



Tutorial

API 2A RP/ISO 19902/Norsok N004

19.01.2021
version 2020.0.2

- ▶ In this tutorial, an API 2A RP Beam Design Checks are reviewed in details.
- ▶ A beam model of a steel frame has been used as a start FEM model.
- ▶ Beam member finder was used to recognize beam member length in 3 directions.
- ▶ The report was generated with the help of report designer.

Open Project

1

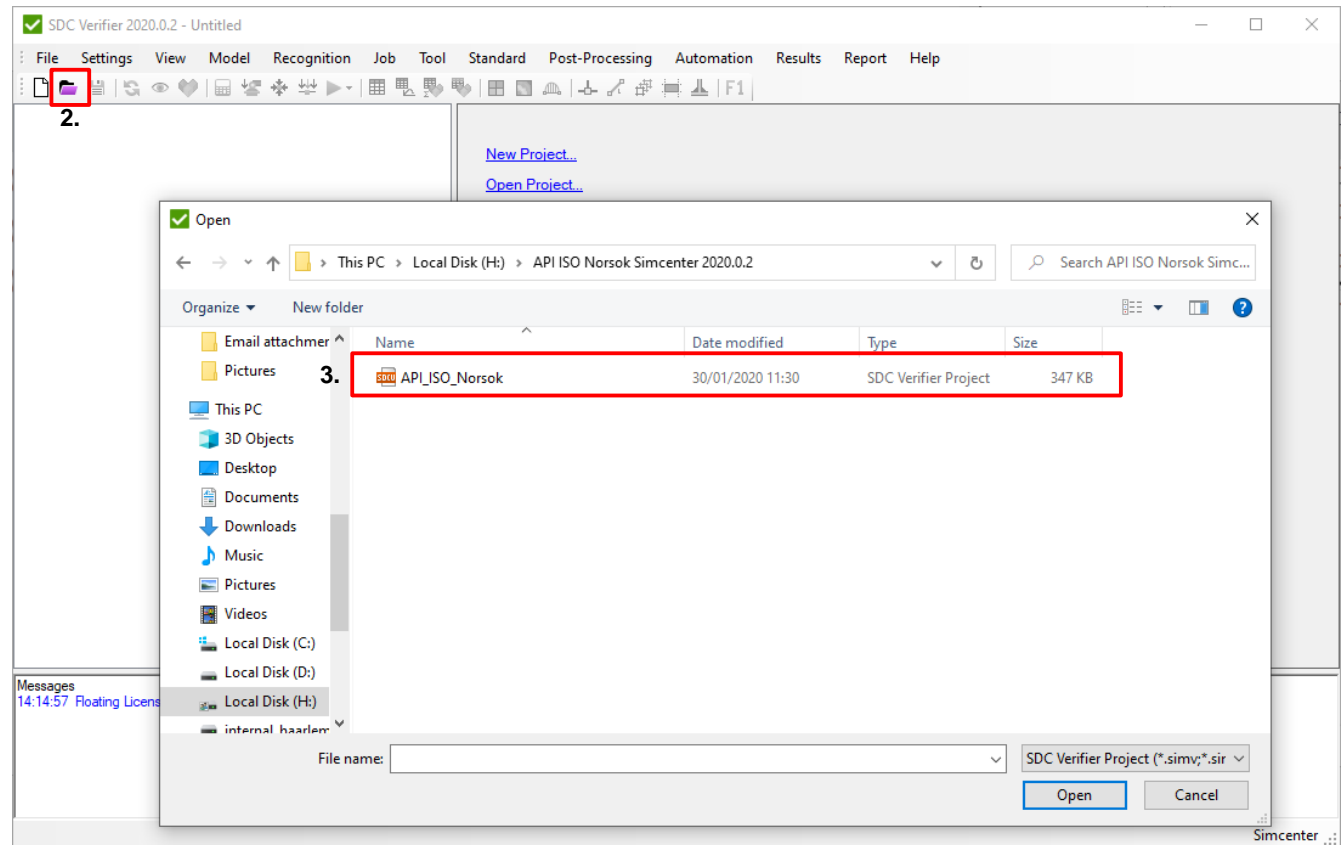
Launch **SDC Verifier** ✓

2

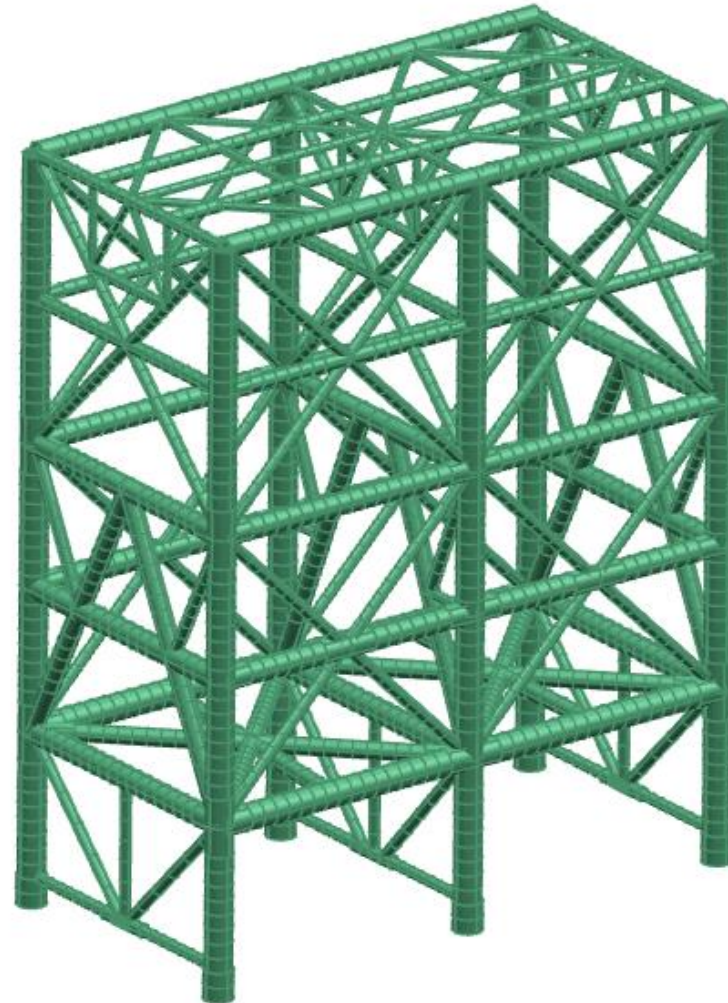
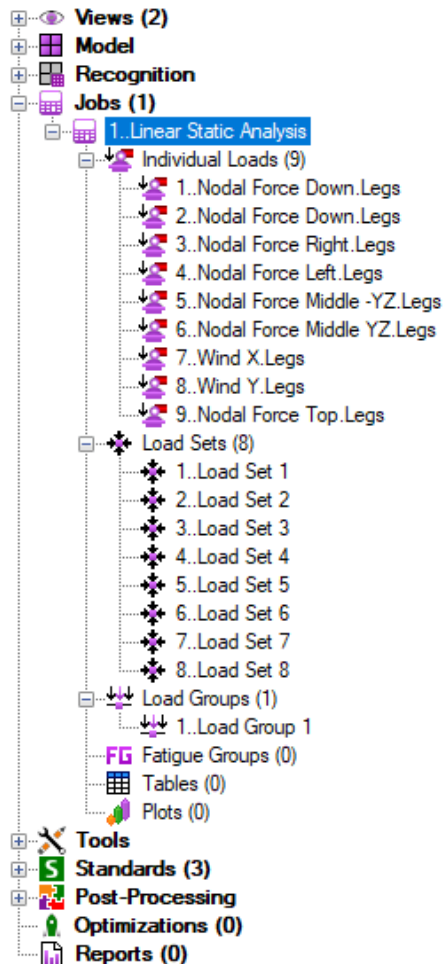
Execute *File - Open Project*.

3

Project: **API RP 2A-LRFD.sdcv**



Predefined project

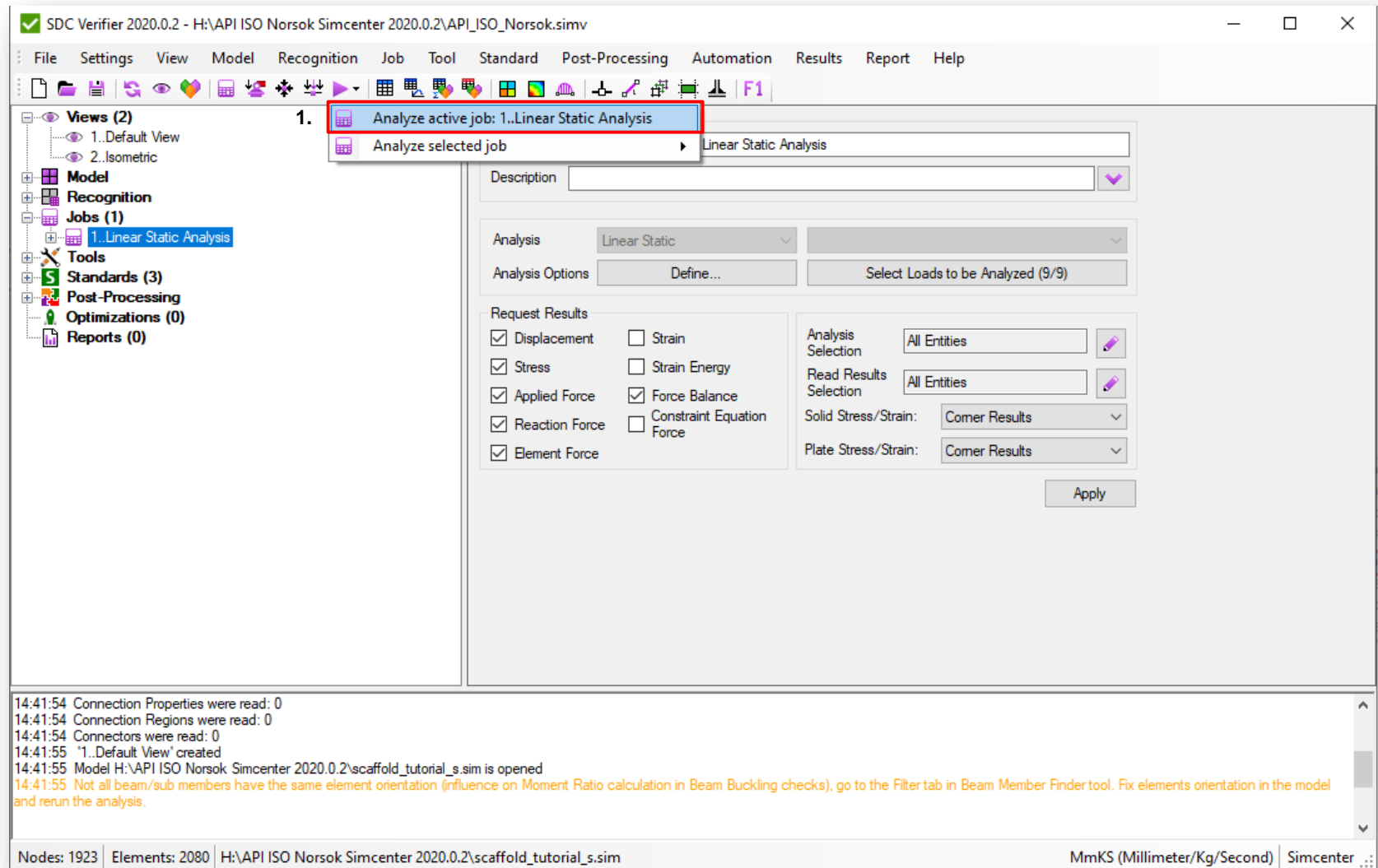


This tutorial uses predefined project with the following created data: individual loads, load sets and load group. The focus of this tutorial is to check the cylindrical members and create the basic report.

