



Tutorial

API 2A RP/ISO 19902/Norsok N004

30 Jan 2020
version 5.3

- ▶ In this tutorial, an API 2A RP, ISO 19902 and Norsok N004 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

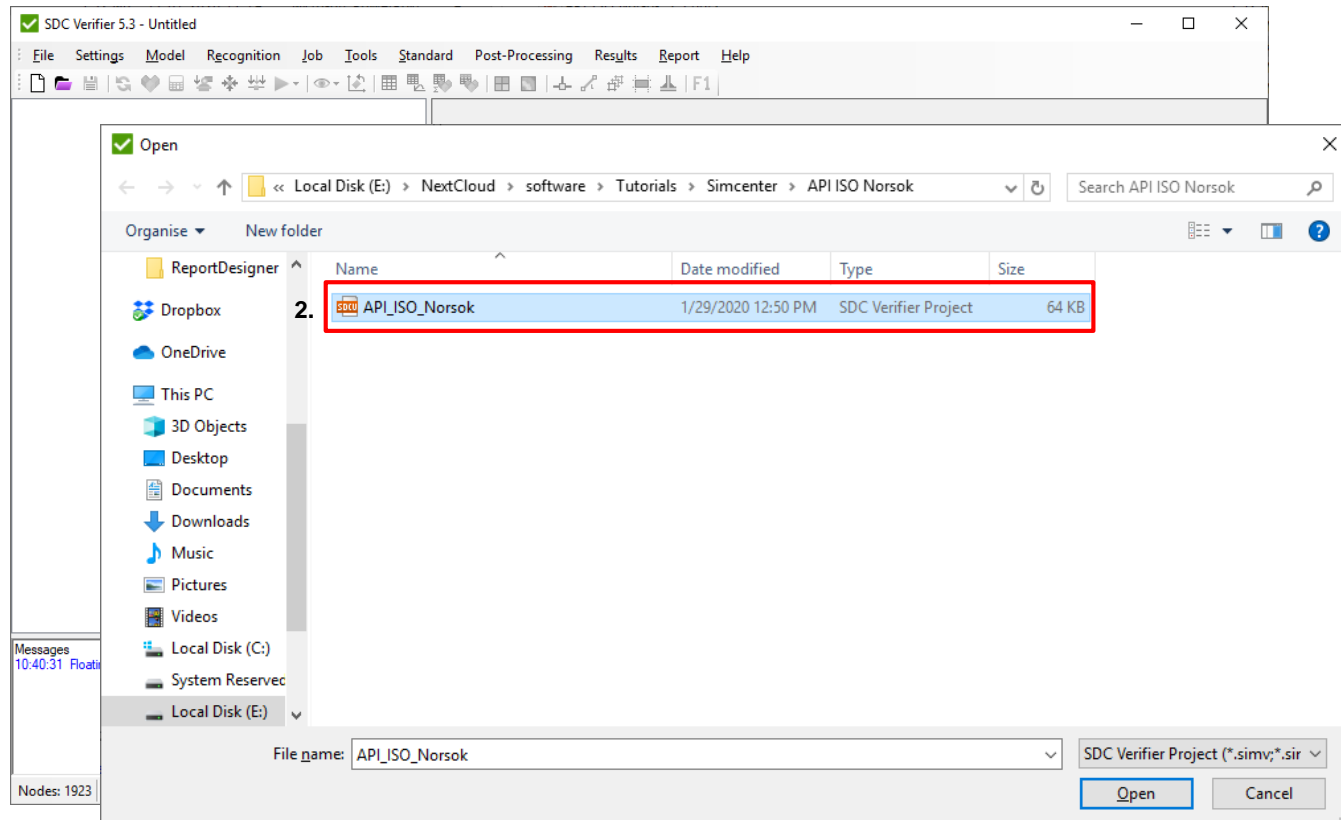
Launch **SDC Verifier** 

2

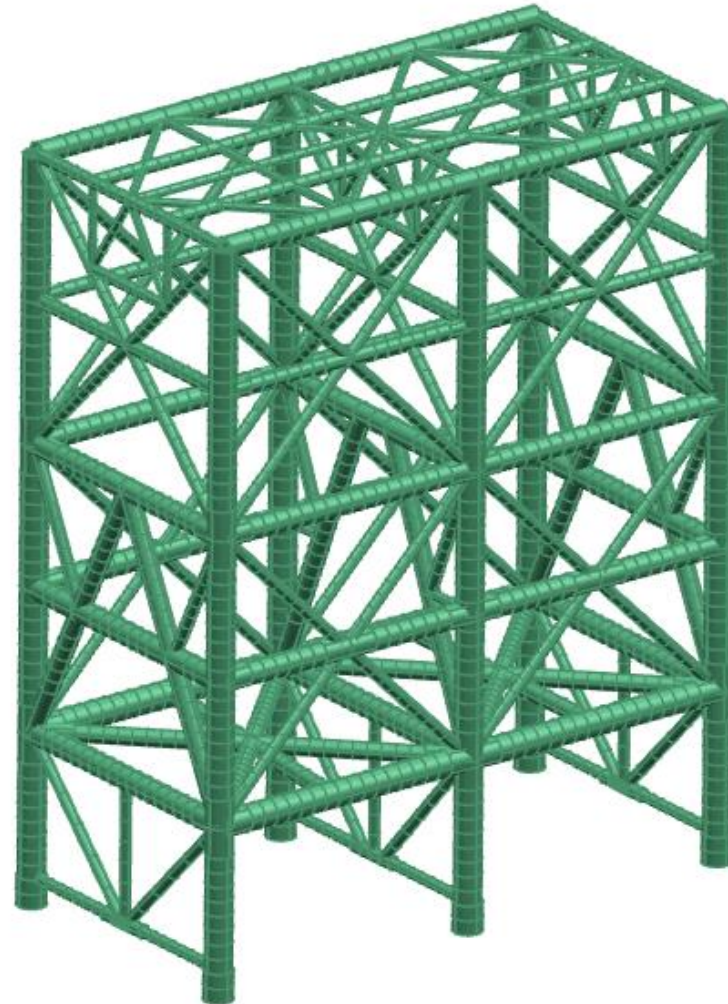
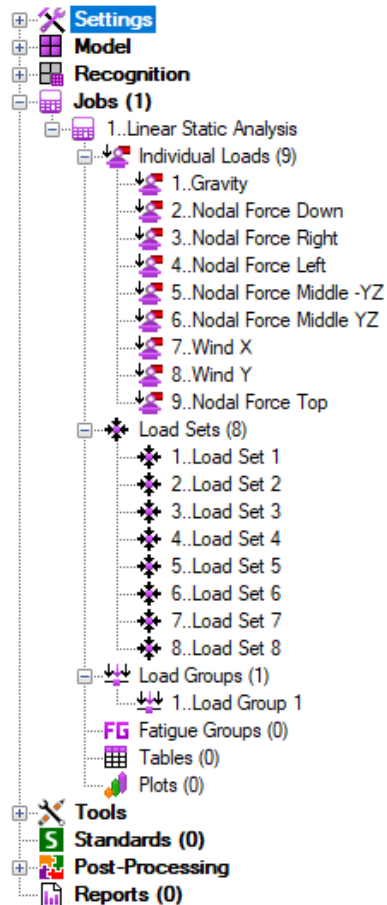
Execute *File - Open Project*.

3

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



Predefined project

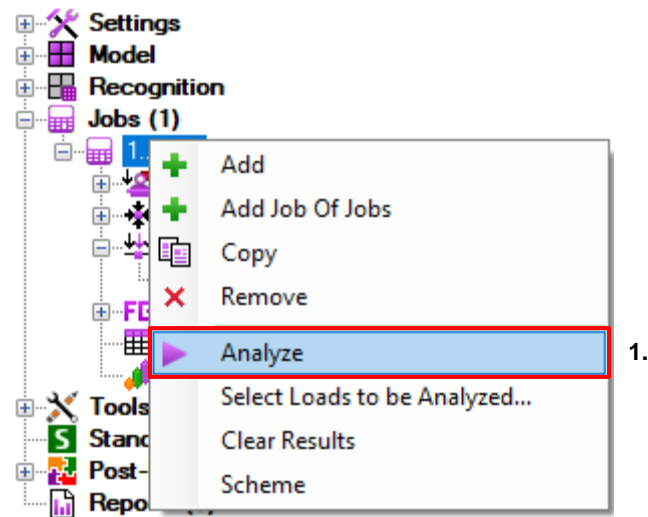


This tutorial uses predefined project with the following created data: individual loads, load sets and load group. The focus of this tutorial is to check the cylindrical members and create the basic report.

