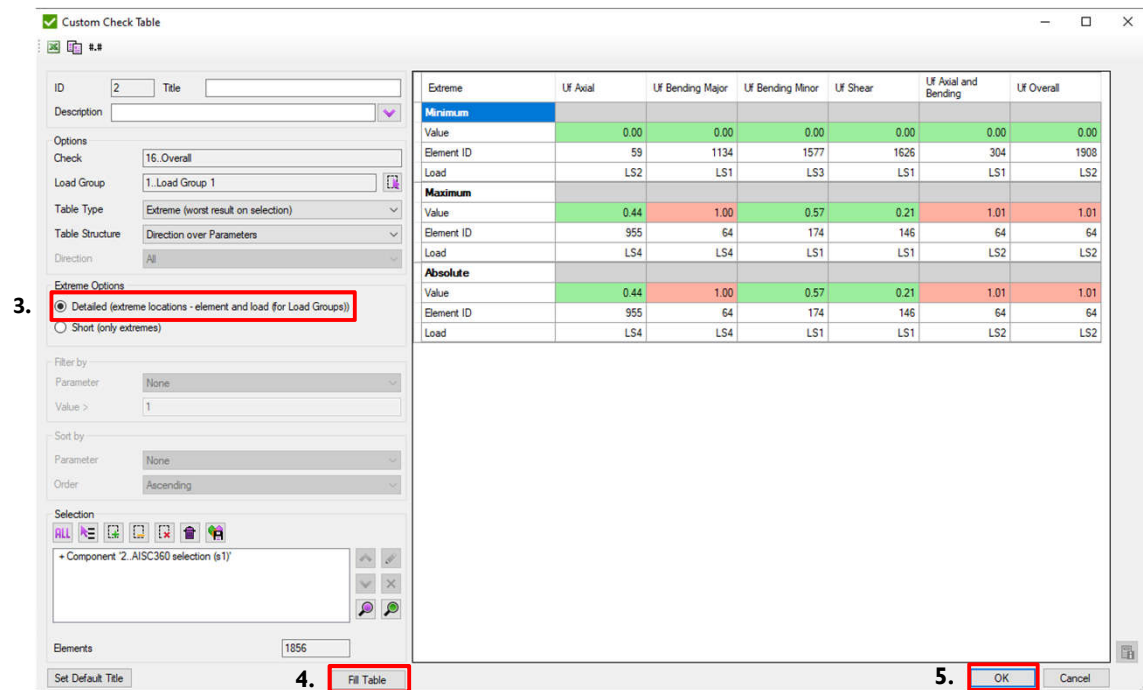
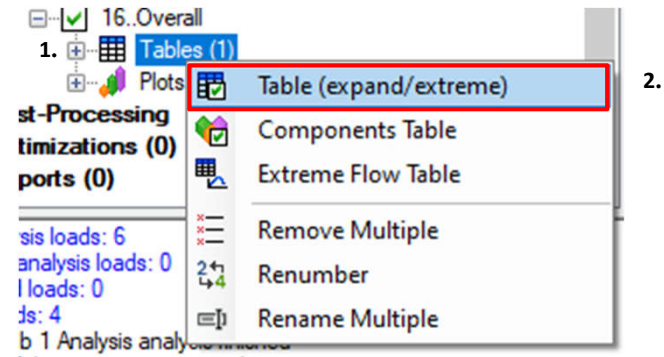
2 Execute *Table (expand/extreme)* in context menu