Analyze Job

1

Execute ▶ **Analyze active job**



Explanation of 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;

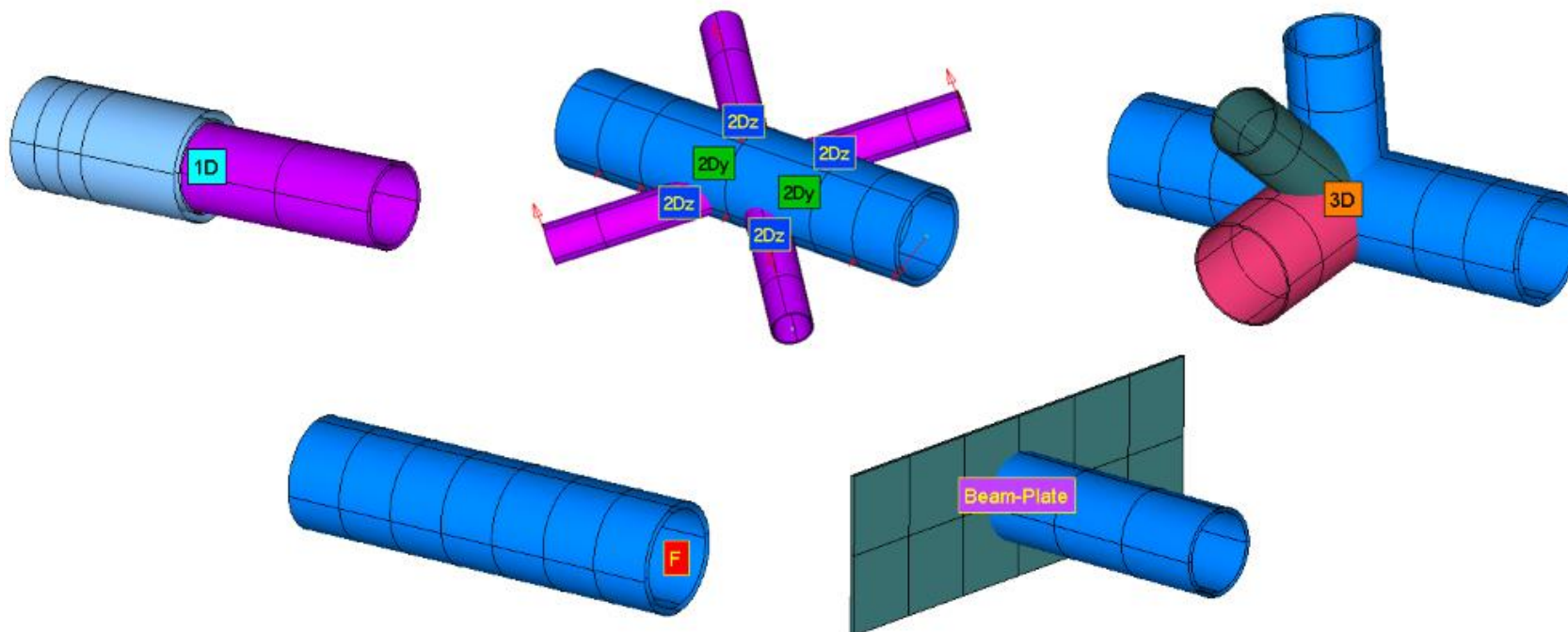
2D Joint – beam members connected in one plane;

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. Settings

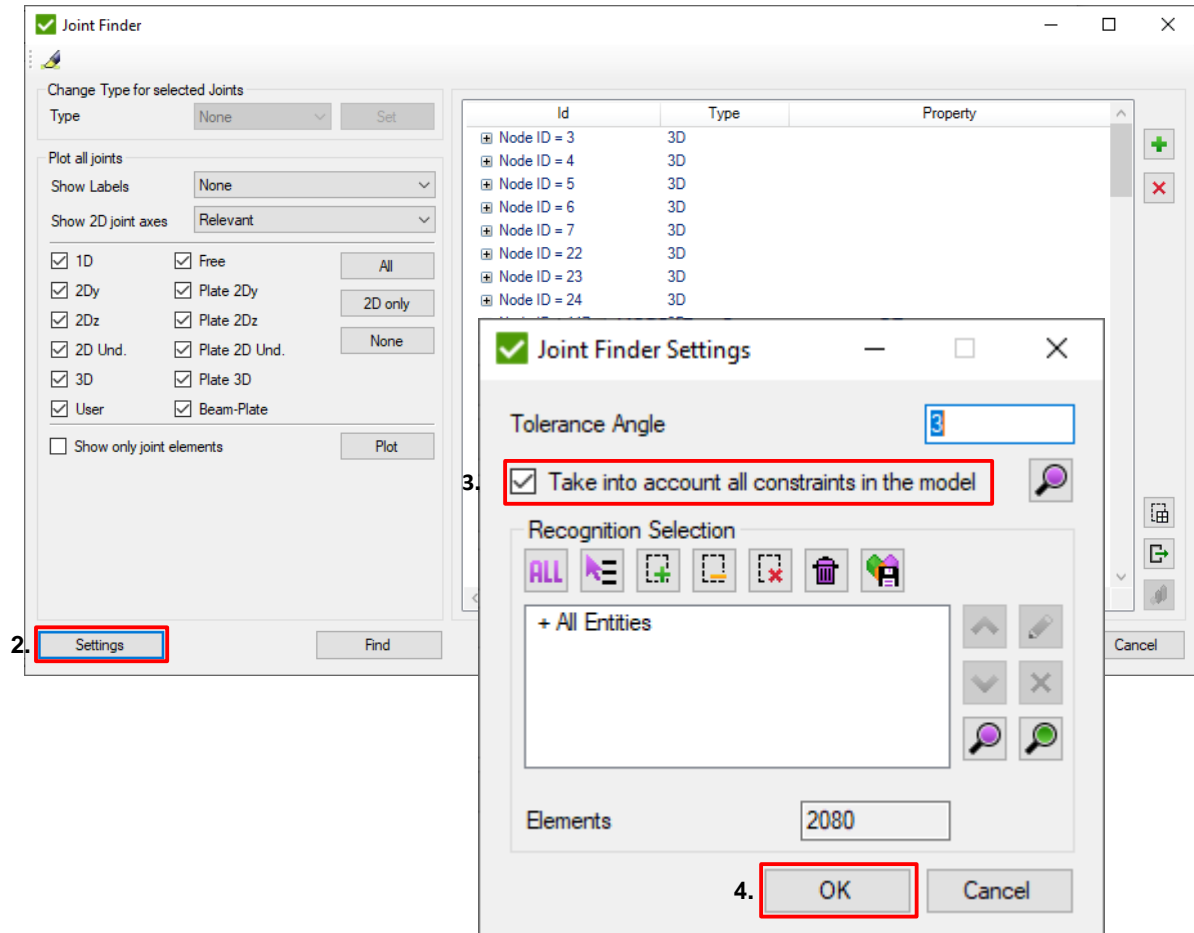
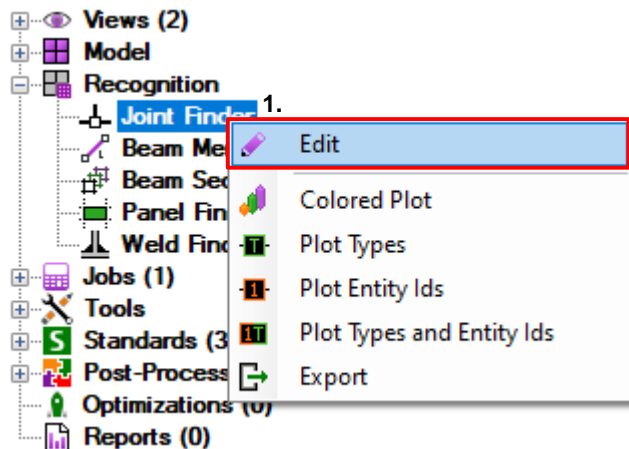
1. Execute *Edit* from *Joint Finder* context menu

2. Press *Settings*.

3. Take into account all constraints in the model: **ON**

4. Press *Ok*.

When performing the joint recognition there are 3 options for existing joints. Default option: Keep only modified– remove all joints except edited by user. Keep all existing options should be used when additional elements were added to the model.



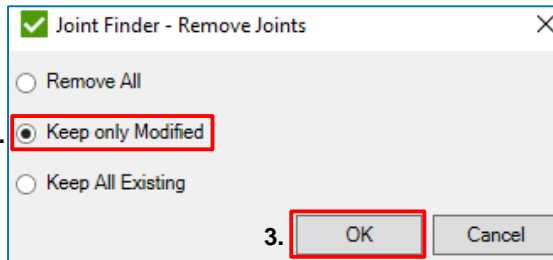
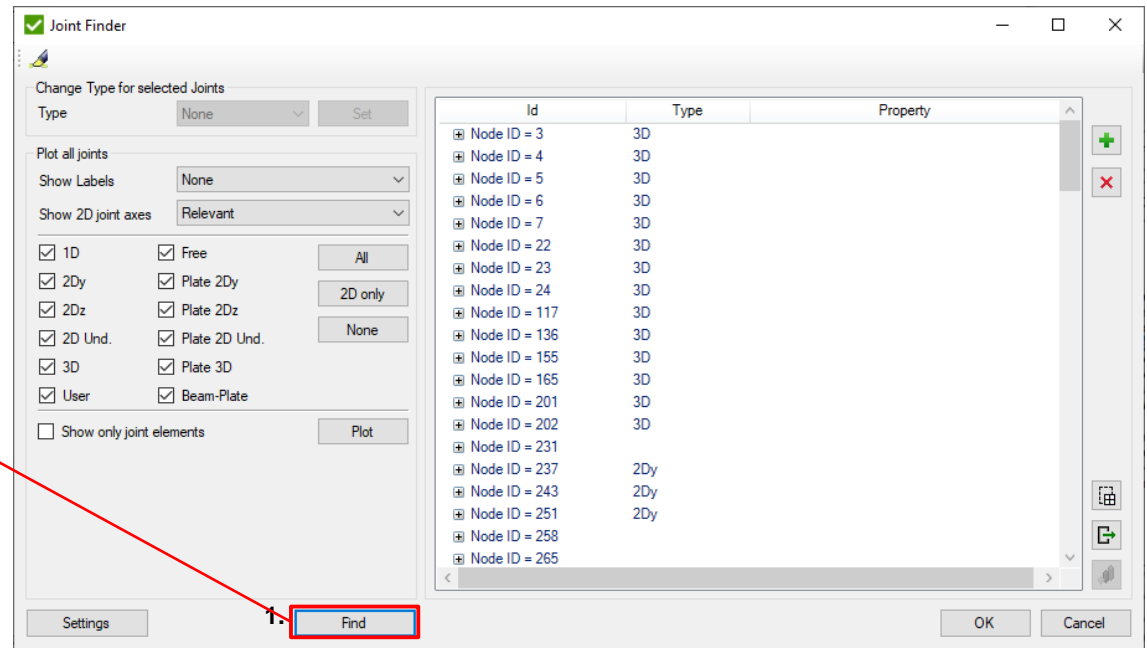
Joint Recognition. Find

1 Press *Find*.

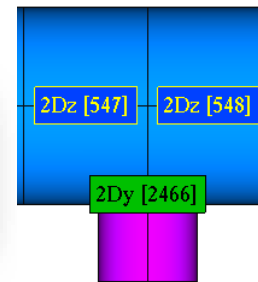
2 Select *Keep Only Modified*

3 Press *Ok*.

When performing the joint recognition there are 3 options for existing joints. Default option: Keep only modified– remove all joints except edited by user. Keep all existing options should be used when additional elements were added to the model.