Analyze Job

1

Execute ► **Analyze** from *Linear Static Analysis* 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;

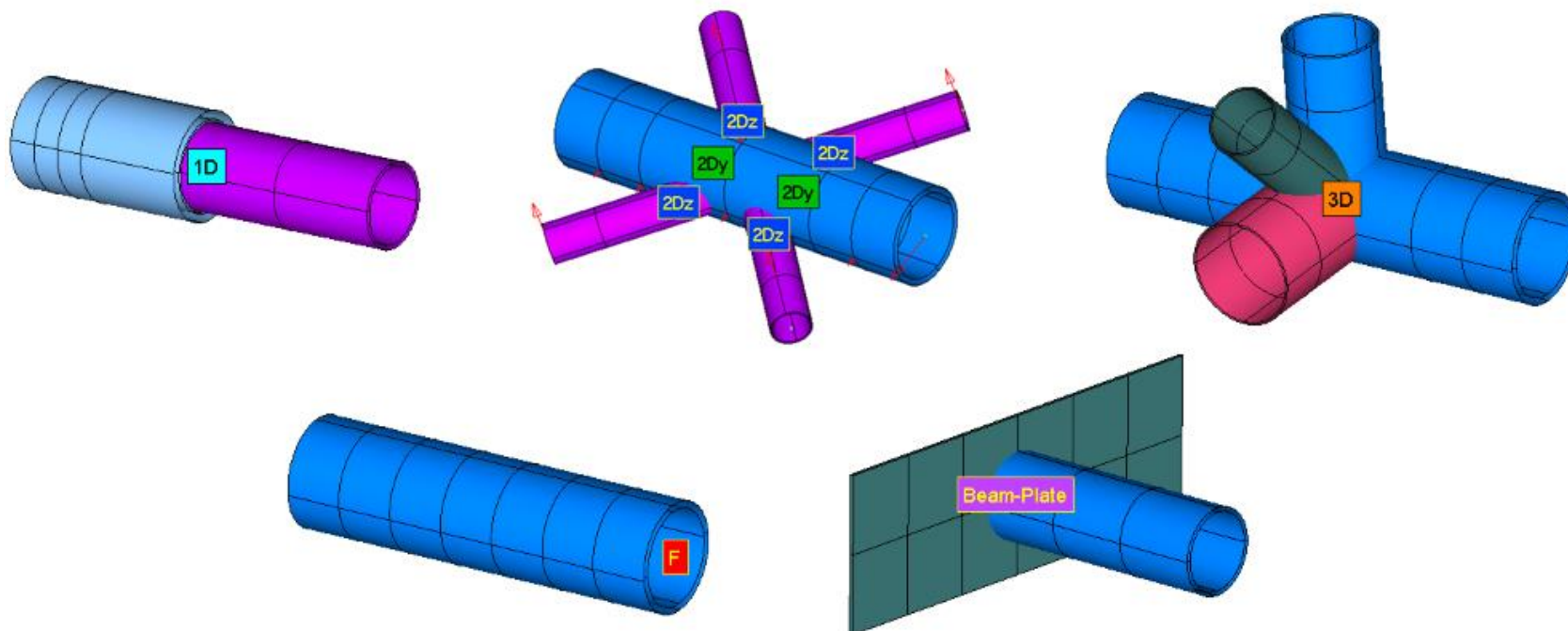
2D Joint – beam members connected in one plane;

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. Settings

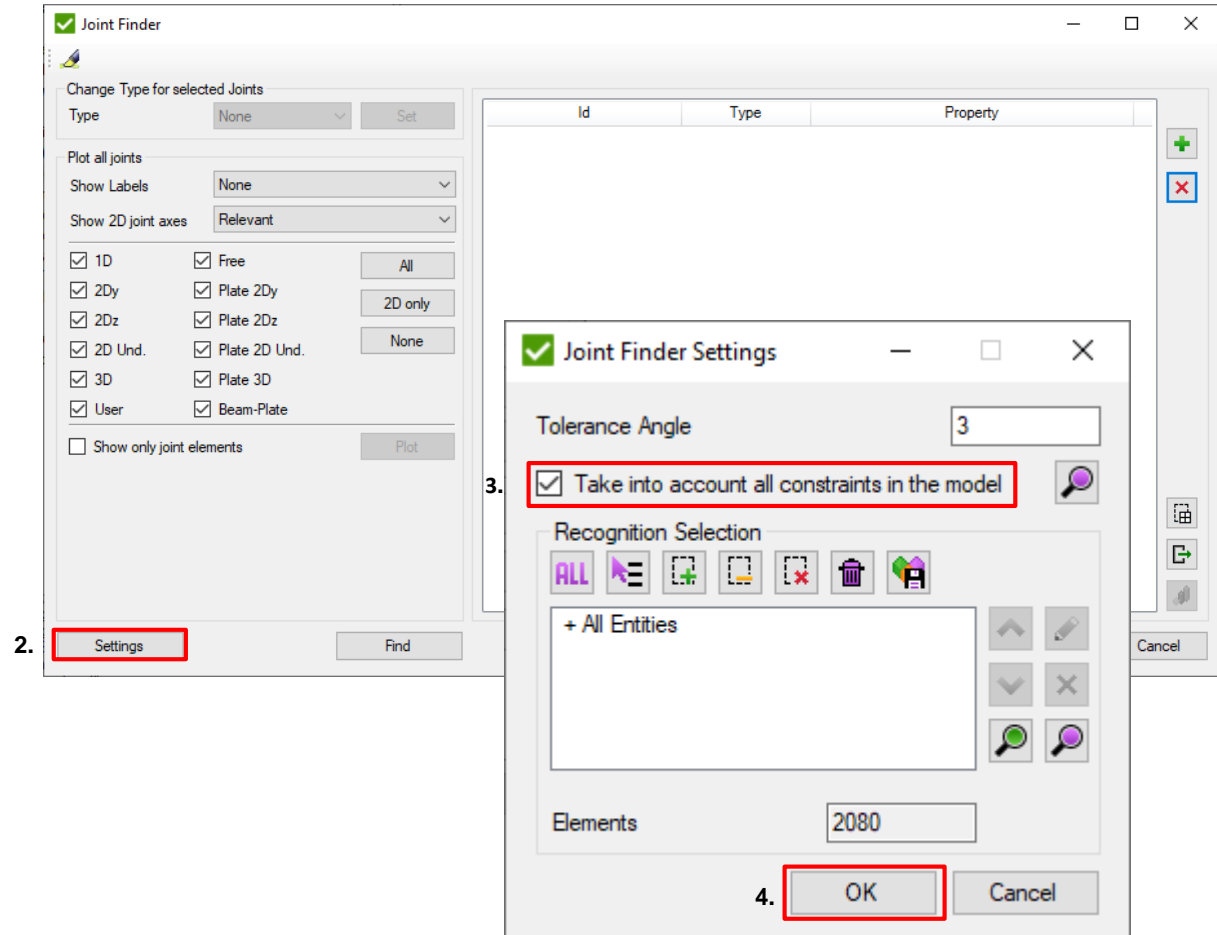
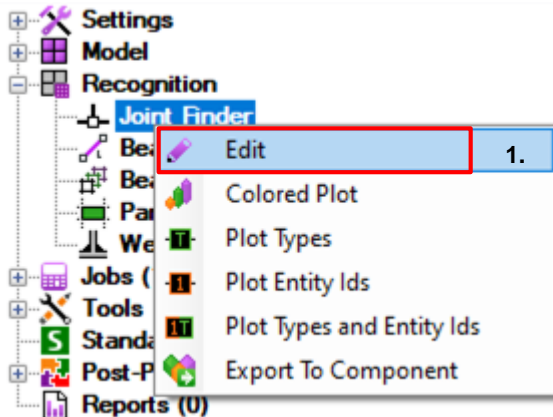
1 Execute *Edit* from *Joints* context menu

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.

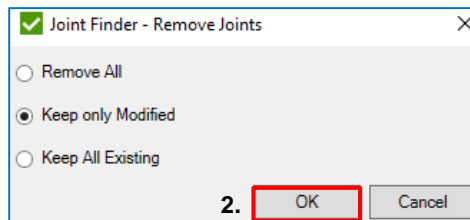
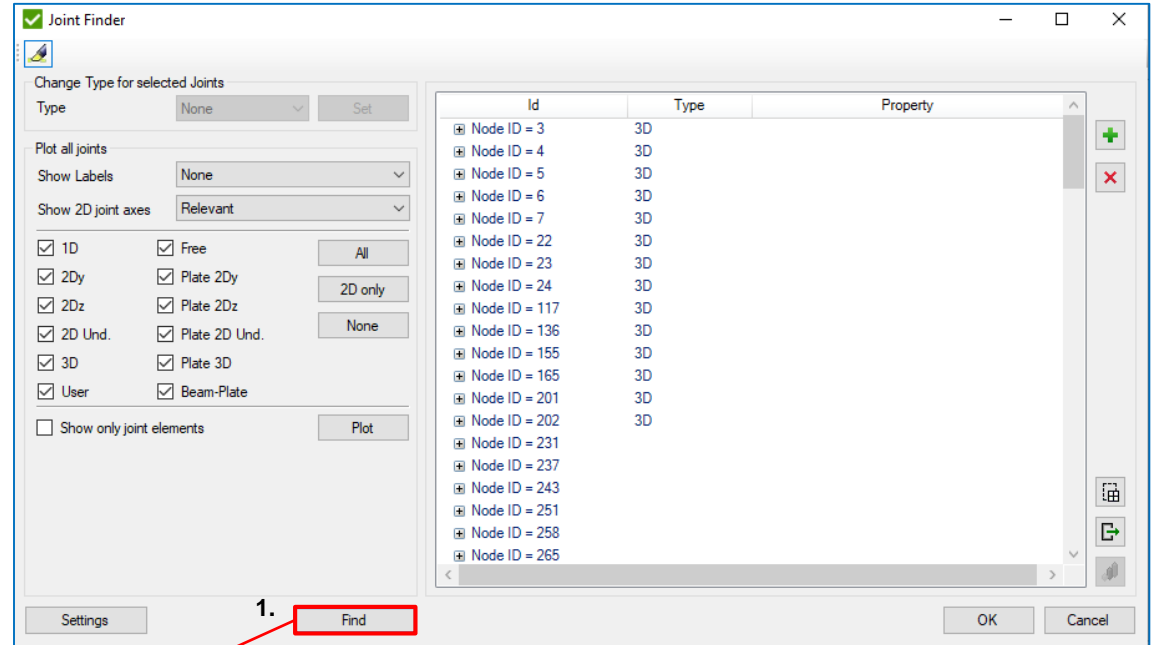
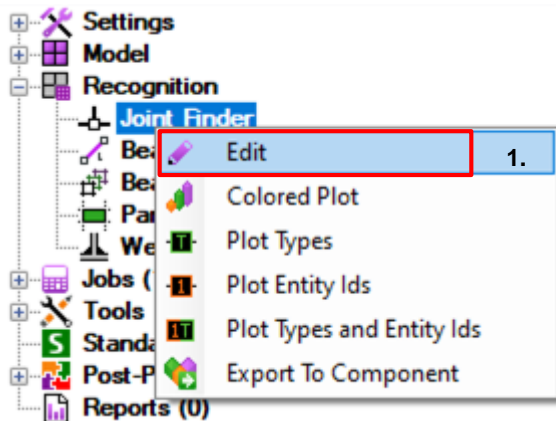


Joint Recognition. Find

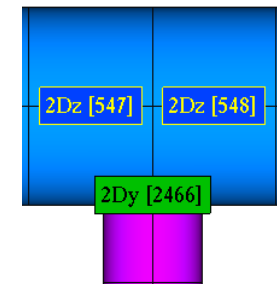
1 Press *Find*.