3 Select Extreme Options - *Detailed*


4 Press *Fill Table*

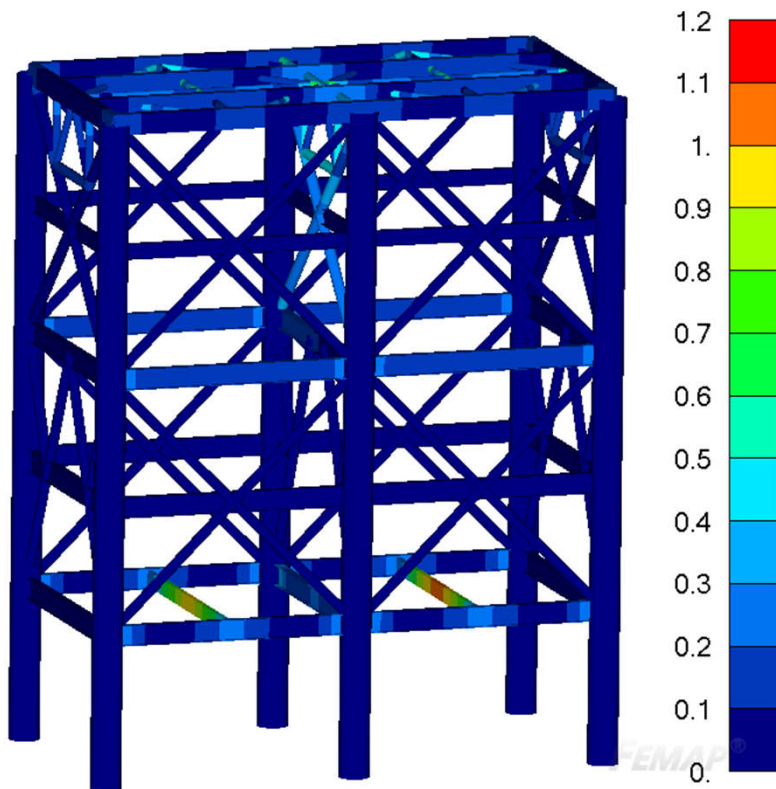
5 Press *Ok*

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

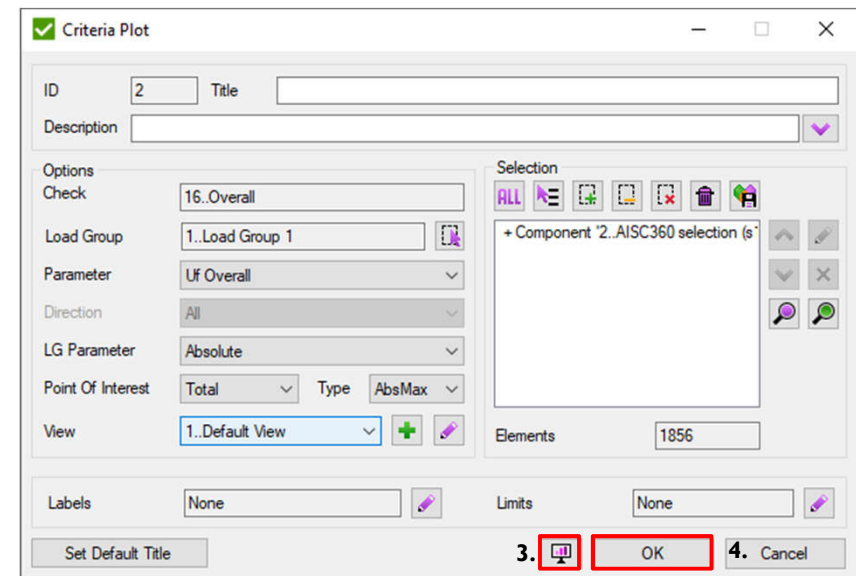


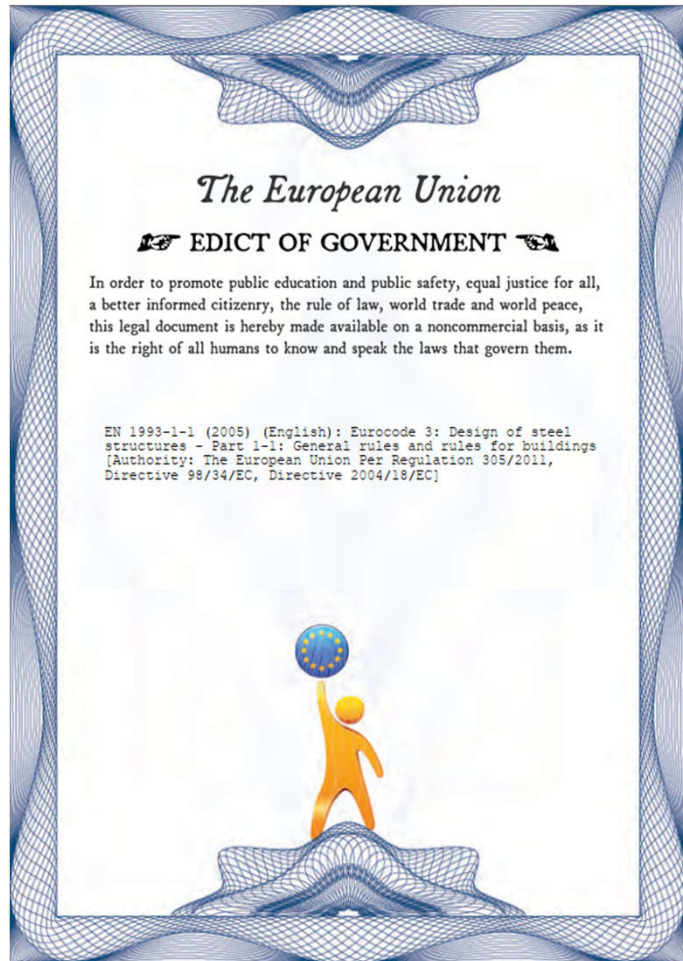
Utilization Factor Plot

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

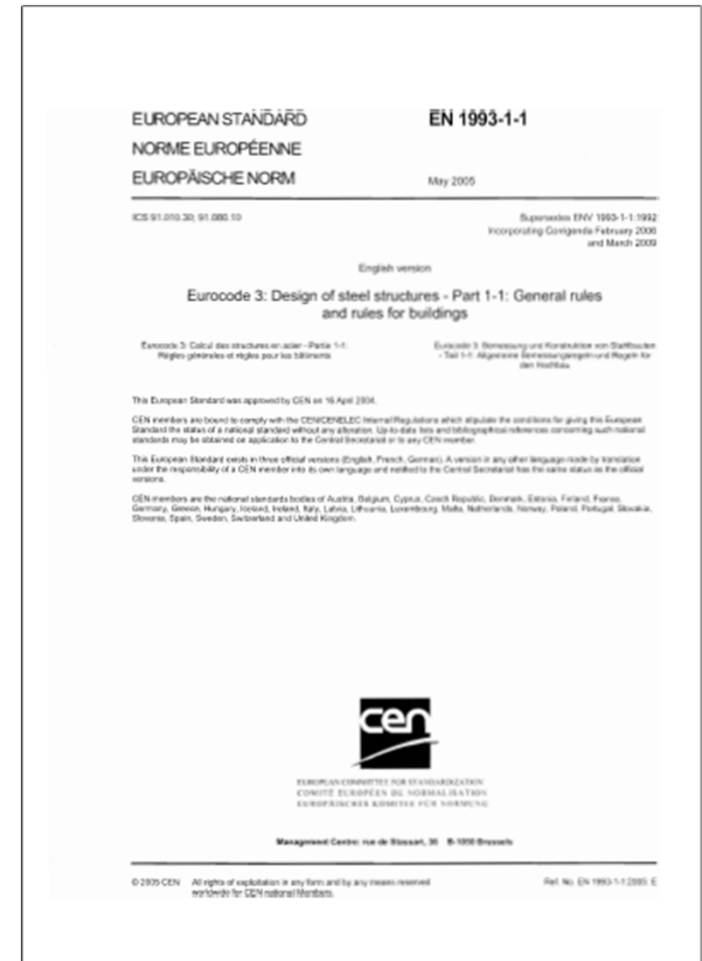


SDC Verifier uses legend from 0 to 1.2 for Utilization factor. Elements in orange and red do not pass the check





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;
 β - correction factor for the lateral torsional buckling curves for rolled sections;
 η - is used in the shear area calculations.

Note: All parameters may be taken from the National Annex

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

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

Alias:

Description:

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

Fabrication Type

Fabrication Type:

Manufacture Method:

Fillet:

Section Net Area:

Material Type:

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

Lengths for Torsional-Flexural and Lateral Torsional Buckling

☒ LT = max(Ly, Lz)
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)

Preview Not Supported OK Cancel

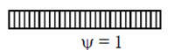




Fabrication Type:
Rolled/Welded;
Manufacture Type: Hot Finished/Cold Formed
Fillets has to be defined in the characteristic (they are missing in the model);
Section Net Area - for fasteners with holes net area has to be defined;
Material Type - the buckling curve (Table 6.2) depends on the material type.

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):



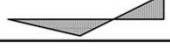
Description of Eurocode3 (EN1993-1-1, 2005) (Continue)

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

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

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

Alias:

Description:

Factors

Partial Factor G_m0 : 1.0

Partial Factor G_m1 : 1.0

Partial Factor G_m2 : 1.25

Lambda $L T,0$: 0.4

Beta: 0.75

Eta: 1.2

Fabrication Type:

Manufacture Method:

Fillet:

Section Net Area:

Material Type:

Correction Factor K_c

☒ Calculate according to Table 6.6

☐ Set $K_c = 1$ for all members

Lengths for Torsional-Flexural and Lateral Torsional Buckling

☒ $L T = \max(L_y, L_z)$
L LT = length in strong axis (L_y or L_z)

☐ 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)

☐ Calculate asymmetric shapes as symmetric

Materials with Yield and Tensile = 0

Selection: 14 Properties

Preview Not Supported

OK Cancel

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.

Beam Member Finder

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

Break Joint Options

Torsion (Lb)