Node ID = 719			
Element ID = 2466	2Dy	14..200x10	
Element ID = 547	2Dz	8..400x19	
Element ID = 548	2Dz	8..400x19	



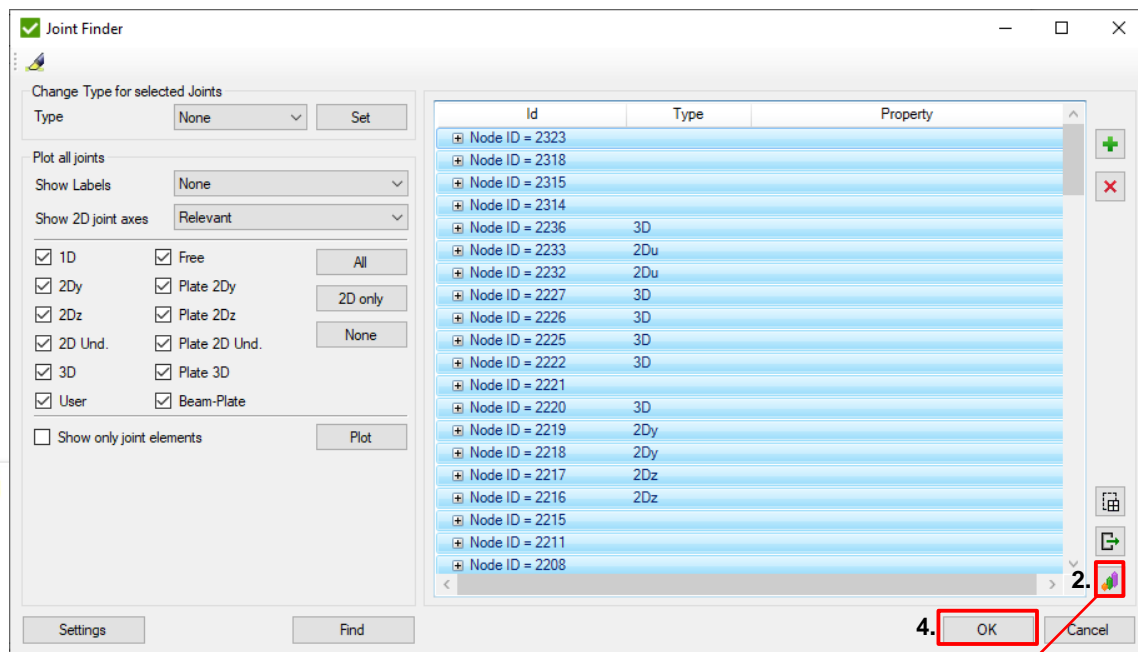
Joints Plot

1 Select All Joints (Ctrl+A).

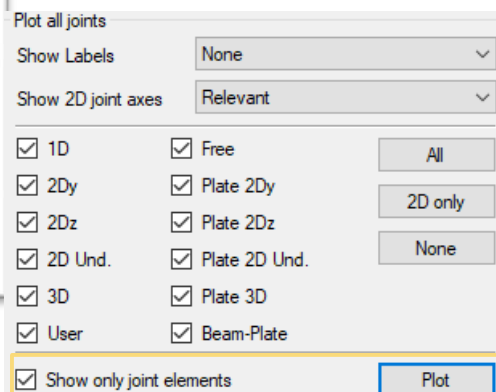
2 Press 

3 Press  Plot Joint Type in colors



4 Press OK



Plot Joints of specific type:



3.

 Plot Joint Type Labels
 Plot Joint Type in colors

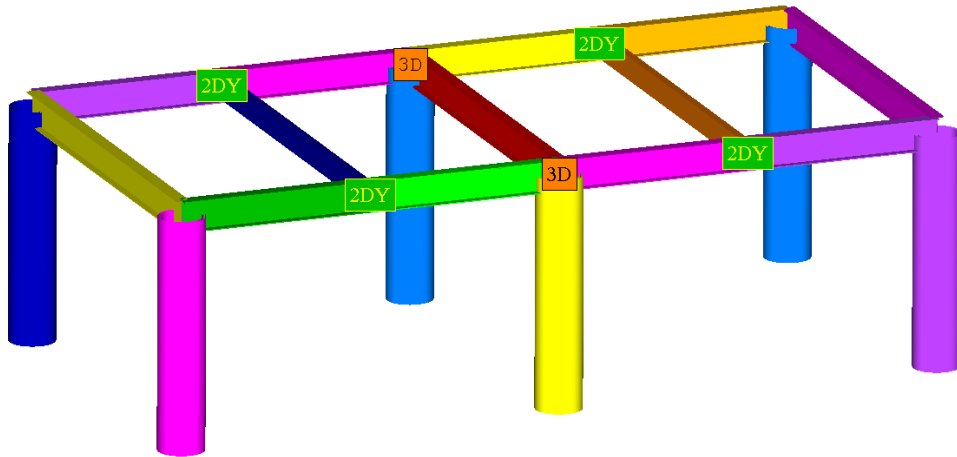
Modify Joint Type:

Change Type for selected Joints

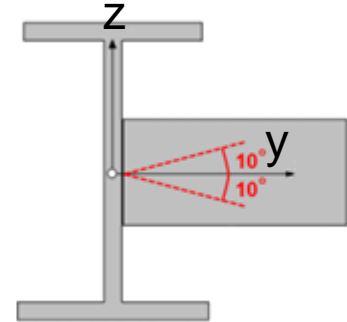
Type None Set

Beam Member Lengths in 2 directions

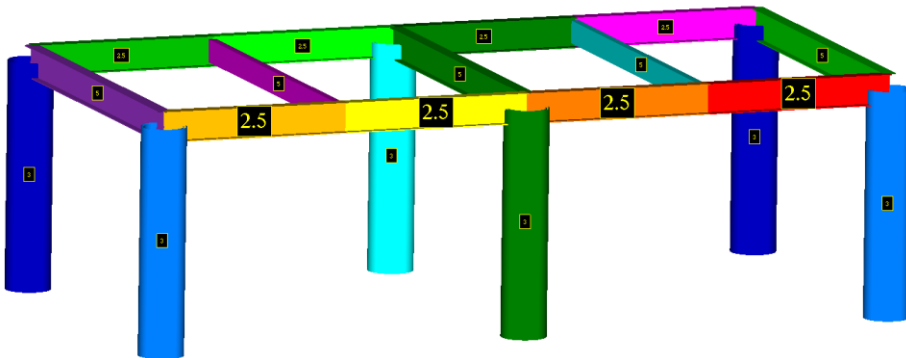
Beam Member Finder recognizes beam members and (buckling) lengths for different directions (Y, Z and Torsional).