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



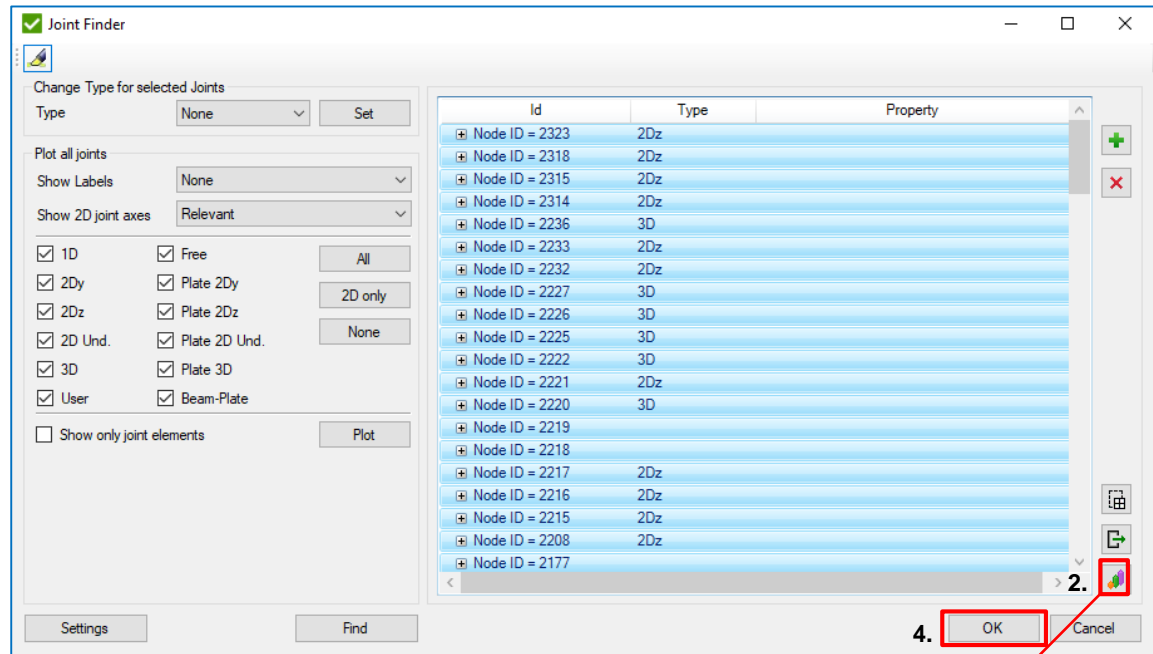
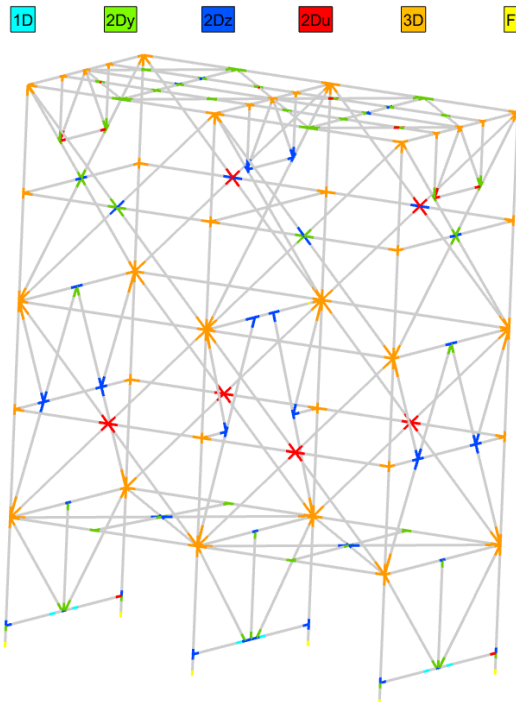
Joints Plot

1 Select All Joints (Ctrl+A).

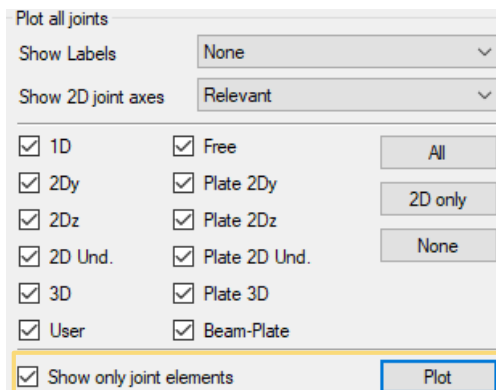
2 Press 

3 Press  Plot Joint Type in colors

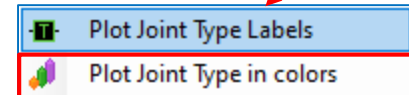
4 Press OK



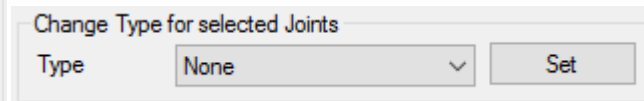
Plot Joints of specific type:



3.

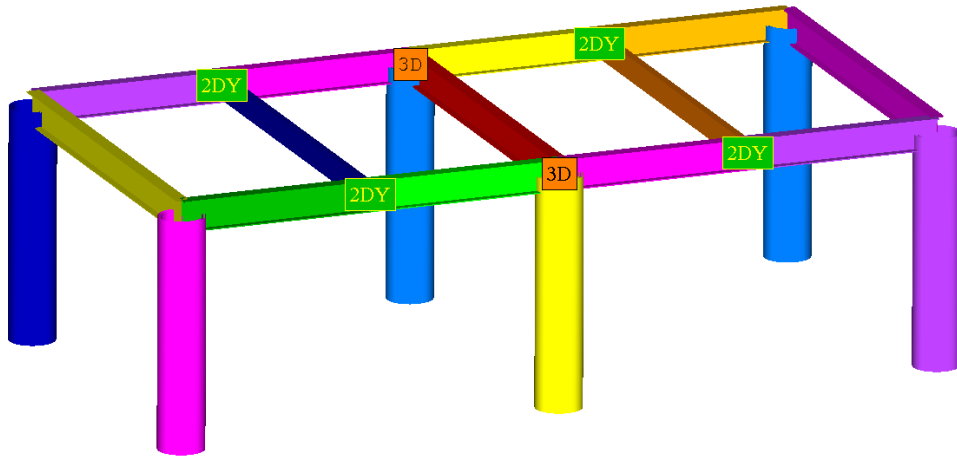


Modify Joint Type:

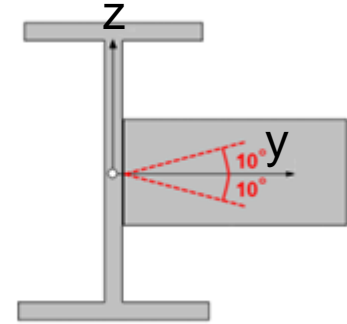


Beam Member Lengths in 2 directions

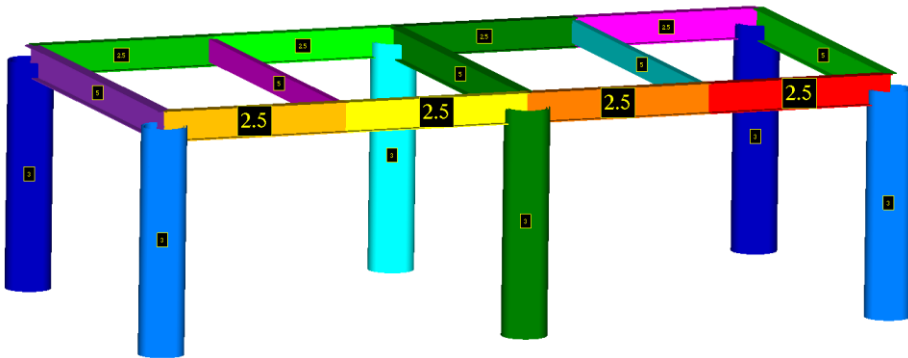
Beam Member Finder recognizes beam members and (buckling) lengths for different directions (Y, Z and Torsional).