☐ 1D ☐ User

☒ 2DY ☐ Plate 2DY

☒ 2DZ ☐ Plate 2DZ

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**

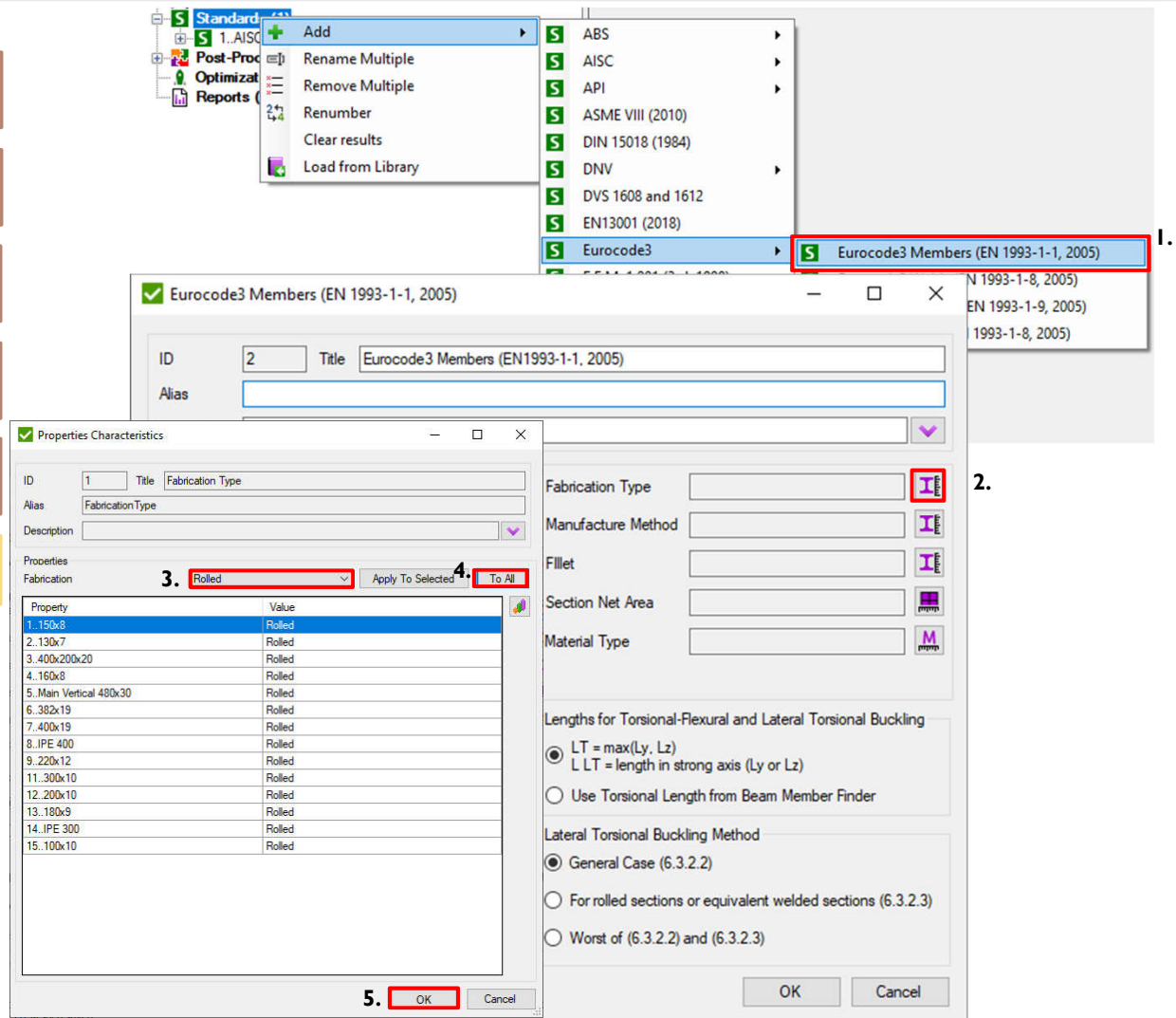
4

Press *To All*

5


Press *Ok*

Go to the next slide to Continue



Eurocode3. Manufacture Method

1

Press  to set *Manufacture Method*

2

Execute – **Hot Finished**

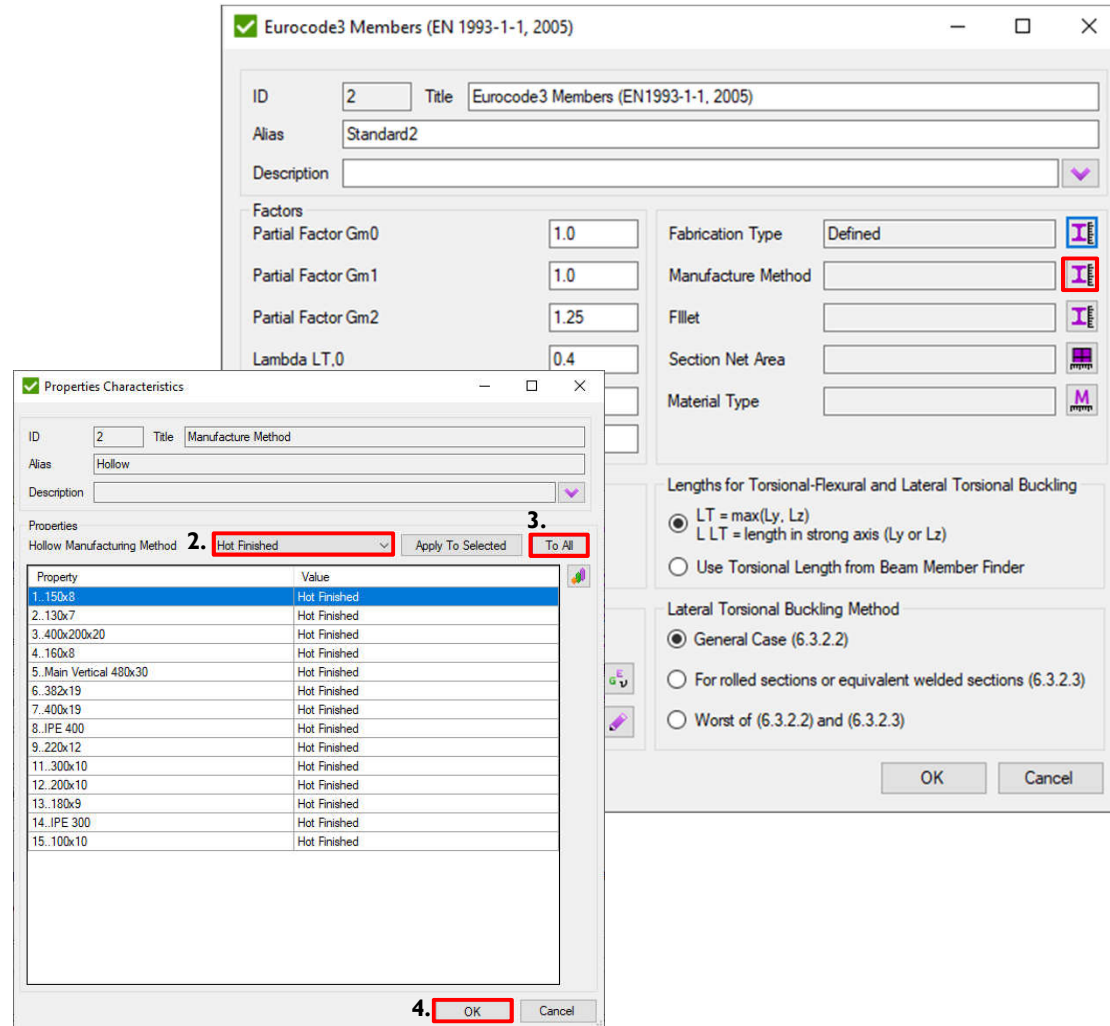
3

Press *To All*

4

Press *Ok*

Go to the next slide to Continue



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

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

Alias: Standard2

Description:

Factors


Partial Factor Gm0: 1.0

Partial Factor Gm1: 1.0

Partial Factor Gm2: 1.25

Lambda LT.0: 0.4

Fabrication Type: Defined

Manufacture Method:  1.