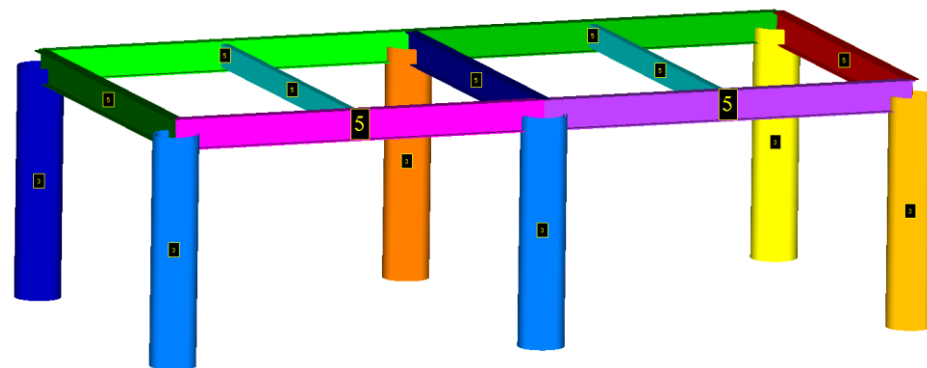
2DY
Joint



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



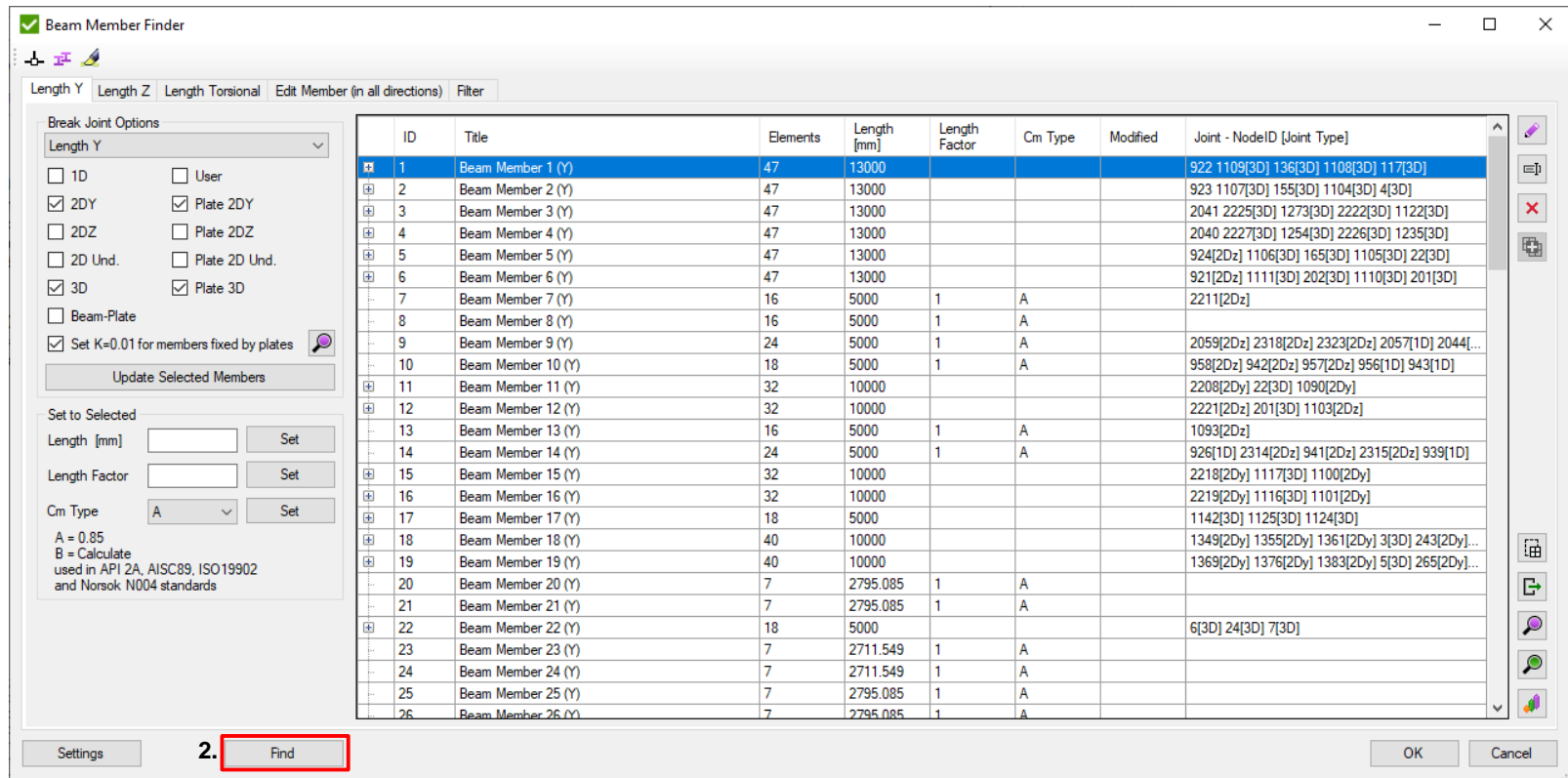
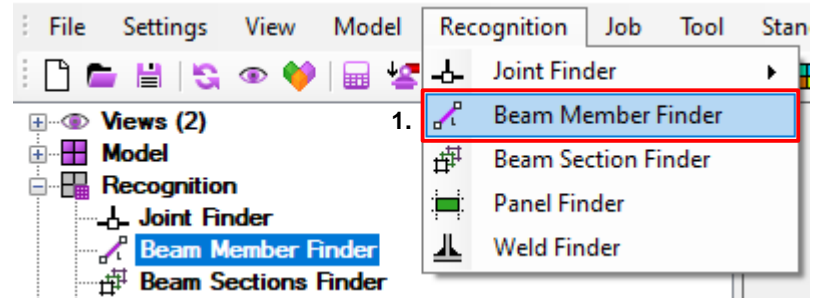
Length Z – 2 Beam Members with $L = 5$



Recognize Length

1 Execute *Recognition – Beam Member Finder*

2 Press *Find*.



Beam Member Finder interface

Beam Member Finder

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

Break Joint Options

Length Y

☐ 1D ☐ User

☒ 2DY ☒ Plate 2DY

☐ 2DZ ☐ Plate 2DZ

☐ 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 [mm] Set

Length Factor Set

Cm Type A Set

A = 0.85
B = Calculate
used in API 2A, AISC89, ISO 19902
and Norsok N004 standards

Settings Find

ID	Title	Elements	Length [mm]	Length Factor	Cm Type	Modified	Joint - NodeID [Joint Type]
1	Beam Member 1 (Y)	47	13000				923 1107[3D] 155[3D] 1104[3D] 4[3D]
2	Beam Member 2 (Y)	47	13000				922 1109[3D] 136[3D] 1108[3D] 117[3D]
3	Beam Member 3 (Y)	47	13000				2041 2225[3D] 1273[3D] 2222[3D] 1122[3D]
4	Beam Member 4 (Y)	47	13000				2040 2227[3D] 1254[3D] 2226[3D] 1235[3D]
5	Beam Member 5 (Y)	47	13000				924[2Dz] 1106[3D] 165[3D] 1105[3D] 22[3D]
6	Beam Member 6 (Y)	47	13000				921[2Dz] 1111[3D] 202[3D] 1110[3D] 201[3D]
7	Beam Member 7 (Y)	32	10000				22[3D] 2208[2Dy] 1090[2Dy]
7.1	Beam Member 7.1 (Y)	8	2500	1	A		
7.2	Beam Member 7.2 (Y)	8	2500	1	A		
7.3	Beam Member 7.3 (Y)	8	2500	1	A		
7.4	Beam Member 7.4 (Y)	8	2500	1	A		
8	Beam Member 8 (Y)	16	5000	1	A		1093[2Dz]
9	Beam Member 9 (Y)	24	5000	1	A		926[1D] 2314[2Dz] 941[2Dz] 2315[2Dz] 939[1D]
10	Beam Member 10 (Y)	24	5000	1	A		2059[2Dz] 2318[2Dz] 2323[2Dz] 2057[1D] 2044[...]
11	Beam Member 11 (Y)	18	5000	1	A		958[2Dz] 942[2Dz] 957[2Dz] 956[1D] 943[1D]
12	Beam Member 12 (Y)	16	5000	1	A		2211[2Dz]
13	Beam Member 13 (Y)	16	5000	1	A		
14	Beam Member 14 (Y)	32	10000				2221[2Dz] 201[3D] 1103[2Dz]
15	Beam Member 15 (Y)	32	10000				1116[3D] 1101[2Dy] 2219[2Dy]
16	Beam Member 16 (Y)	32	10000				1100[2Dy] 1117[3D] 2218[2Dy]
17	Beam Member 17 (Y)	7	2711.549	1	A		
18	Beam Member 18 (Y)	7	2711.549	1	A		
19	Beam Member 19 (Y)	7	2795.085	1	A		
20	Beam Member 20 (Y)	7	2795.085	1	A		
21	Beam Member 21 (Y)	18	5000				1124[3D] 1142[3D] 1125[3D]
22	Beam Member 22 (Y)	40	10000				2512[2Dz] 2582[2Dz] 2652[2Dz] 5130[1383[2Dz] 1

OK Cancel

Break Options define what joints are used to split beam members

Change Length/Length Factor for selected beam members

Cm Type is used in API 2A, AISC89, 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

- 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

7	Beam Member 7 (Y)	32	10000				22[3D] 2208[2Dy] 1090[2Dy]
7.1	Beam Member 7.1 (Y)	8	2500	1	A		
7.2	Beam Member 7.2 (Y)	8	2500	1	A		
7.3	Beam Member 7.3 (Y)	8	2500	1	A		
7.4	Beam Member 7.4 (Y)	8	2500	1	A		



Beam Member's Length Plot

1 Select All Beam Members (Ctrl+A)

2 Press 

3 Press  Plot Length labels

4 Press OK

Beam Member Finder

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

Break Joint Options

Length Y

☐ 1D ☐ User

☒ 2D ☒ Plate 2D

☐ 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 [mm] Set

Length Factor Set

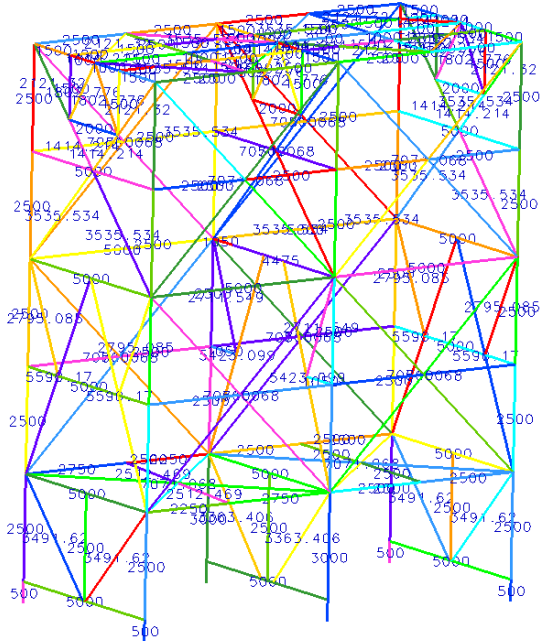
Cm Type A Set

A = 0.85
B = Calculate
used in API 2A, AISC89, ISO 19902
and Norsok N004 standards


ID	Title	Elements	Length [mm]	Length Factor	Cm Type	Modified	Joint - NodeID [Joint Type]
1	Beam Member 1 (Y)	47	13000				923 1107[3D] 155[3D] 1104[3D] 4[3D]
2	Beam Member 2 (Y)	47	13000				922 1109[3D] 136[3D] 1108[3D] 117[3D]
3	Beam Member 3 (Y)	47	13000				2041 2225[3D] 1273[3D] 2222[3D] 1122[3D]
4	Beam Member 4 (Y)	47	13000				2040 2227[3D] 1254[3D] 2226[3D] 1235[3D]
5	Beam Member 5 (Y)	47	13000				924[2Dz] 1106[3D] 165[3D] 1105[3D] 22[3D]
6	Beam Member 6 (Y)	47	13000				921[2Dz] 1111[3D] 202[3D] 1110[3D] 201[3D]
7	Beam Member 7 (Y)	32	10000				22[3D] 2208[2Dy] 1090[2Dy]
7.1	Beam Member 7.1 (Y)	8	2500	1	A		
7.2	Beam Member 7.2 (Y)	8	2500	1	A		
7.3	Beam Member 7.3 (Y)	8	2500	1	A		
7.4	Beam Member 7.4 (Y)	8	2500	1	A		
8	Beam Member 8 (Y)	16	5000	1	A		1093[2Dz]
9	Beam Member 9 (Y)	24	5000	1	A		926[1D] 2314[2Dz] 941[2Dz] 2315[2Dz] 939[1D]
10	Beam Member 10 (Y)	24	5000	1	A		2059[2Dz] 2318[2Dz] 2323[2Dz] 2057[1D] 2044[
11	Beam Member 11 (Y)	18	5000	1	A		958[2Dz] 942[2Dz] 957[2Dz] 956[1D] 943[1D]
12	Beam Member 12 (Y)	16	5000	1	A		2211[2Dz]
13	Beam Member 13 (Y)	16	5000	1	A		
14	Beam Member 14 (Y)	32	10000				2221[2Dz] 201[3D] 1103[2Dz]
15	Beam Member 15 (Y)	32	10000				1116[3D] 1101[2Dy] 2219[2Dy]
16	Beam Member 16 (Y)	32	10000				1100[2Dy] 1117[3D] 2218[2Dy]
17	Beam Member 17 (Y)	7	2711.549	1	A		
18	Beam Member 18 (Y)	7	2711.549	1	A		
19	Beam Member 19 (Y)	7	2795.085	1	A		
20	Beam Member 20 (Y)	7	2795.085	1	A		
21	Beam Member 21 (Y)	18	5000				1124[3D] 1142[3D] 1125[3D]

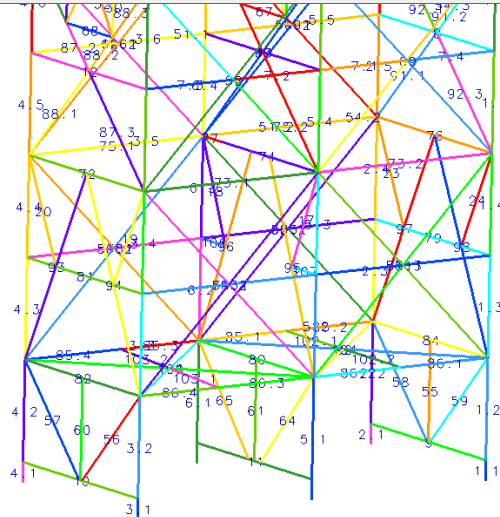
Settings Find








4. OK Cancel



Also it is possible to display beam members IDs by pressing

 Plot Members ID labels



-  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

Cm – reduction factors

Cmy and Cmz reduction factors are used in combined axial and bending check:

$$\frac{f_c}{\phi_c F_{cn}} + \frac{1}{\phi_b F_{bn}} \left\{ \left[\frac{C_{my} f_{by}}{\phi_c F_{ey}} \right]^2 + \left[\frac{C_{mz} f_{bz}}{\phi_c F_{ez}} \right]^2 \right\}^{0.5} \leq 1.0$$

..... (D.3.2-1)

By default **Cm Type** equal to A = 0.85 for all members.
It is possible to modify Cm Type for selected members:

Cm Type A Set

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

In SDC Verifier B = minimum from (b) and (c)

Notes to Table D.3-1:

(1) Use whichever is more applicable to a specific situation. Values of the reduction factor C_m referred to in the above table are as follows:

(a) 0.85

(b) $0.6 - 0.4 \frac{M_1}{M_2}$, no more than 0.85, or less than

0.40, where M_1/M_2 is the ratio of smaller to larger moments at the ends of that portion of the member unbraced in the plane of bending under consideration. M_1/M_2 is positive when the number is bent in reverse curvature, negative when bent in single curvature.