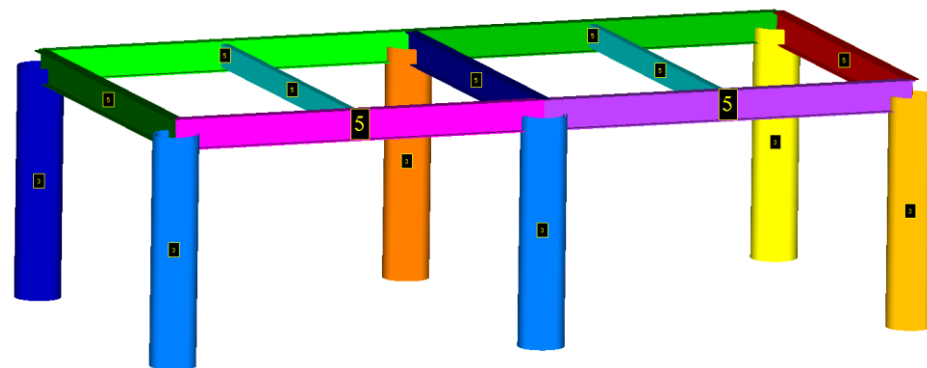
2DY
Joint



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



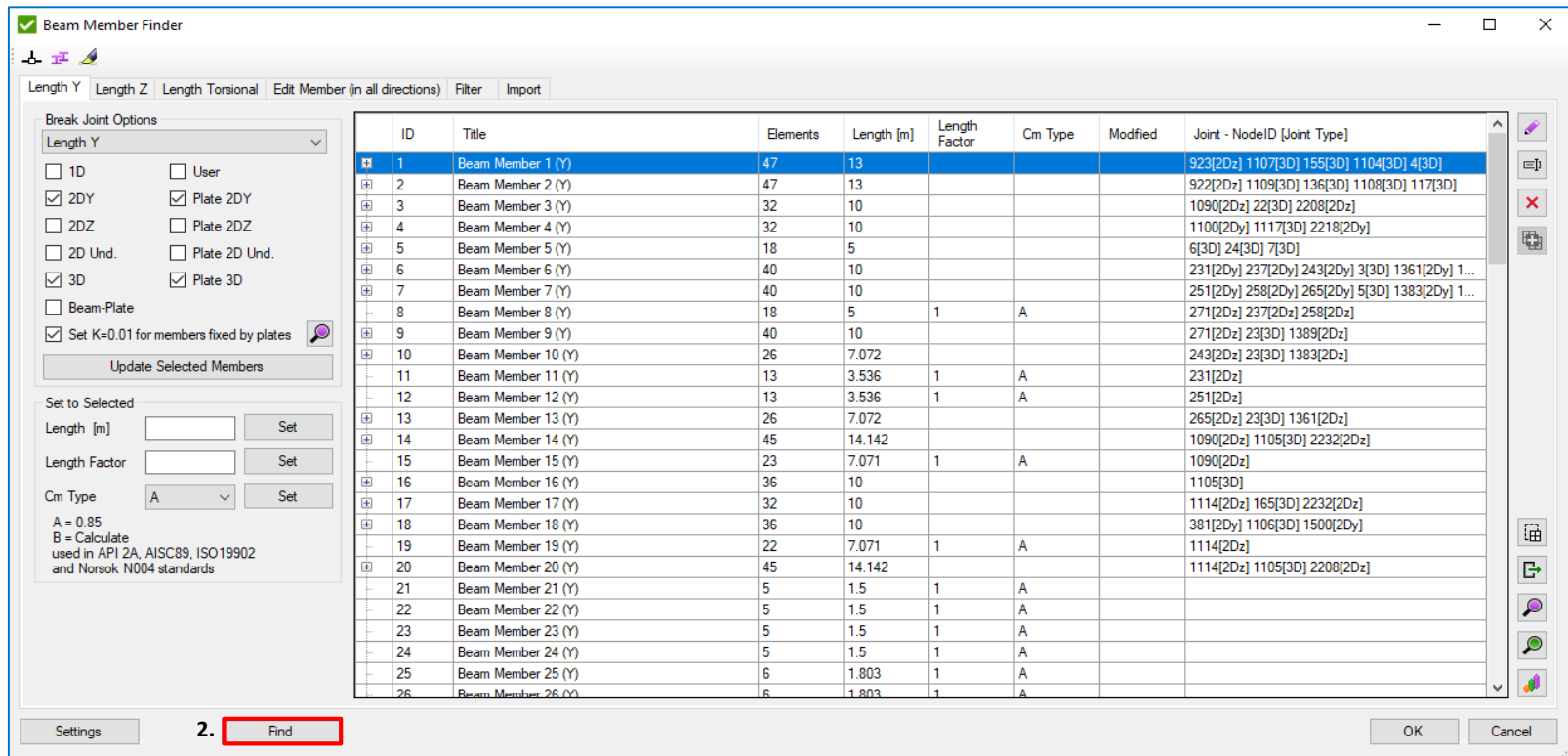
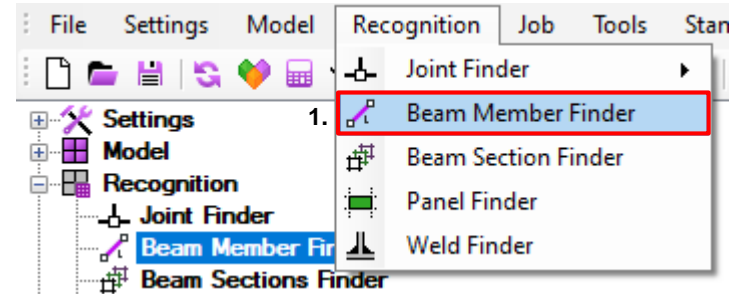
Length Z – 2 Beam Members with $L = 5$



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, ISO19902
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				922 1109[3D] 136[3D] 1108[3D] 117[3D]
2	Beam Member 2 (Y)	47	13000				923 1107[3D] 155[3D] 1104[3D] 4[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)	16	5000	1	A		2211[2Dz]
8	Beam Member 8 (Y)	16	5000	1	A		
9	Beam Member 9 (Y)	24	5000	1	A		2059[2Dz] 2318[2Dz] 2323[2Dz] 2057[1D] 2044[1D]
10	Beam Member 10 (Y)	18	5000	1	A		958[2Dz] 942[2Dz] 957[2Dz] 956[1D] 943[1D]
11	Beam Member 11 (Y)	32	10000				2208[2Dy] 22[3D] 1090[2Dy]
11.1	Beam Member 11.1 (Y)	8	2500	1	A		
11.2	Beam Member 11.2 (Y)	8	2500	1	A		
11.3	Beam Member 11.3 (Y)	8	2500	1	A		
11.4	Beam Member 11.4 (Y)	8	2500	1	A		
12	Beam Member 12 (Y)	32	10000				2221[2Dz] 201[3D] 1103[2Dz]
13	Beam Member 13 (Y)	16	5000	1	A		1093[2Dz]
14	Beam Member 14 (Y)	24	5000	1	A		926[1D] 2314[2Dz] 941[2Dz] 2315[2Dz] 939[1D]
15	Beam Member 15 (Y)	32	10000				2218[2Dy] 1117[3D] 1100[2Dy]
16	Beam Member 16 (Y)	32	10000				2219[2Dy] 1116[3D] 1101[2Dy]
17	Beam Member 17 (Y)	18	5000				1142[3D] 1125[3D] 1124[3D]
18	Beam Member 18 (Y)	40	10000				1349[2Dy] 1355[2Dy] 1361[2Dy] 3[3D] 243[2Dy]
19	Beam Member 19 (Y)	40	10000				1369[2Dy] 1376[2Dy] 1383[2Dy] 5[3D] 265[2Dy]
20	Beam Member 20 (Y)	7	2795.085	1	A		
21	Beam Member 21 (Y)	7	2795.085	1	A		
22	Beam Member 22 (Y)	18	5000				67[3D] 24[3D] 7[3D]

Settings Find 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

11	Beam Member 11 (Y)	32	10000				2208[2Dy] 22[3D] 1090[2Dy]
11.1	Beam Member 11.1 (Y)	8	2500	1	A		
11.2	Beam Member 11.2 (Y)	8	2500	1	A		
11.3	Beam Member 11.3 (Y)	8	2500	1	A		
11.4	Beam Member 11.4 (Y)	8	2500	1	A		



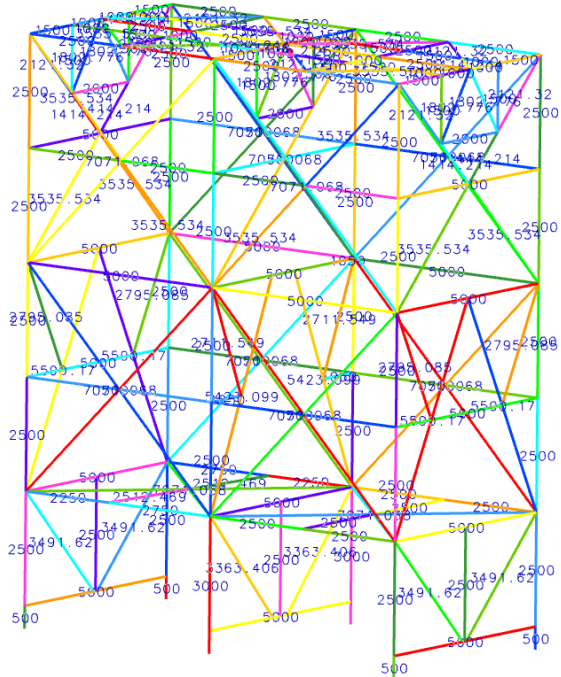
Beam Member's Length Plot

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
☒ 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, ISO19902
and Norsok N004 standards