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)

OK Cancel

Properties Characteristics

ID: 2 Title: Manufacture Method

Alias: Hollow

Description:

Properties

Hollow Manufacturing Method: 2. Hot Finished Apply To Selected: 3. 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
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

4. OK Cancel

Eurocode3. Fillet

1 Press  to set *Fillet*

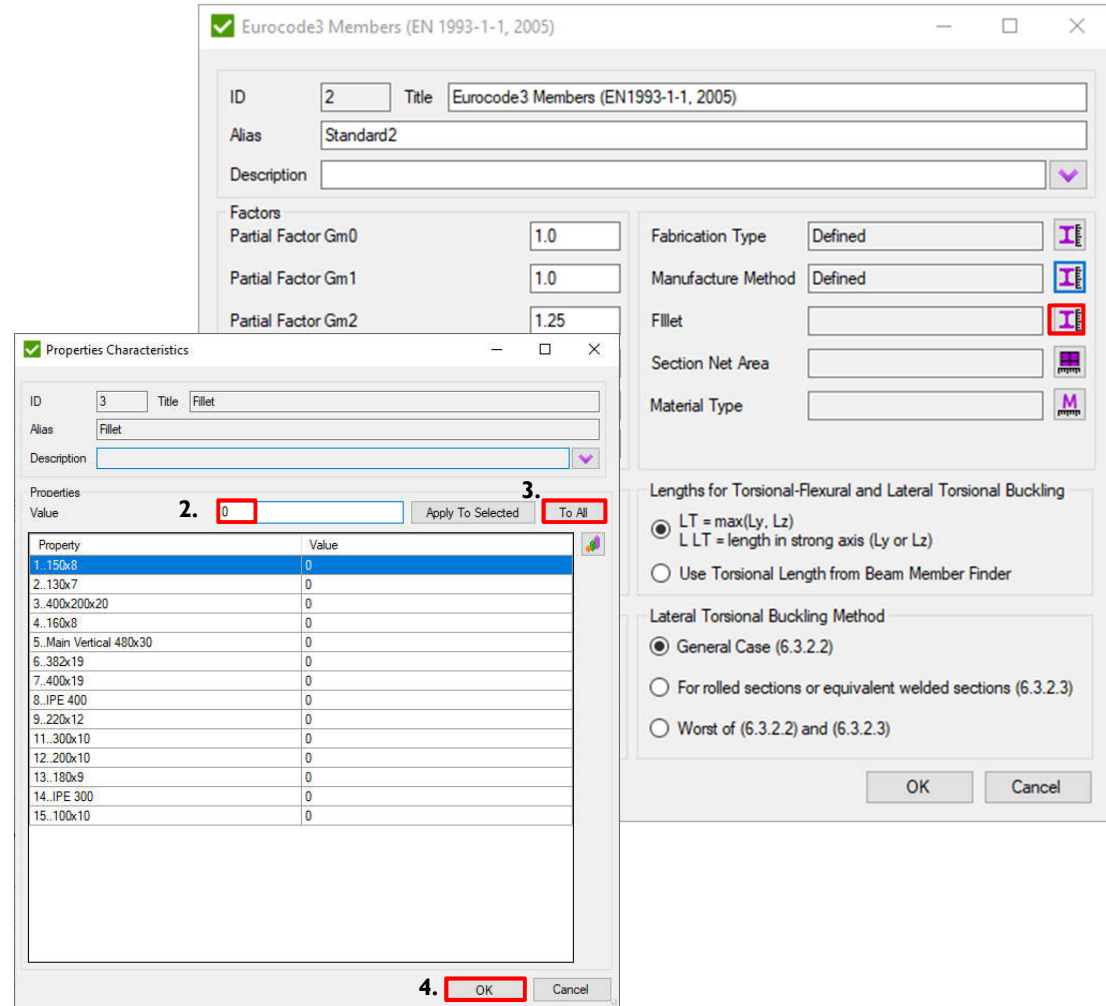
2 Properties Value - **0**

3 Press *To All*

4 Press *Ok*

Repeat Steps 1-4 for *Section Net Area*

Go to the next slide to Continue



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

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

Alias: Standard2

Description:

Factors


Partial Factor Gm0: 1.0


Partial Factor Gm1: 1.0


Partial Factor Gm2: 1.25

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

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)

OK Cancel

Properties Characteristics

ID: 3 Title: Fillet

Alias: Fillet

Description:

Properties

Value: 0

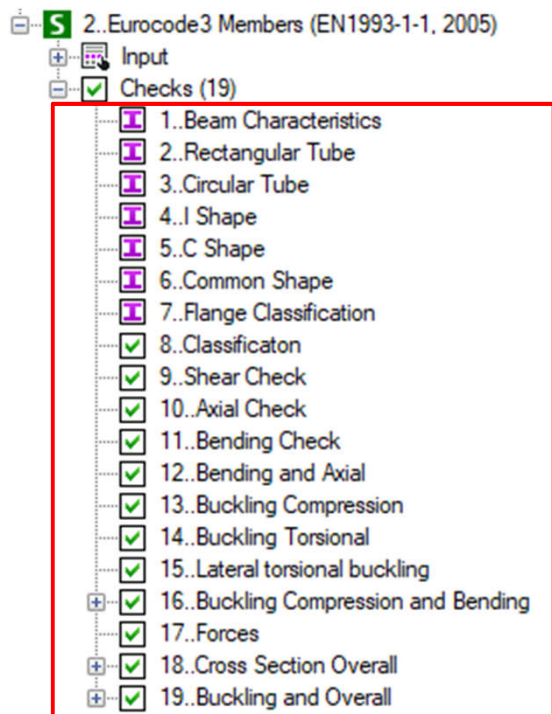
Apply To Selected To All

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

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: 1.0
- Materials Characteristics**
- ID: 1 Title: Material Type
- Alias: Material Type
- Description:
- Materials
- Material Type: 2. S235_S275_S355_S420
- Apply To Selected To All
- | Material | Value |
|--------------------|---------------------|
| 1. AISI 4340 Steel | S235_S275_S355_S420 |
| 2. AISI 4130 Steel | S235_S275_S355_S420 |
- Design Parameters**
- Fabrication Type: Defined
- Manufacture Method: Defined
- Fillet: Defined
- Section Net Area: Defined
- 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)
- OK Cancel

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

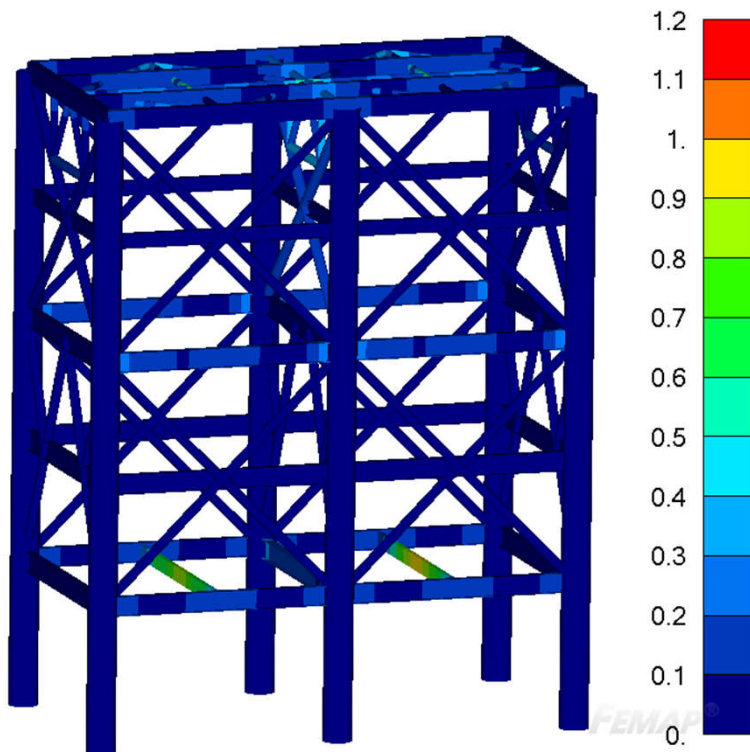
5 Press Ok

The screenshot shows the SDC Verifier software interface. On the left, a list of tables is displayed, including '8..Classification', '9..Shear Check', '10..Axial Check', '11..Bending Check', '12..Bending and Axial', '13..Buckling Compression', '14..Buckling Torsional', '15..Lateral torsional buckling', '16..Buckling Compression and Bending', '17..Forces', '18..Cross Section Overall', '19..Buckling', and '20..Buckling'. A context menu is open over the '18..Cross Section Overall' table, showing options: 'Table (expand/extreme)', 'Components Table', 'Extreme Flow Table', and 'Remove Multiple'. The 'Table (expand/extreme)' option is highlighted. Below the context menu, the 'Extreme Options' dialog box is open. The 'Detailed (extreme locations - element and load (for Load Groups))' option is selected under 'Extreme Options'. The 'Fill Table' button is highlighted. The 'OK' button is also highlighted.