(c) $1.0 - 0.4 \frac{f_c}{\phi_c F_e}$, or 0.85, whichever is less

TABLE D.3-1
EFFECTIVE LENGTH AND BENDING
REDUCTION FACTORS FOR
MEMBER STRENGTH CHECKING

Situation	Effective Length Factor K	Reduction Factor $C_m^{(1)}$
Superstructure Legs		
Braced	1.0	(a)
Portal (unbraced)	$K^{(2)}$	(a)
Jacket Legs & Piling		
Grouted Composite Section	1.0	(c)
Ungouted Jacket Legs	1.0	(c)
Ungouted Piling Between Shim Points	1.0	(b)
Jacket Braces		
Face-to-face Length of Main Diagonals	0.8	(b) or (c)
Face of Leg to Centerline of Joint Length of K-Braces ⁽³⁾	0.8	(c)
Longer Segment Length of X-Braces ⁽³⁾	0.9	(c)
Secondary Horizontals	0.7	(c)
Deck Truss Chord members	1.0	(a),(b) or (c)
Deck Truss Web Members		
In-Plane Action	0.8	(b)
Out-of-Plane Action	1.0	(a) or (b)

API RP*2A-LRFD 93 ■ 0732290 0507612 001 ■

Recommended Practice for Planning, Designing and Constructing Fixed Offshore Platforms — Load and Resistance Factor Design

API RECOMMENDED PRACTICE 2A-LRFD (RP 2A-LRFD)
FIRST EDITION, JULY 1, 1993

American Petroleum Institute
1220 L Street, Northwest
Washington, DC 20005



This “Recommended Practice for Planning, Designing, and Constructing Fixed Offshore Platforms — Load and Resistance Factor Design” (LRFD) contains the engineering design principles and good practices that have been the basis of the API RP2A working strength design (WSD) recommended practice, now in its 20th Edition. The LRFD provisions have been developed from the WSD provisions using reliability based calibration.

API RP*2A-LRFD 93 ■ 0732290 0507613 T48 ■

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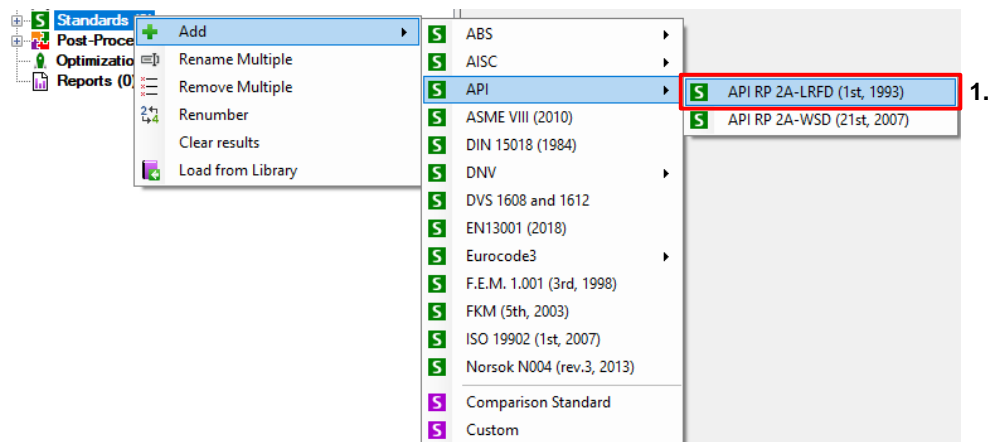
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Add API RP 2A-LRFD standard

1

Execute *Standards* => *Add* => *API*
=> *API RP 2A-LRFD (1st, Jul 1993)*.



SECTION D CYLINDRICAL MEMBER DESIGN

C_x = critical elastic buckling coefficient

The theoretical value of C_x is 0.6. However, a reduced value of $C_x = 0.3$ is recommended for use in Equation D.2.2-3 to account for the effect of initial geometric imperfections within API Spec 2B tolerance limits, Reference D2.

ϕ_t = resistance factor for axial tensile strength, 0.95

ϕ_c = resistance factor for axial compressive strength, 0.85

ϕ_b = resistance factor for bending strength, 0.95.

ϕ_v = resistance factor for beam shear strength, 0.95

API RP 2A-LRFD (1st, 1993)

ID: 4 Title: API RP 2A-LRFD (1st, 1993)

Alias: Standard4

Description:

Safety Factors

Critical Elastic Buckling Coefficient (C_x): 0.3

Resistance Factor for Tension (F_t): 0.95

Resistance Factor For Compression (F_c): 0.85

Resistance Factor For Bending (F_b): 0.95

Resistance Factor For Shear (F_v): 0.95

Selection

ALL

+ Shape '2..Tube'

API 2A RP standard covers the design checks only cylindrical types of shapes.

Elements: 2078


☐ Use AISC 360-10 for non-tubular shapes

Materials with Yield = 0

OK Cancel

Define Material Characteristics

1

Press  to set the material yield stress and tensile strength

2

Select All Materials (Ctrl+A)

3

Tensile Strength: **360e+3 [kPa]**

4

Yield Stress: **240e+3 [kPa]**

5

Press Set

6

Press OK

☒ API RP 2A-LRFD (1st, 1993)

ID: 4 Title: API RP 2A-LRFD (1st, 1993)

Alias: Standard4

Description:

Safety Factors

Critical Elastic Buckling Coefficient (Cx): 0.3

Resistance Factor for Tension (F_t): 0.95

Resistance Factor For Compression (F_c): 0.85

Resistance Factor For Bending (F_b): 0.95


Resistance Factor For Shear (F_v): 0.95

Selection

+ Shape '2..Tube'

Elements: 2078

☐ Use AISC 360-10 for non-tubular shapes

Materials with Yield = 0 1. 0 

OK Cancel

☒ Material Fatigue Parameters

Materials	Tensile Strength [KPa]	Yield Stress [KPa]
1..AISI 4340 Steel	360000	240000
2..AISI 4130 Steel	360000	240000

Properties

Tensile Strength [KPa]: 360e3

Yield Stress [KPa]: 240e3

Set


OK Cancel

Extreme table for bending check

1

Execute *Table* from the **Bending Stress Check** context menu

2

Press  to select load

3

Load Type: **Load Group**

4

Load: **1..Load Group 1**

5

Press *OK*

6

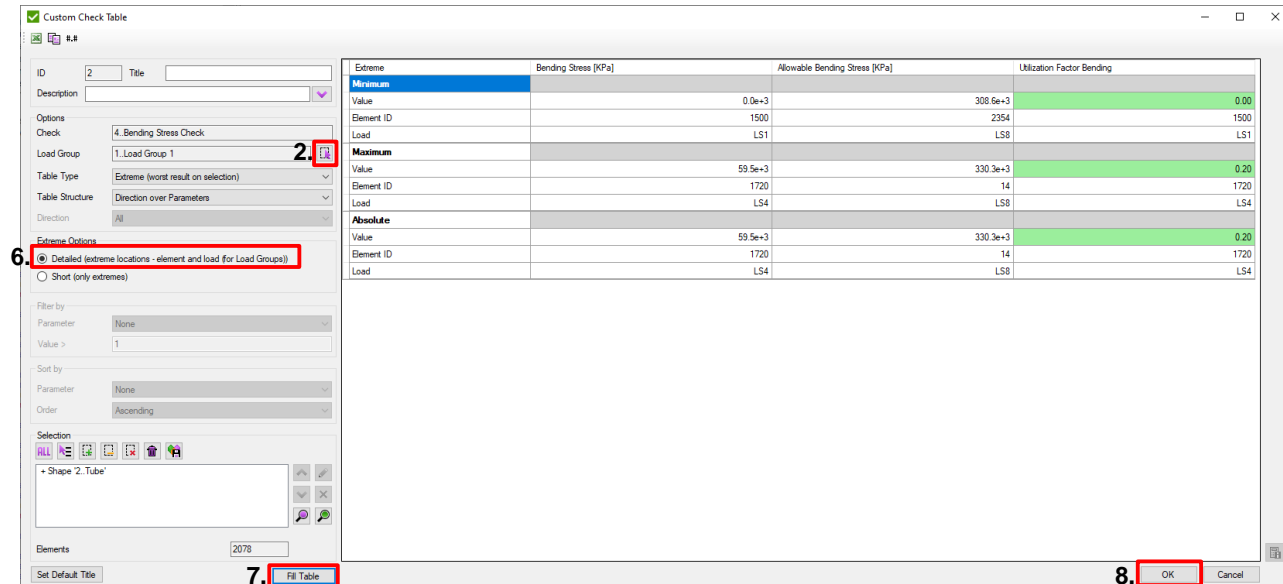
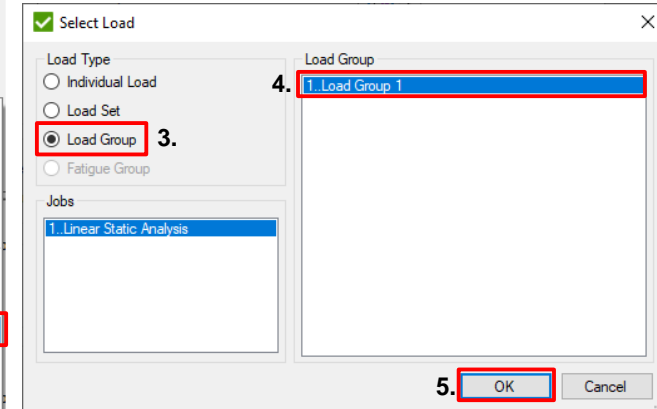
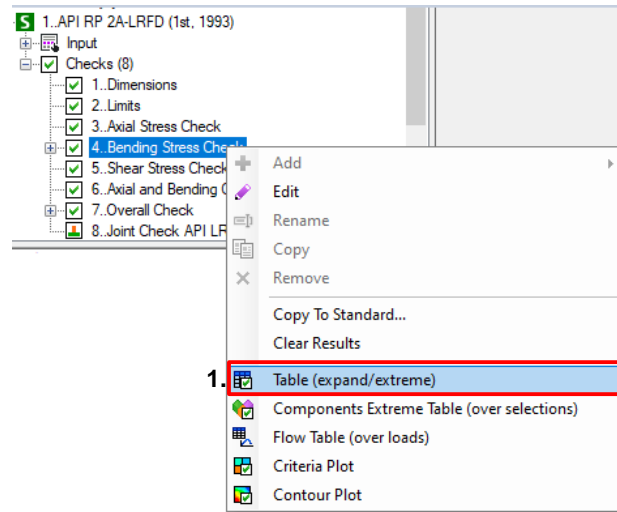
Extreme Options: **Detailed**

7

Press *Fill Table*

8

Press *OK*



Overall Check contains results from all checks. With the help of one table/plot it is possible to verify if the model passes the checks (< 1).
Overall Utilization Factor = worst Uf among all checks.