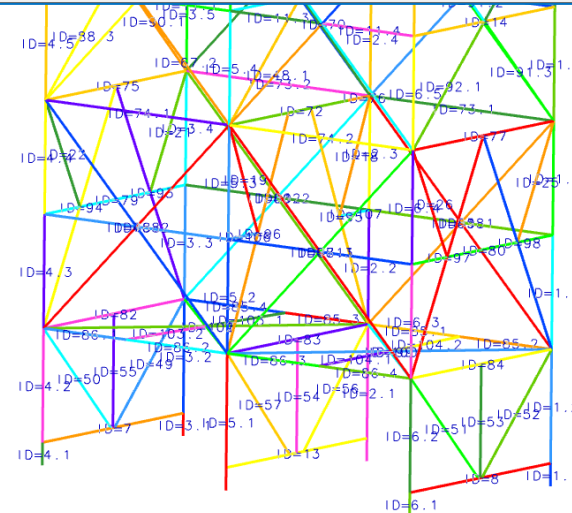
ID	Title	Elements	Length [mm]	Length Factor	Cm Type	Modified	Joint - NodeID [Joint Type]
1	Beam Member 1 (Y)	47	13000				922 1109[3D] 136[3D] 1108[3D] 117[3D]
2	Beam Member 2 (Y)	47	13000				923 1107[3D] 155[3D] 1104[3D] 4[3D]
3	Beam Member 3 (Y)	47	13000				2041 2228[3D] 1273[3D] 2222[3D] 1122[3D]
4	Beam Member 4 (Y)	47	13000				2040 2227[3D] 1254[3D] 2226[3D] 1235[3D]
5	Beam Member 5 (Y)	47	13000				924[2Dy] 1106[3D] 165[3D] 1105[3D] 22[3D]
6	Beam Member 6 (Y)	47	13000				921[2Dy] 1111[3D] 202[3D] 1110[3D] 201[3D]
7	Beam Member 7 (Y)	16	5000	1	A		2211[2Dy]
8	Beam Member 8 (Y)	16	5000	1	A		
9	Beam Member 9 (Y)	24	5000	1	A		2059[2Dy] 2318[2Dy] 2323[2Dy] 2057[1D] 2044[1D]
10	Beam Member 10 (Y)	18	5000	1	A		958[2Dy] 942[2Dy] 957[2Dy] 956[1D] 943[1D]
11	Beam Member 11 (Y)	32	10000				2208[2Dy] 22[3D] 1090[2Dy]
12	Beam Member 12 (Y)	32	10000				2221[2Dy] 201[3D] 1103[2Dy]
13	Beam Member 13 (Y)	16	5000	1	A		1093[2Dy]
14	Beam Member 14 (Y)	24	5000	1	A		936[1D] 2314[2Dy] 941[2Dy] 2315[2Dy] 939[1D]
15	Beam Member 15 (Y)	32	10000				2218[2Dy] 1117[3D] 1100[2Dy]
16	Beam Member 16 (Y)	32	10000				2219[2Dy] 1116[3D] 1101[2Dy]
17	Beam Member 17 (Y)	18	5000				1142[3D] 1125[3D] 1124[3D]
18	Beam Member 18 (Y)	40	10000				1349[2Dy] 1355[2Dy] 1361[2Dy] 3[3D] 243[2Dy]
19	Beam Member 19 (Y)	40	10000				1369[2Dy] 1376[2Dy] 1383[2Dy] 5[3D] 265[2Dy]
20	Beam Member 20 (Y)	7	2795.085	1	A		
21	Beam Member 21 (Y)	7	2795.085	1	A		
22	Beam Member 22 (Y)	18	5000				6[3D] 24[3D] 7[3D]
23	Beam Member 23 (Y)	7	2711.549	1	A		
24	Beam Member 24 (Y)	7	2711.549	1	A		
25	Beam Member 25 (Y)	7	2795.085	1	A		









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

3.

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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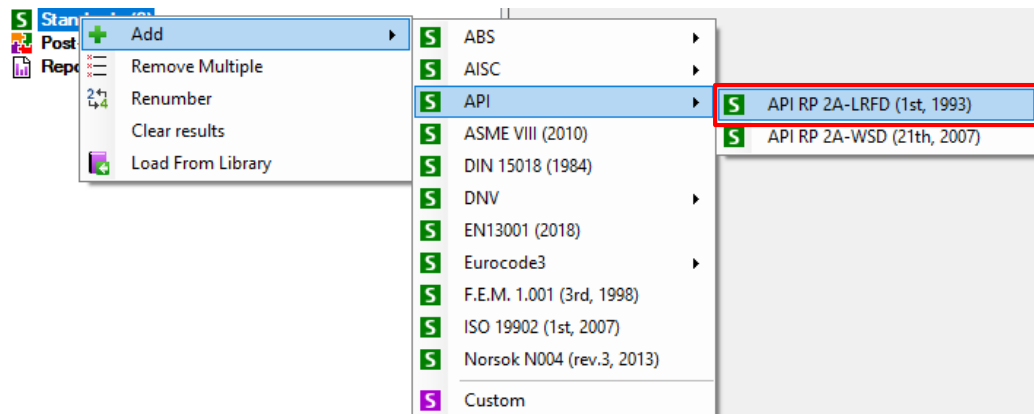
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Add API RP 2A-LRFD standard

1

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



1.

SECTION D

CYLINDRICAL MEMBER DESIGN

C_x = critical elastic buckling coefficient

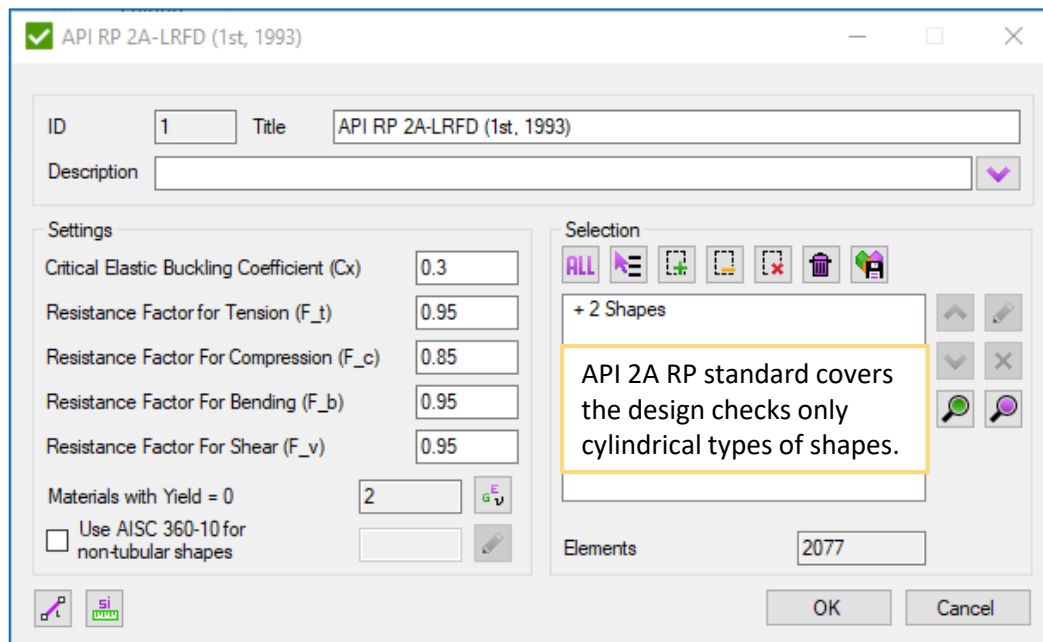
The theoretical value of C_x is 0.6. However, a reduced value of $C_x = 0.3$ is recommended for use in Equation D.2.2-3 to account for the effect of initial geometric imperfections within API Spec 2B tolerance limits, Reference D2.

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



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

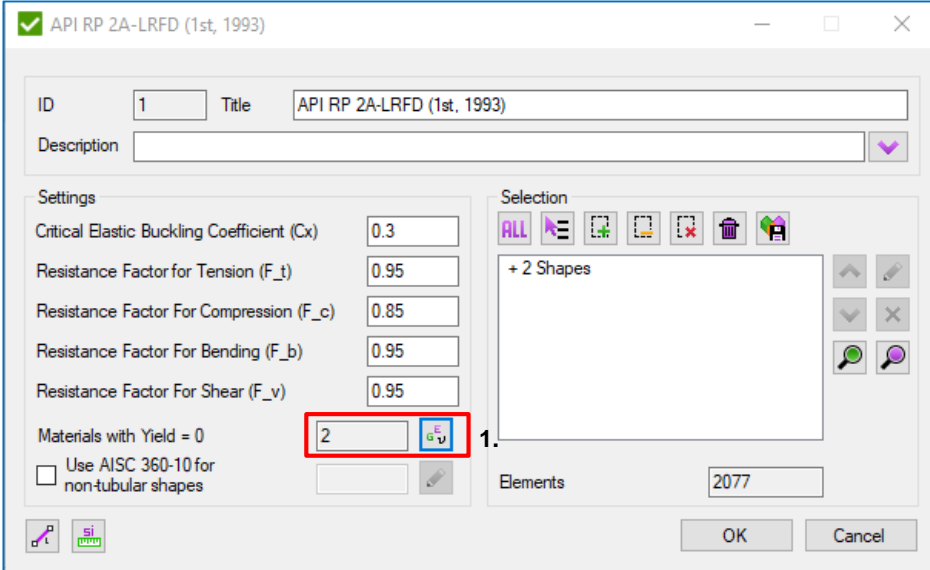
Yield Stress: **240e+3 [kPa]**

5

Press Set

6

Press OK



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

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

Description:

Settings


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

Materials with Yield = 0: 2 

☐ Use AISC 360-10 for non-tubular shapes

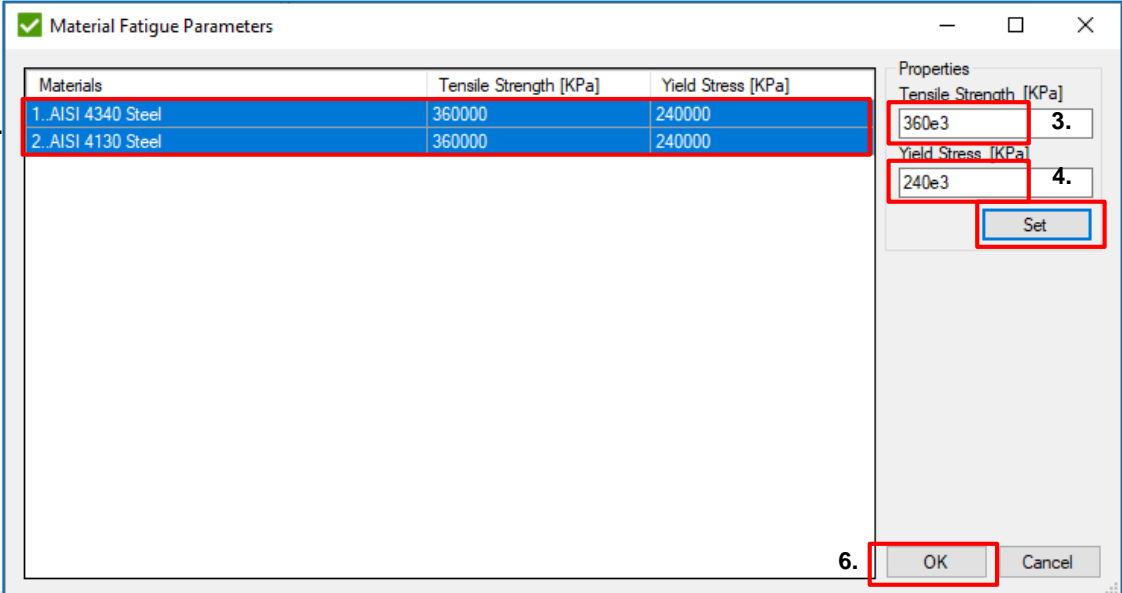
Selection

+ 2 Shapes

Elements: 2077

OK Cancel

2.