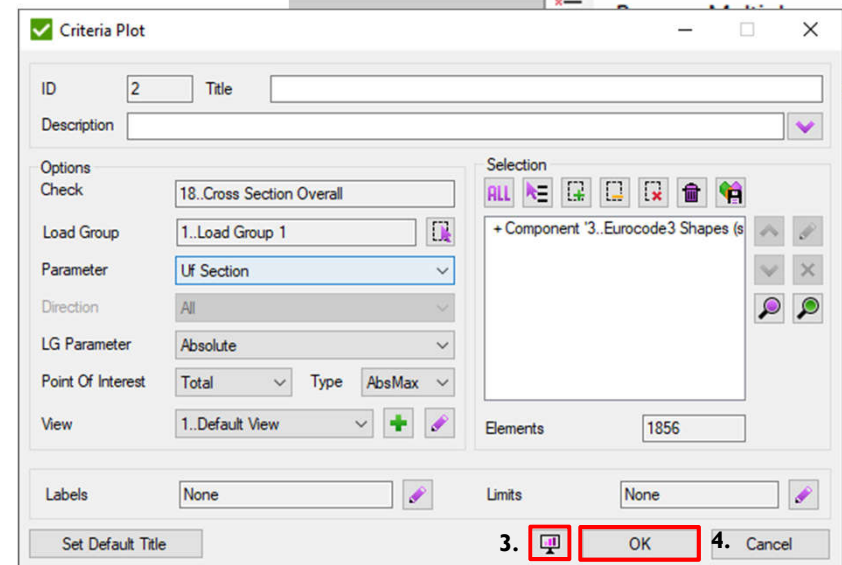
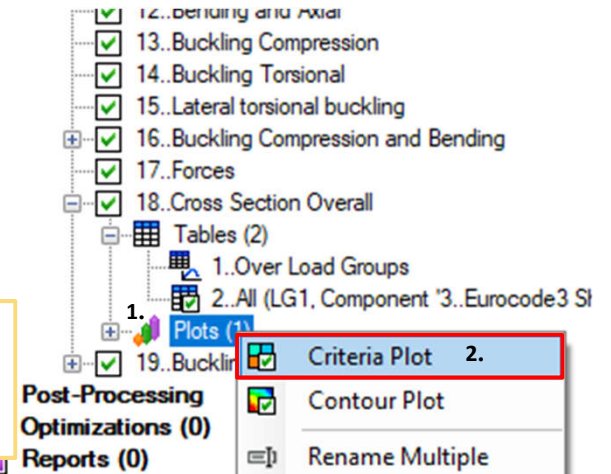
Extreme	UF Axial	UF ShearY	UF ShearZ	UF BendY	UF BendZ	UF Comb	UF Section
Minimum							
Value	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Element ID	2497	1400	64	1577	1134	1614	1908
Load	LS4	LS4	LS1	LS3	LS1	LS1	LS2
Maximum							
Value	0.38	0.16	0.16	0.90	0.56	0.84	0.90
Element ID	955	171	1854	64	1140	64	64
Load	LS4	LS1	LS2	LS4	LS1	LS2	LS4
Absolute							
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

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*.

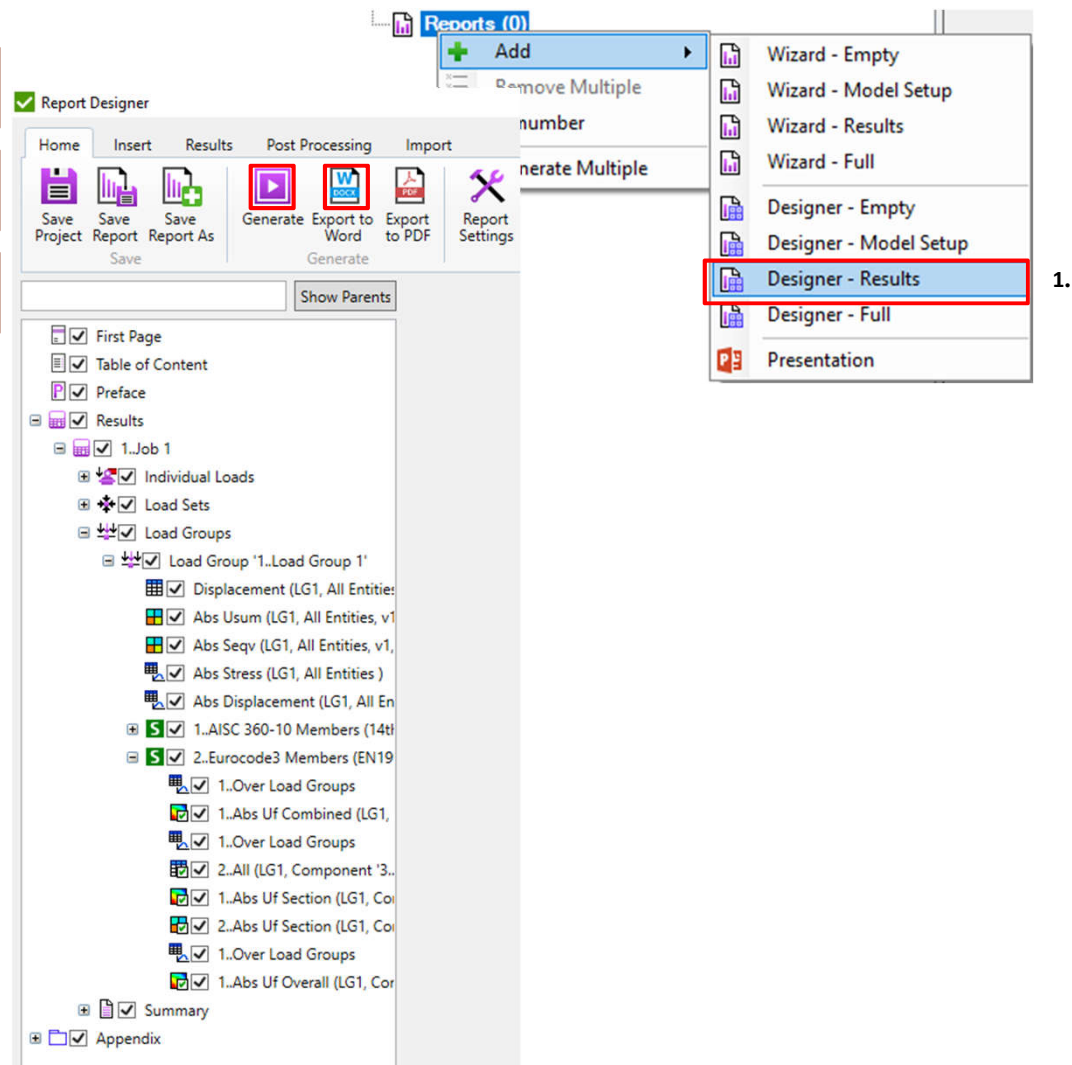
2

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

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16..Overall

Property	Value
Category	Elemental Custom Check
Selection	Component '7..s1.AISC360 selection'
Parameters	8