Criteria Plot for Bending Stress Check

1 Execute *Criteria Plot* from **Bending Stress Check** context menu

2 Press  to select load

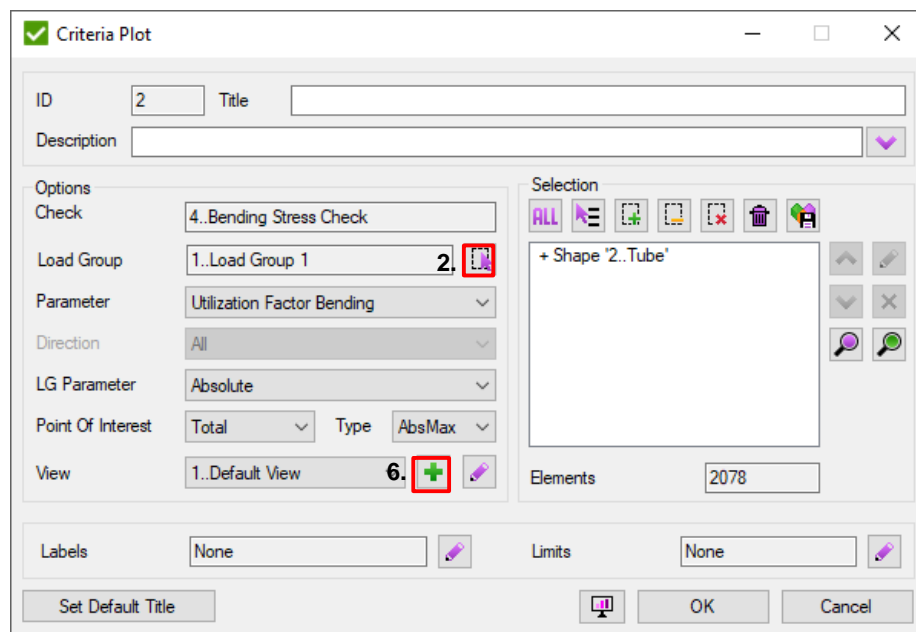
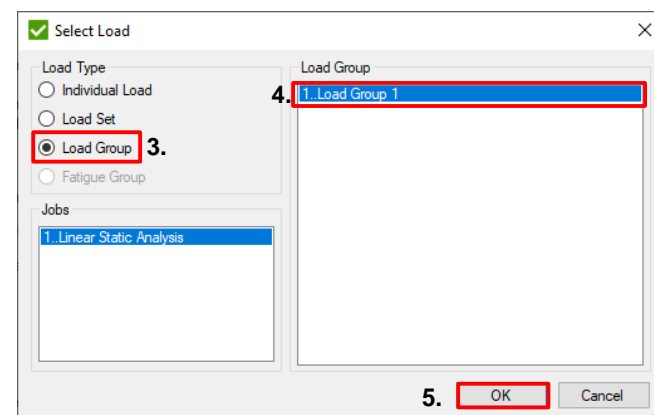
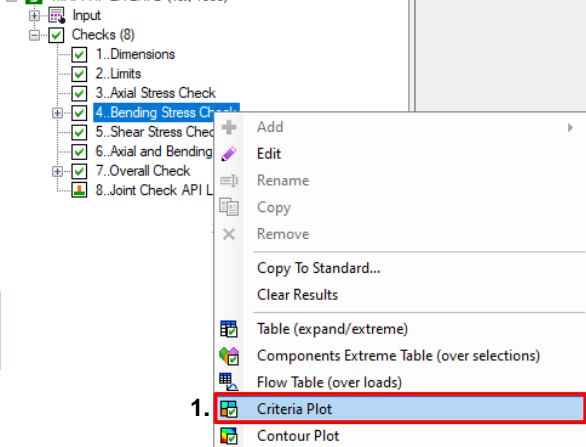
3 Load Type: **Load Group**

4 Load: **1..Load Group 1**

5 Press **OK**

6 Press to add view

1..API RP 2A-LRFD (1st, 1993)



Plot. Create View

- 1 Title: **Isometric**
- 2 Orient model in Simcenter as shown on the picture
- 3 Press *Get*
- 4 Color Display: **Banded**
- 5 Select: **Use local limits**. Max: **0.48**
- 6 Press *OK*

View

ID: 3 Title: **Isometric** 1.

Description:

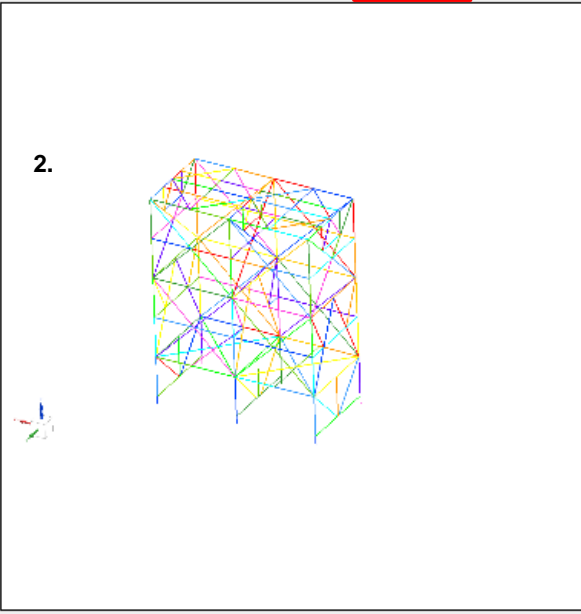
Location

Origin X: 2353.06 Origin Y: 7639.54 Origin Z: 629.61

Rotation Matrix

XX	-0.87	XY	-0.49	XZ	-0.03
YX	0.22	YY	-0.45	YZ	0.87
ZX	-0.44	ZY	0.75	ZZ	0.50

Scale: 1.27E-002 3. **Get** Show

2. 

Settings

Rendering Style: Shaded with Edge

Edges: External

Edges Color: Silver Gray

☒ Lighted

Color Display: 4. **Banded**

☐ Show Cross Section and Plate Thickness

☐ Show Deformation

☐ Show undeformed model

Legend Text Color: Deep Steel

☒ Automatic Font Scaling

Text Scale Factor:

Legend Header: Customized

Legend Position: Left

Legend Limits

☐ Use limits from legend settings

5. ☒ Use local limits

Mode: Min Max

Min: 0

Max: 0.48


Number of levels: 12

Format: General

6. **OK** Cancel

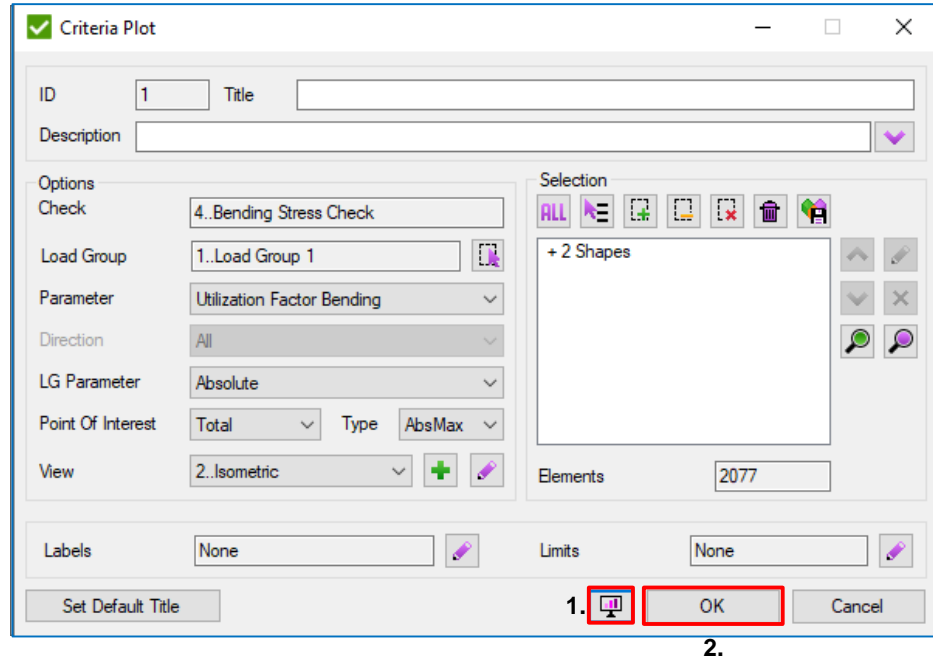
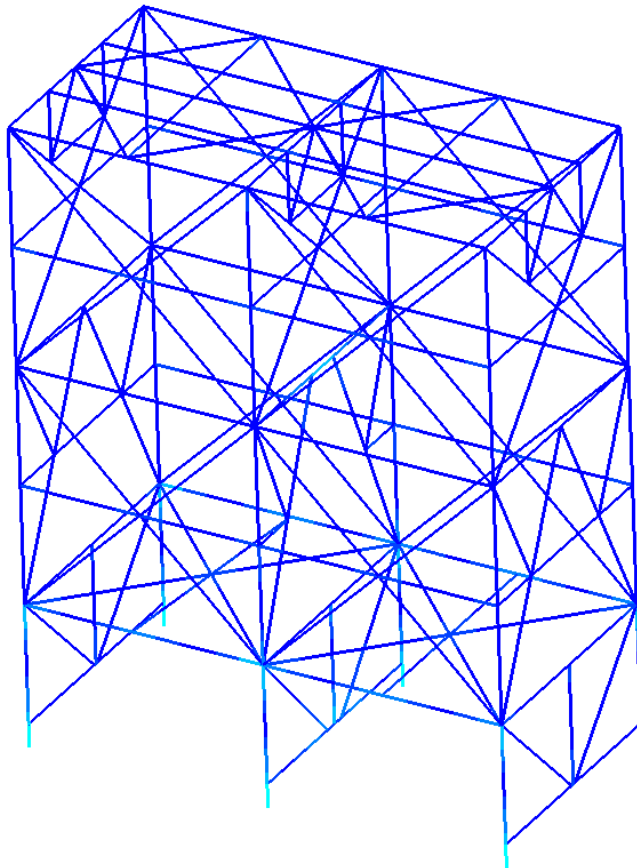
Display Plot