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 3.

Yield Stress [KPa]: 240e3 4.


Set 5.


OK Cancel 6.


API RP 2A Standard is applicable to stiffened and unstiffened cylinders having $t \geq 6\text{mm}$, $D / t < 120$ and Yield Stress $< 414\text{ MPa}$. To validate this condition unit system used in the model should be specified in SDC Verifier.




Parameter = RequirementsValid (Requirements Valid)

All: if((Units.GetInMillimeters(Thickness) ≥ 6) and (Units.GetInMPa(Yield) < 414) and (D / Thickness < 300), yes, no)


By default MKS (Meter/Kg/Second) unit system is used. To change unit system press 

Materials with Yield = 0 

☐ Use AISI 360-10 for non-tubular shapes 

There are 7 predefined Unit Systems: MKS; MTS; MmKS; MmTS; MmKMs; IPS and FPS. Custom Unit System can be used in specific cases as well.

 Unit System

Unit System: **MKS (Meter/Kg/Second)** (selected)

Description: **MKS (Meter/Kg/Second)**

Length: **Meter**

Weight: **Kilogram**

Time: **Second**

Force: **Newton**

Stress: **Pa**

Buttons: Set as Default, OK, Cancel

In case the standard cannot perform verification of the model the results will display the value = **12345678**.

All (All Entities)


Standard	1..API 2A RP		Check	7..Overall Check	
Individual Load	1..Gravity -9.81.Legs.Fixed		Selection	All Entities	
Extreme	Absolute Axial Uf	Absolute Bending Uf	Absolute Shear Uf	Absolute Axial and Bending Uf	Overall Utilization Factor
Minimum	12345678.00	12345678.00	12345678.00	12345678.00	12345678.00
Maximum	12345678.00	12345678.00	12345678.00	12345678.00	12345678.00
Absolute	12345678.00	12345678.00	12345678.00	12345678.00	12345678.00

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

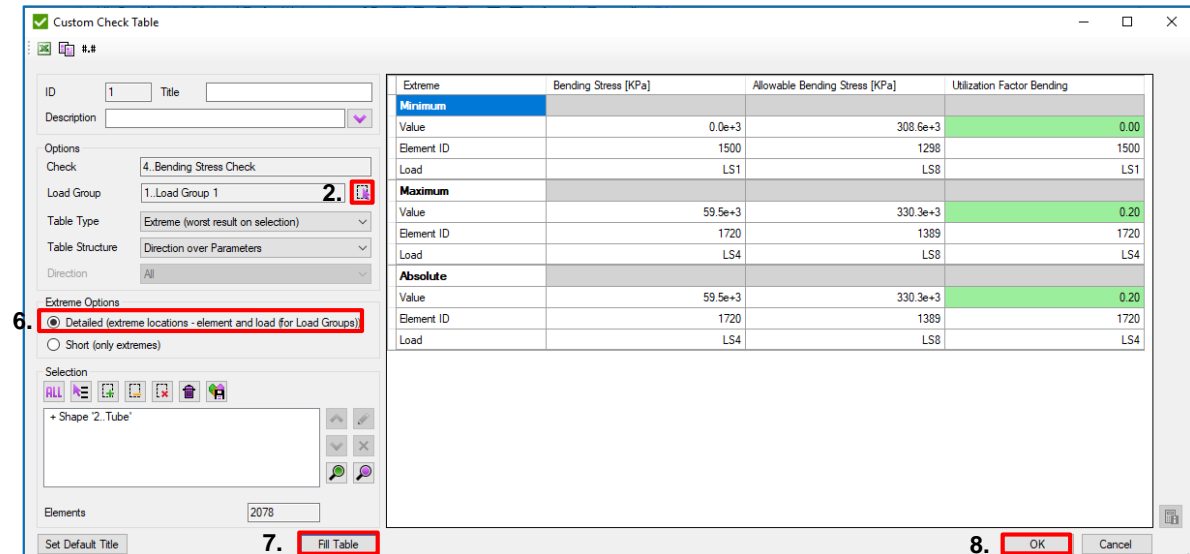
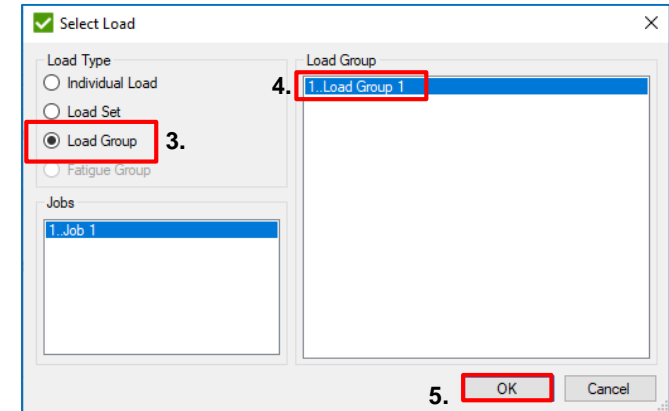
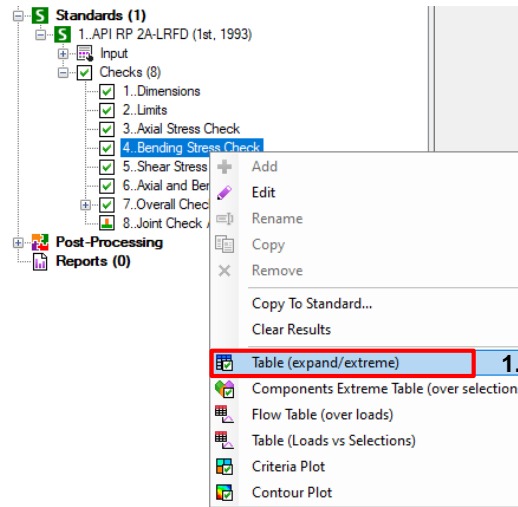
Extreme Options: **Detailed**

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

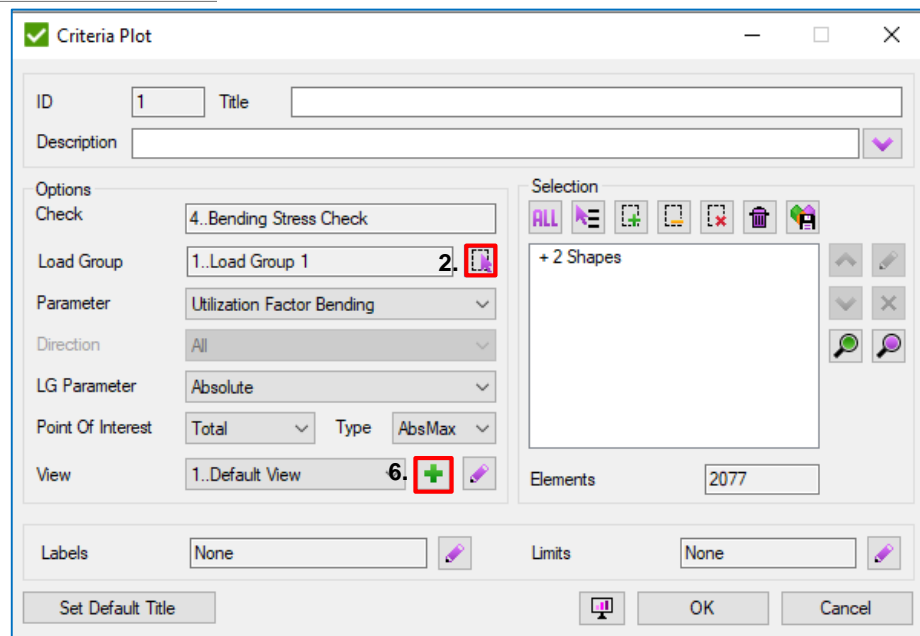
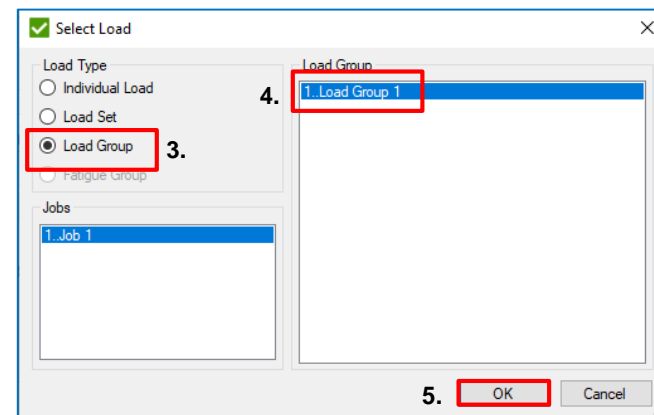
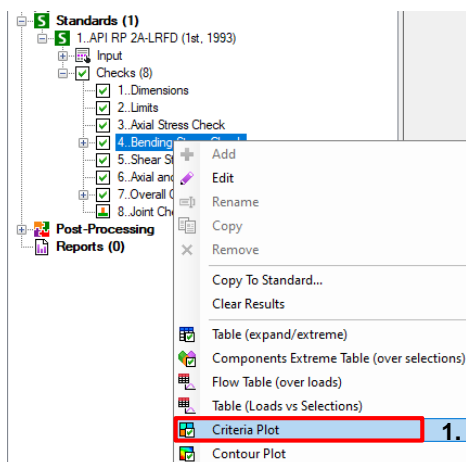
2 Press  to select load

3 Load Type: **Load Group**

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

5 Press *OK*

6 Press to add view



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*

Add/Edit View

1.