1..Over Load Groups

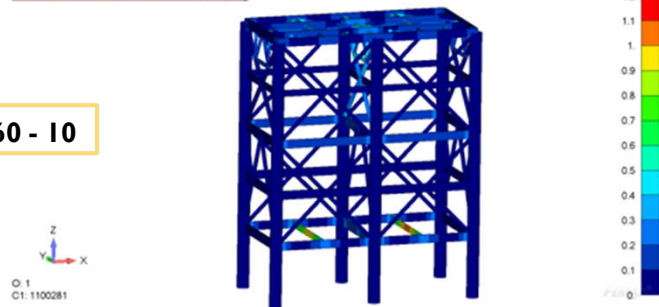
Check Selection	[S1] 16..Overall	Load Group	LG1..Load Group 1
Load	Uf Axial	Uf Bending Major	Uf Bending Minor
Uf Axial	0.44	1.00	0.57
Uf Bending Major	0.21	1.01	1.01
Uf Bending Minor			
Uf Shear			
Uf Axial and Bending			
Uf Overall			

2..All (LG1, Component '7..s1.AISC360 selection')

Standard	1..AISC 360-10 Members (14th, 2010)	Check Selection	[S1] 16..Overall
Load Group	LG1..Load Group 1	Component '7..s1.AISC360 selection'	
Extreme	Uf Axial	Uf Bending Major	Uf Bending Minor
Uf Axial	0.00	0.00	0.00
Uf Bending Major	0.00	0.00	0.00
Uf Bending Minor	0.00	0.00	0.00
Uf Shear	0.00	0.00	0.00
Uf Axial and Bending	0.00	0.00	0.00
Uf Overall	0.00	0.00	0.00
Minimum			
Value	59	1134	1577
Element ID	LS2	LS1	LS3
Load	LS2	LS1	LS3
Maximum			
Value	0.44	1.00	0.57
Element ID	955	64	174
Load	LS4	LS4	LS1
Absolute			
Value	0.44	1.00	0.57
Element ID	955	64	174
Load	LS4	LS4	LS1

2..Abs Uf Overall (LG1, Component '7..s1.AISC360 selection', v1, Total)

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Check	[S1] 16..Overall	Point	Total
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AISC 360 - 10

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17..Cross Section Overall

Property	Value
Category	Elemental Custom Check
Selection	Component '10..Eurocode3 Shapes'
Parameters	7

1..Over Load Groups

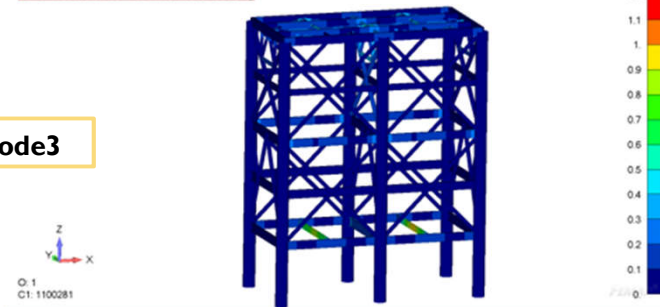
Check Selection	[S2] 17..Cross Section Overall	Load Group	LG1..Load Group 1
Load	Uf Axial	Uf ShearY	Uf ShearZ
Uf Axial	0.38	0.16	0.16
Uf ShearY	0.90	0.56	0.84
Uf ShearZ			
Uf BendingY			
Uf BendingZ			
Uf Comb			
Uf Section			

2..All (LG1, Component '10..Eurocode3 Shapes')

Standard	2..Eurocode3 Members (EN1993-1-1, 2005)	Check Selection	[S2] 17..Cross Section Overall
Load Group	LG1..Load Group 1	Component '10..Eurocode3 Shapes'	
Extreme	Uf Axial	Uf ShearY	Uf ShearZ
Uf Axial	0.00	0.00	0.00
Uf ShearY	0.00	0.00	0.00
Uf ShearZ	0.00	0.00	0.00
Uf BendingY	0.00	0.00	0.00
Uf BendingZ	0.00	0.00	0.00
Uf Comb	0.00	0.00	0.00
Uf Section	0.00	0.00	0.00
Minimum			
Value	2497	1400	64
Element ID	LS4	LS4	LS1
Load	LS4	LS4	LS1
Maximum			
Value	0.38	0.16	0.16
Element ID	955	171	1854
Load	LS4	LS1	LS2
Absolute			
Value	0.38	0.16	0.16
Element ID	955	171	1854
Load	LS4	LS1	LS2

2..Abs Uf Section (LG1, Component '10..Eurocode3 Shapes', v1, Total)

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Check	[S2] 17..Cross Section Overall	Point	Total
Load Group	LG1..Load Group 1	Parameter	Absolute Uf Section
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Eurocode3