1

Press  to display plot

2

Press *OK*

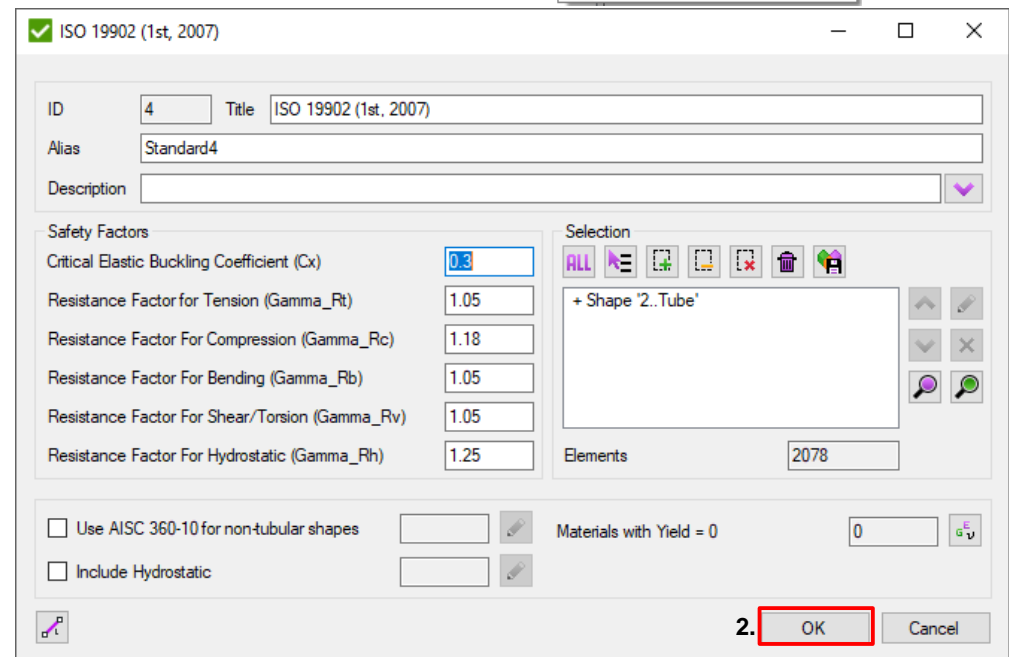
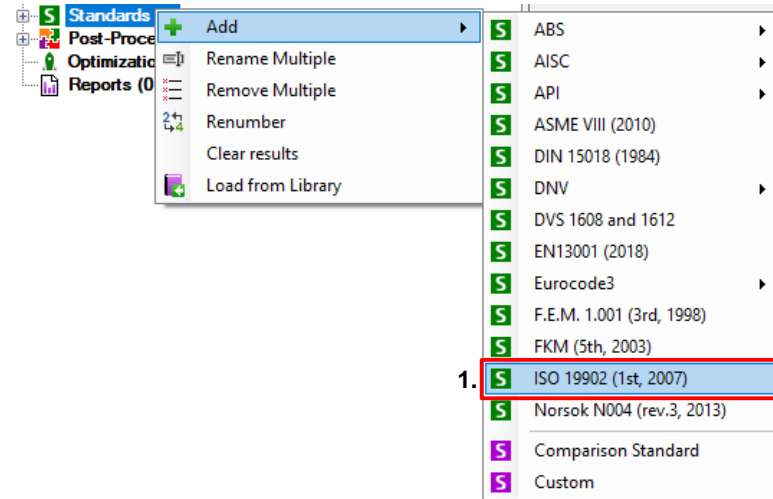


Add ISO 19902 standard

1 Execute *Standards* => *Add* => *ISO 19902* (1st, Dec 2007).

2 Press *OK*

ISO 19902 procedure is similar to API 2A RP. In overall check it is possible to verify if the structure passes all checks : Overall Utilization Factor = worst U_f among all checks < 1 .



C_x is the elastic critical buckling coefficient, see below;

The theoretical value of C_x for an ideal tubular is 0,6. However, a reduced value of $C_x = 0,3$ should be used in Equation (13.2-10) to account for the effect of initial geometric imperfections within the tolerance limits given in Clause 21. A reduced value of $C_x = 0,3$ is implicit in the value of f_{xe} used in Equations (13.2-8) and (13.2-9).

$\gamma_{R,t}$ is the partial resistance factor for axial tensile strength, $\gamma_{R,t} = 1,05$.

$\gamma_{R,c}$ is the partial resistance factor for axial compressive strength, $\gamma_{R,c} = 1,18$.

$\gamma_{R,b}$ is the partial resistance factor for bending strength, $\gamma_{R,b} = 1,05$;

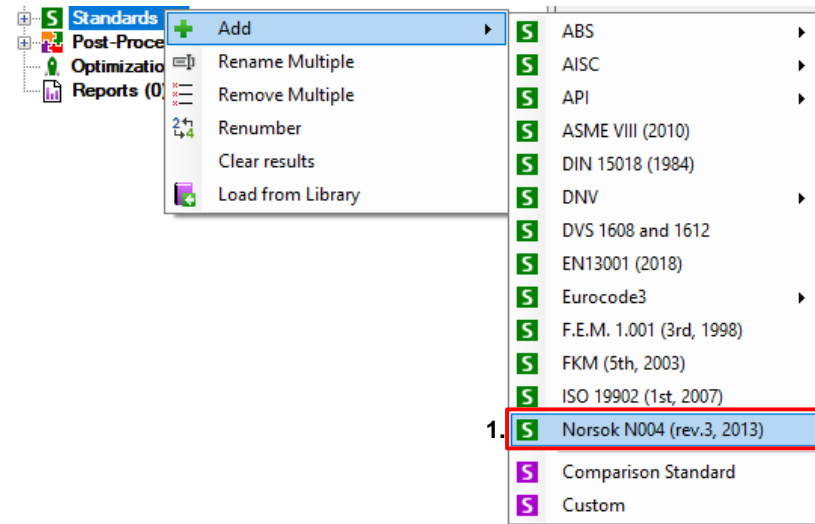
$\gamma_{R,v}$ is the partial resistance factor for shear strength, $\gamma_{R,v} = 1,05$;

$\gamma_{R,h}$ is the partial resistance factor for hoop buckling strength, $\gamma_{R,h} = 1,25$.

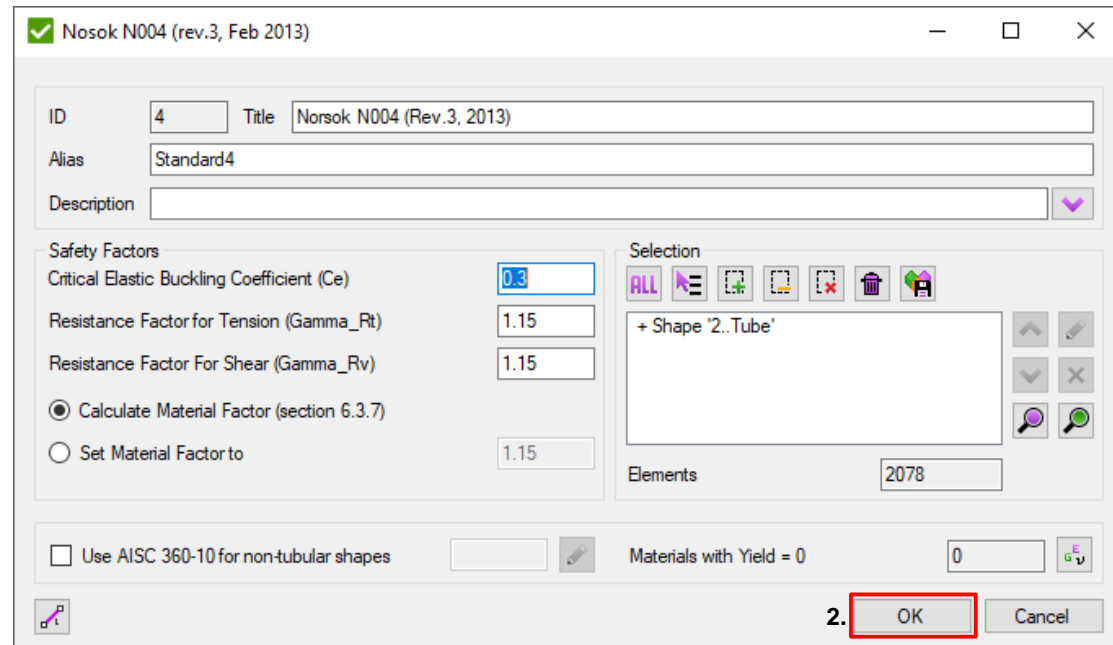
Add Norsok N004 standard

1 Execute *Standards* => *Add* => *Norsok N004 (rev.3, Feb 2013)*.

2 Press *OK* twice



Norsok N004 procedure is similar to API 2A RP. In overall check it is possible to verify if the structure passes all checks : Overall Utilization Factor = worst U_f among all checks < 1 .



Add Norsok N004 standard

$$\begin{aligned}
 C_e &= \text{critical elastic buckling coefficient} = 0.3 \\
 \gamma_{R,t} &= \text{material factor for tension} = 1.15 \\
 \gamma_{R,v} &= \text{material factor for shear} = 1.15 \\
 \gamma_M &= \text{see section 6.3.7} \\
 \gamma_M &= 1.15 \quad \text{for } \bar{\lambda}_s < 0.5 \\
 \gamma_M &= 0.85 + 0.60\bar{\lambda}_s \quad \text{for } 0.5 \leq \bar{\lambda}_s \leq 1.0 \\
 \gamma_M &= 1.45 \quad \text{for } \bar{\lambda}_s > 1.0
 \end{aligned} \tag{6.22}$$

where

$$\bar{\lambda}_s = \frac{|\sigma_{c,Sd}|}{f_{cl}} \cdot \lambda_c + \left(\frac{\sigma_{p,Sd}}{f_h} \right)^2 \cdot \lambda_h \tag{6.23}$$

where f_{cl} is calculated from Equation (6.6) or Equation (6.7) whichever is appropriate and f_h from Equation (6.17), Equation (6.18), or Equation (6.19) whichever is appropriate.

$$\lambda_c = \sqrt{\frac{f_y}{f_{cle}}}, \text{ and } \lambda_h = \sqrt{\frac{f_y}{f_{he}}} \tag{6.24}$$

f_{cle} and f_{he} is obtained from Equation (6.8), and Equation (6.20) respectively.