ID 2 Title **Isometric**

Description

Location

Origin X 2445.65 Origin Y 6933.56 Origin Z 1400.26

Rotation Matrix

XX	-0.77	XY	-0.64	XZ	-0.05
YX	0.29	YY	-0.42	YZ	0.86
ZX	-0.57	ZY	0.65	ZZ	0.50

Scale 1.18E-002

3. **Get** Show

2.

5.

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 Right

Get Show

Legend Limits

☐ Use limits from legend settings

☒ Use local limits

Mode Min Max

Min 0

Max 0.48

Number of levels 12


Format General

6. **OK** Cancel

Preview

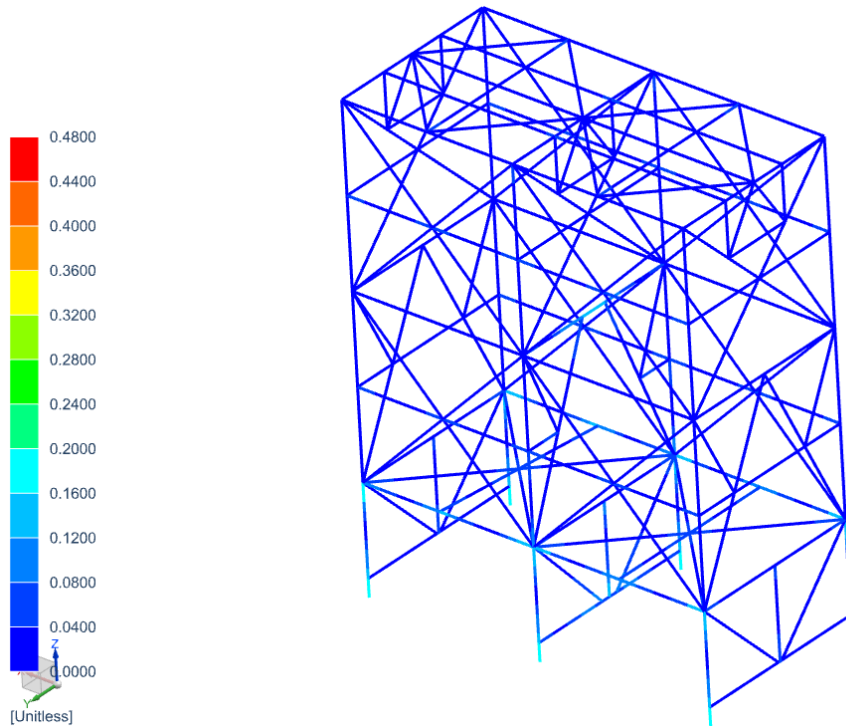
Display Plot

1

Press  to display plot

2

Press *OK*



☒ Criteria Plot

ID: 1 Title:

Description:

Options

Check: 4..Bending Stress Check

Load Group: 1..Load Group 1

Parameter: Utilization Factor Bending

Direction: All

LG Parameter: Absolute

Point Of Interest: Total Type: AbsMax

View: 2..Isometric

Labels: None


Limits: None

Selection

+ 2 Shapes

Elements: 2077

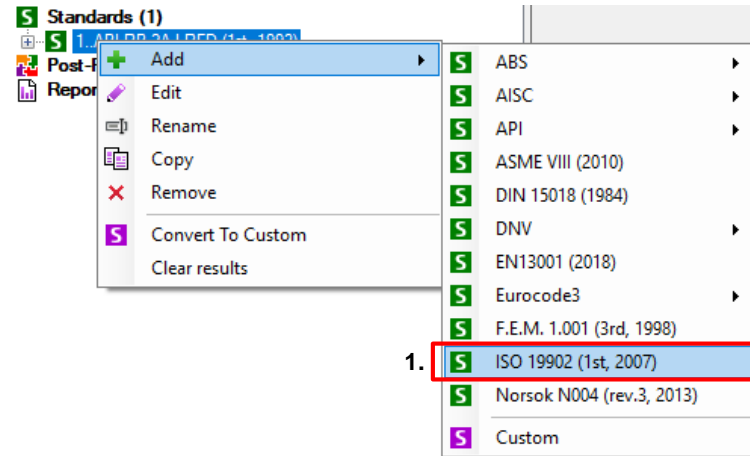
Set Default Title

1.  2.

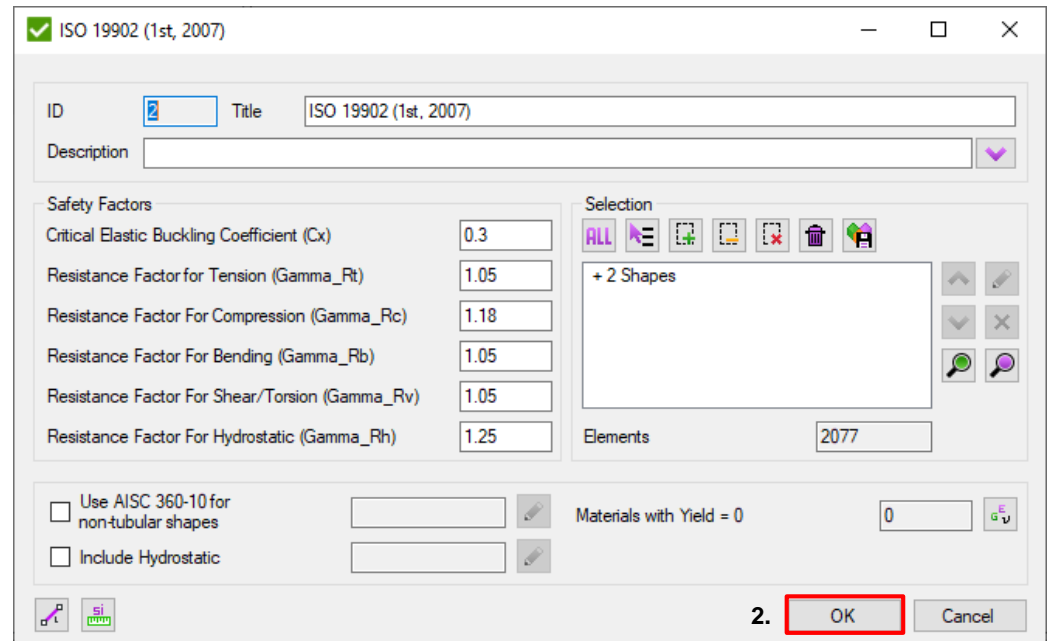
Add ISO 19902 standard

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, $\gamma_{R,b} = 1,05$;

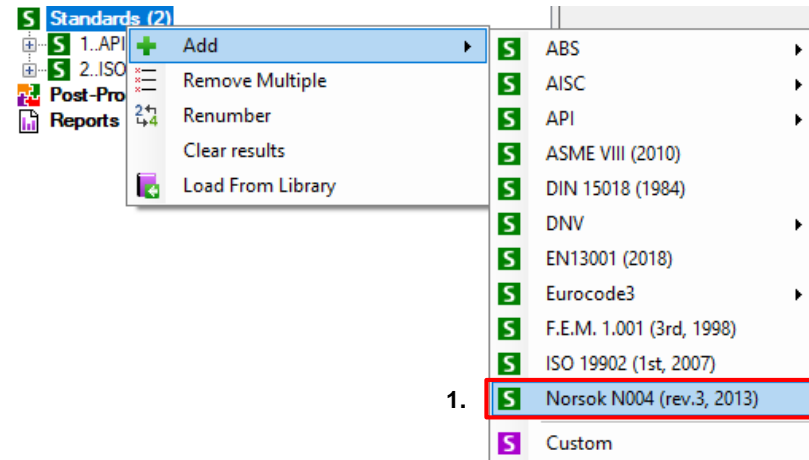
$\gamma_{R,v}$ is the partial resistance factor for shear strength, $\gamma_{R,v} = 1,05$;