$\sigma_{p,Sd}$ is obtained from Equation (6.16) and

$$\sigma_{c,Sd} = \frac{N_{Sd}}{A} + \frac{\sqrt{M_{y,Sd}^2 + M_{z,Sd}^2}}{W} \tag{6.25}$$

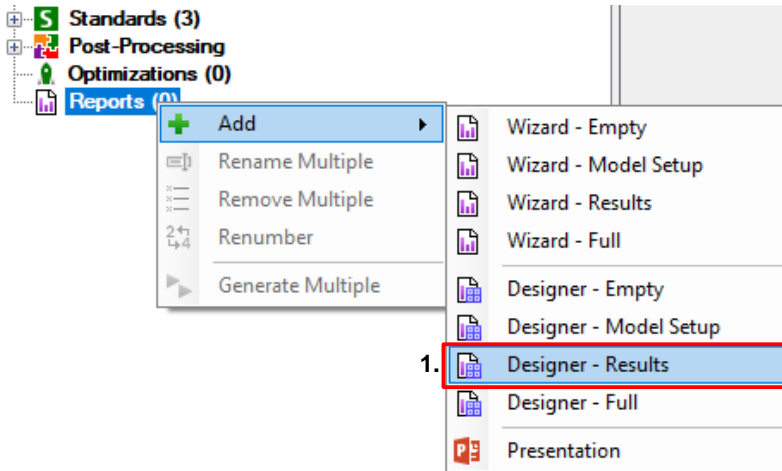
N_{Sd} is negative if in tension.

Report

1 Execute *Add - Designer - Results* from *Reports* context menu.

2 Exclude all checks

3 Press *Generate*



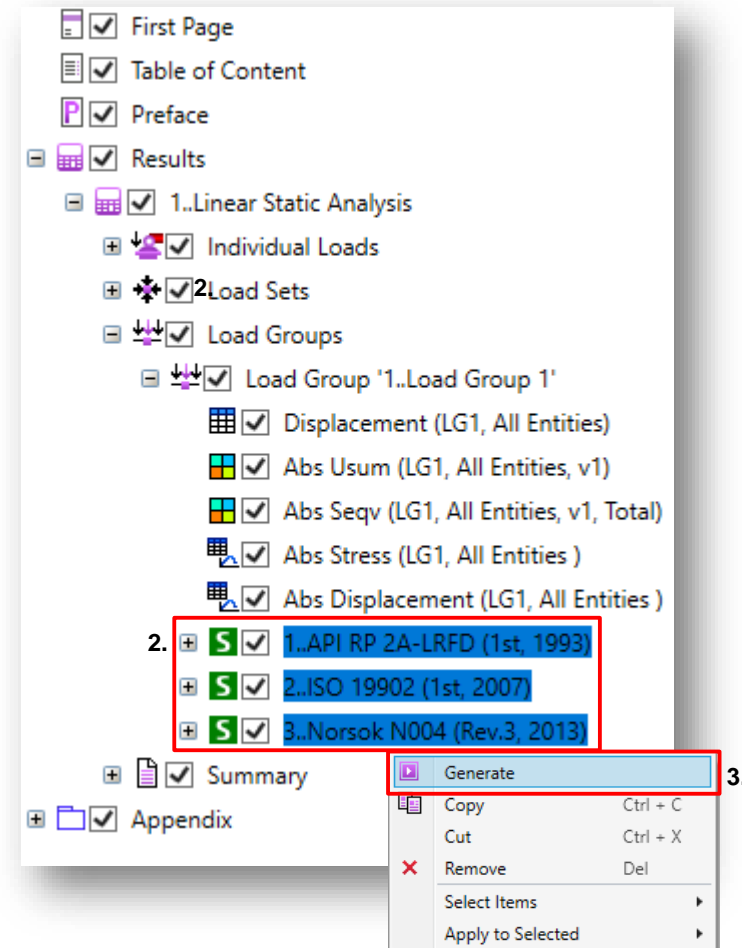
There are 4 templates of the reports:

Empty – only first page and preface items are included;

Model Setup – description of the model data (materials, properties, components, boundary conditions) is included;


Results – for each load extreme displacement tables, stress and displacement plots are included. Predefined tables: sum of reaction forces, stresses/displacements summary tables;

Full – Model Setup + Results + all tables created in Job.



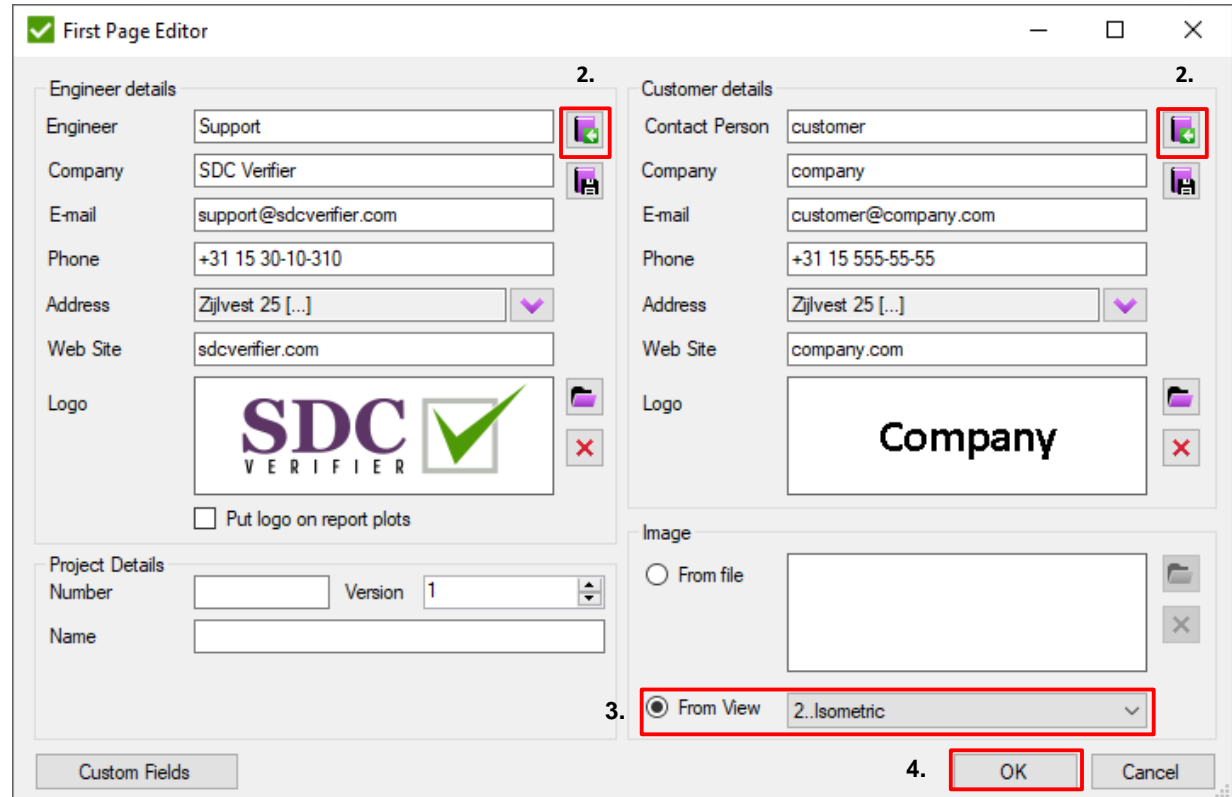
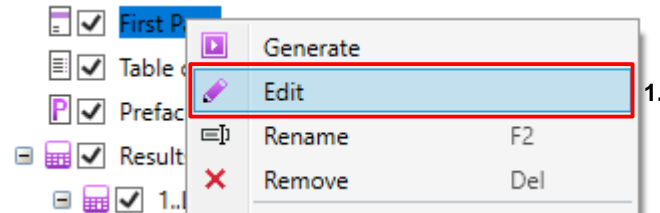
Report. First Page

1 Right click on *First Page* => *Edit*.

2 Press  to load engineer and customer info from library

3 Select Image *From View* and pick '*2..Isometric*'.

4 Press *OK*.



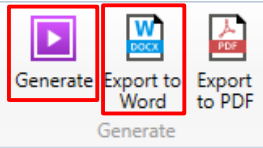
The 'First Page Editor' dialog box is shown. It contains several sections:

- Engineer details:** Fields for Engineer (Support), Company (SDC Verifier), E-mail (support@sdcverifier.com), Phone (+31 15 30-10-310), Address (Zijlvest 25 [...]), Web Site (sdcverifier.com), and Logo (SDC Verifier logo). A checkbox 'Put logo on report plots' is present.
- Customer details:** Fields for Contact Person (customer), Company (company), E-mail (customer@company.com), Phone (+31 15 555-55-55), Address (Zijlvest 25 [...]), Web Site (company.com), and Logo (Company logo).
- Project Details:** Fields for Number and Version (1), and Name.
- Image:** Radio buttons for 'From file' and 'From View'. The 'From View' option is selected, and a dropdown menu shows '2..Isometric' selected.

Buttons at the bottom include 'Custom Fields', 'OK', and 'Cancel'. Red boxes highlight the 'Load from library' icons in the Engineer and Customer details sections, the 'From View' radio button and '2..Isometric' dropdown, and the 'OK' button.

Report exported to Microsoft Word

Press  to generate complete report.



Press  to export to Word.

Norsok N004

ISO 19902

API 2A RP

First page

Report



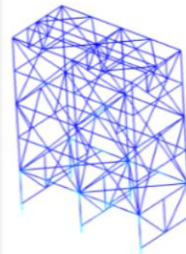
Prepared by:
SDC Verifier
+31 15 30-10-310
sdverifier.com
Zijlvest 25
2011 VB Haarlem
The Netherlands

Prepared for:
company
+31 15 555-55-55
company.com
Zijlvest 25
2011 VB Haarlem
The Netherlands

Engineer: Support
Customer: customer
Project Number:
Version: 1
Date: 19/01/2021

Check Selection	Check	Check
1	(S1) 4. Bending Stress Check	Shape '2. Tube'
Bending Stress [KPa]	Allowable Bending Stress [KPa]	Utilization Factor Bending
0.0e+0	300.0e+3	0.00
1500	313	1500
LS1	LSB	LS1
59.5e+3	330.3e+3	0.20
1720	1858	1720
LS4	LSB	LS4
59.5e+3	330.3e+3	0.20
1720	1858	1720
LS4	LSB	LS4

Bending (LG1, Shape '2. Tube', v2, Total)



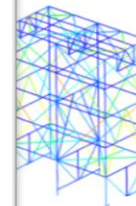
Bending Stress Check	Point	Total
(Group 1)	Parameter	Absolute Utilization Factor B
Tube	View	2. Isometric

Category	Displacement
Type	Extreme
Uz [mm]	Usum [mm]
0.4	-0.04
4.53	0.00
Rz	Ry
0.00	0.00
Rz	Rsum
0.00	0.00

It is used in calculations for the following standards: API RP 1.001 and Eurocode3.

Lead Group		LG1: Load Group 1		
Absolute Shear Uf	Absolute Shear Torsional Uf	Absolute Axial and Bending Uf	Overall Utilization Factor	
0.13	0.12	0.98	0.29	0.99

Shape '2. Tube', v1)

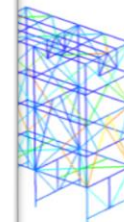


Load Group Selection Data Conversion

p 1

Load Group	LG1: Load Group 1		
Absolute Shear Uf	Absolute Shear Torsional Uf	Absolute Axial and Bending Uf	Overall Utilization Factor
0.13	1.07	0.31	1.07

Shape '2. Tube', v1)



Load Group Selection Data Conversion