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

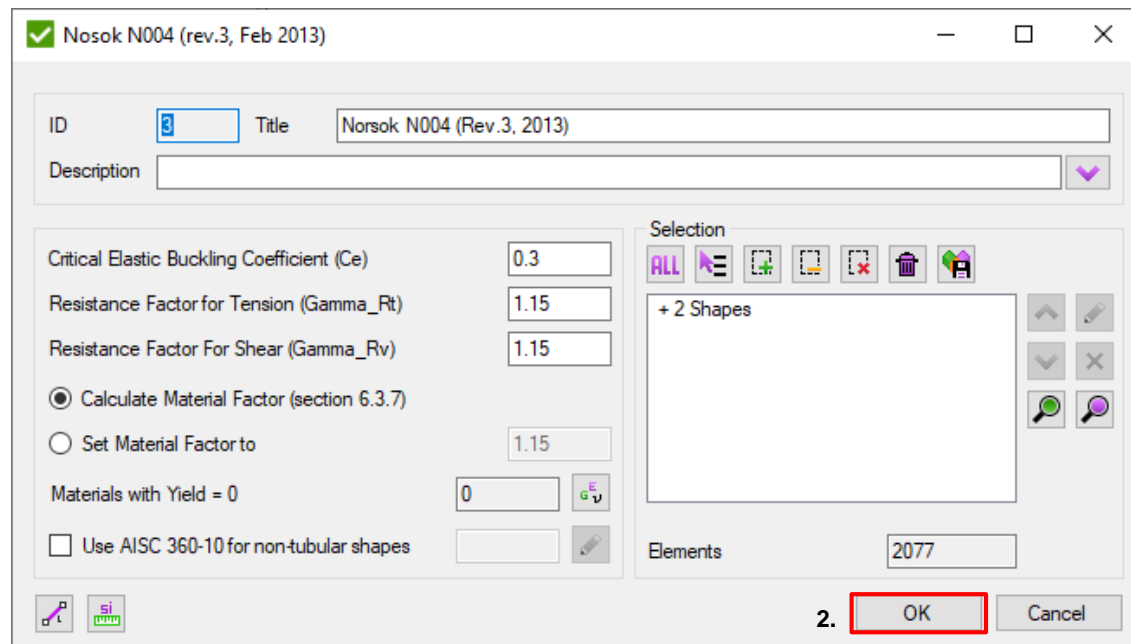
Add Norsok N004 standard

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

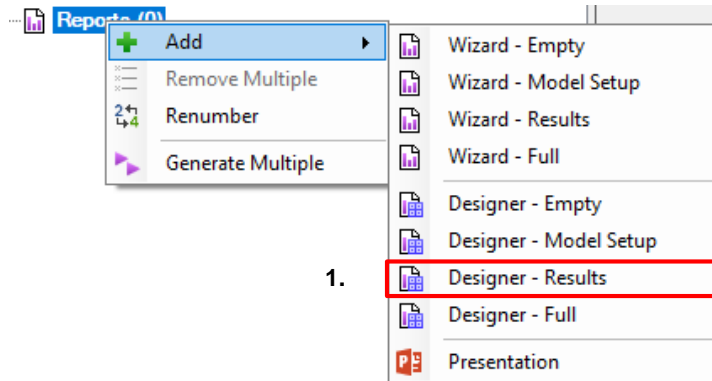
$$\sigma_{c,Sd} = \frac{N_{Sd}}{A} + \frac{\sqrt{M_{y,Sd}^2 + M_{z,Sd}^2}}{W} \tag{6.25}$$

N_{Sd} is negative if in tension.

Report

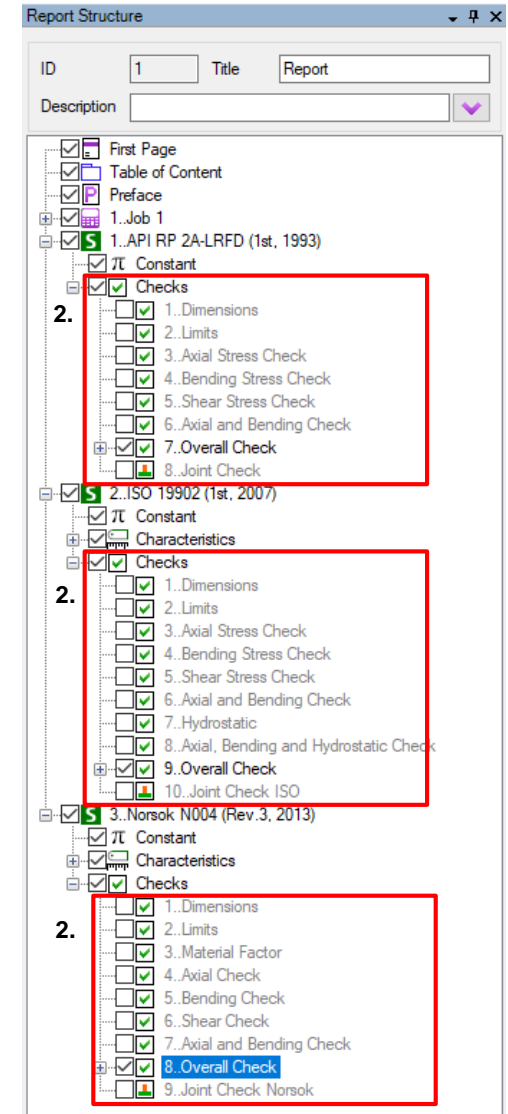
1. Execute *Add - Designer - Results* from *Reports* context menu.

2. Exclude all checks except the **Overall check** in each standard.




1.

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.



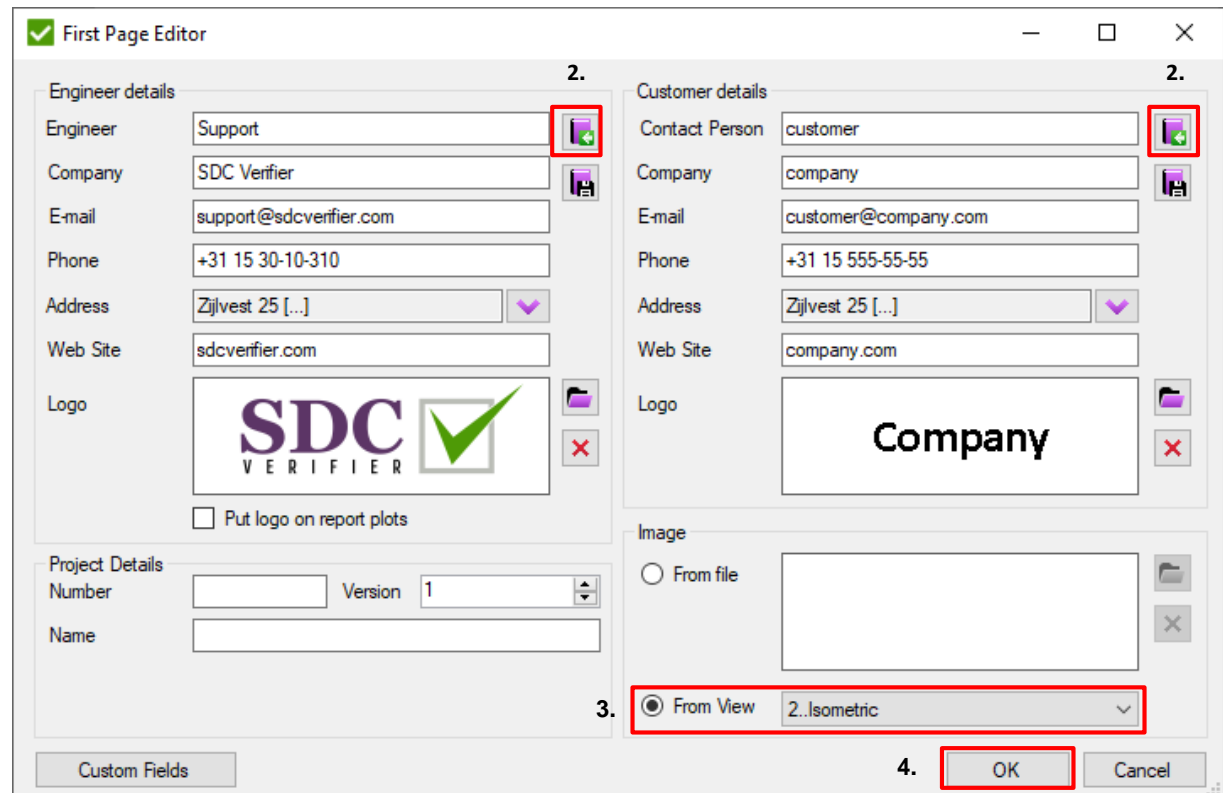
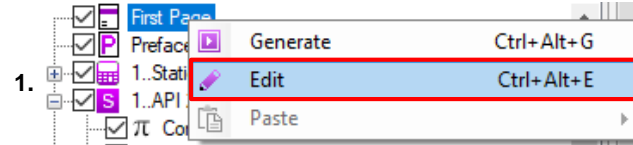
Report. First Page

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*.



Report exported to Microsoft Word

Press  to generate complete report.

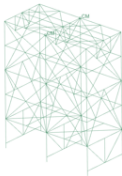


Press  to export to Word.

First page



Report



Prepared by:
SDC Verifier

support@sdcverifier.com
+31 15 30-10-310
sdcverifier.com
Zijlvest 25
2011 VB Haarlem
The Netherlands

Prepared for:
company

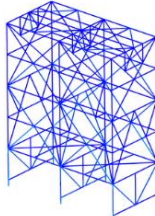
customer@company.com
+31 15 555-55-55
company.com
Zijlvest 25
2011 VB Haarlem
The Netherlands

Engineer:
Customer:
Project Number:
Version:
Date:

Support
customer:
1
2 Nov 2017

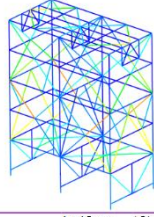
7..Overall Check

API 2A RP

Property	Value								
	Elemental Custom Check								
	Shape '2_Tube'								
	5								
78									
	77..Overall Check	Load Group		LG1..Load Group 1					
	Shape '2_Tube'								
	Absolute Axial UF	Absolute Bending UF	Absolute Shear UF	Absolute Axial and Bending UF	Overall Utilization Factor				
	0.21	0.20	0.12	0.28	0.35				
	Utilization Factor (LG1, Shape '2_Tube', v1)								
	<div> <div>  </div> </div>								
	77..Overall Check	Load Group		LG1..Load Group 1					
	Absolute Overall Utilization Factor								
	Default View								
		Shape Selection		Shape '2_Tube'					
		Data Conversion Average							

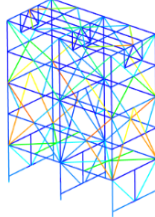
9..Overall Check

ISO 19902

Check	Load Group	LG1..Load Group 1
Elemental Custom Check Shape '2_Tube'		
Absolute Bending Um	Absolute Shear Um	Absolute Axial and Bending Um
0.22	0.19	0.12
Utilization Factor (LG1, Shape '2_Tube', v1)		
		
Check		
Absolute Utilization Factor		
Load Group		
Selection		
Data Conversion Average		

8..Overall Check

Norsok N004

Check	Load Group	LG1..Load Group 1
Elemental Custom Check Shape '2_Tube'		
Absolute Bending UF	Absolute Shear UF	Absolute Axial and Bending UF
0.22	0.21	0.13
Utilization Factor (LG1, Shape '2_Tube', v1)		
		
Check		
Absolute Utilization Factor		
Load Group		
Selection		
Data Conversion Average		