



Tutorial

Joint Check

Updated on: August 14th, 2024

Tested with: SDC Verifier 2024 R1.1

ANSYS Workbench 2023 R1

SDC Verifier is a powerful extension to **Ansys Mechanical** with an advanced calculation core for checking structures according to different standards and report generation.

The goal of **SDC Verifier** is to automate all possible routine work and speed up a verification of the engineering projects significantly.

In this tutorial, Joint Check is reviewed in details.

- General Info;
- Connection Types;
- Connection design;
- Joint Checks according to standards;
- Create Plots and Tables;
- Criteria Plot comparison of Joint Checks;
- The functionality of SDC Verifier Report Designer can be checked via the link to a separate tutorial (Slide 37).

Launch SDC Verifier

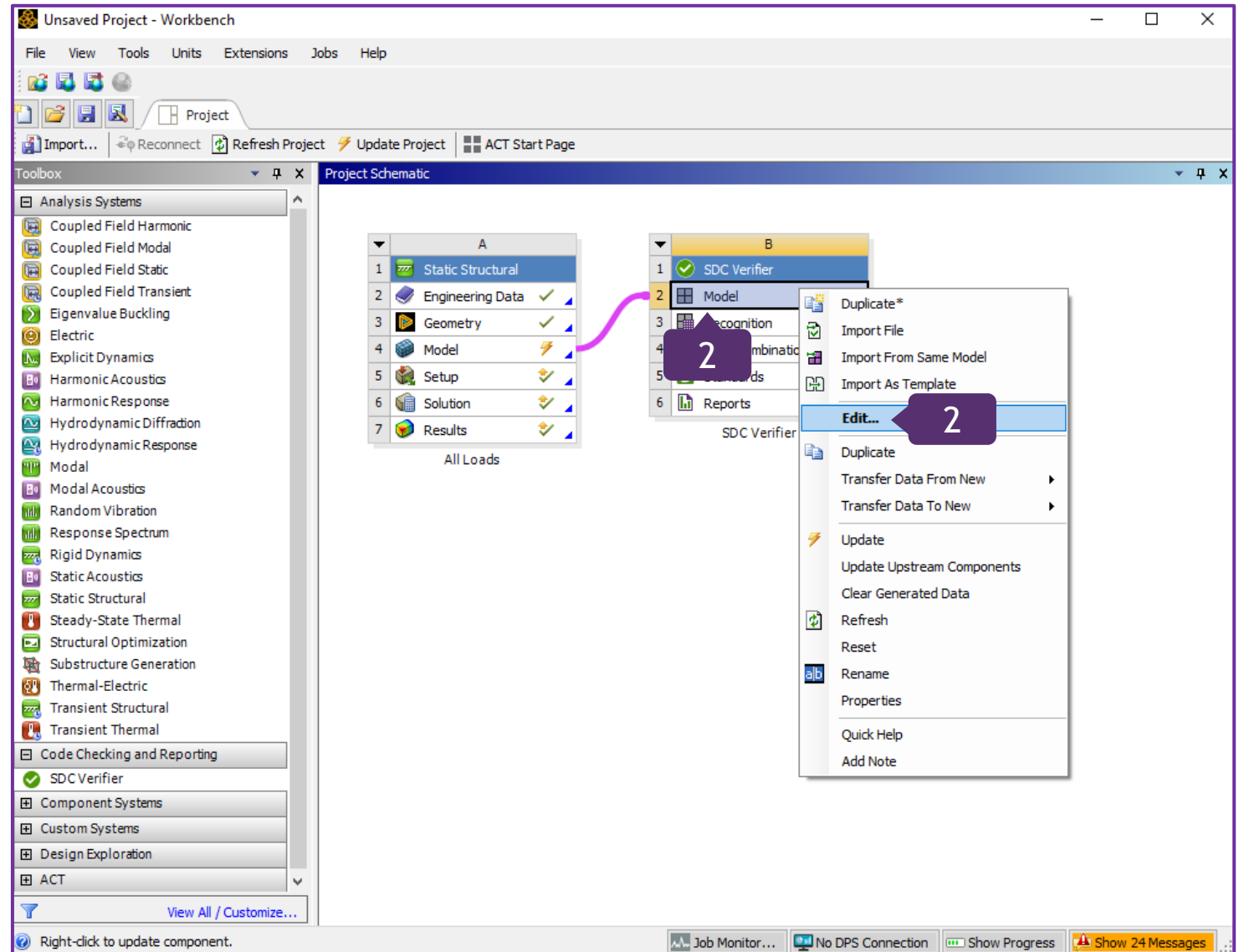
1

In Ansys Workbench open
JointCheck.wbpz

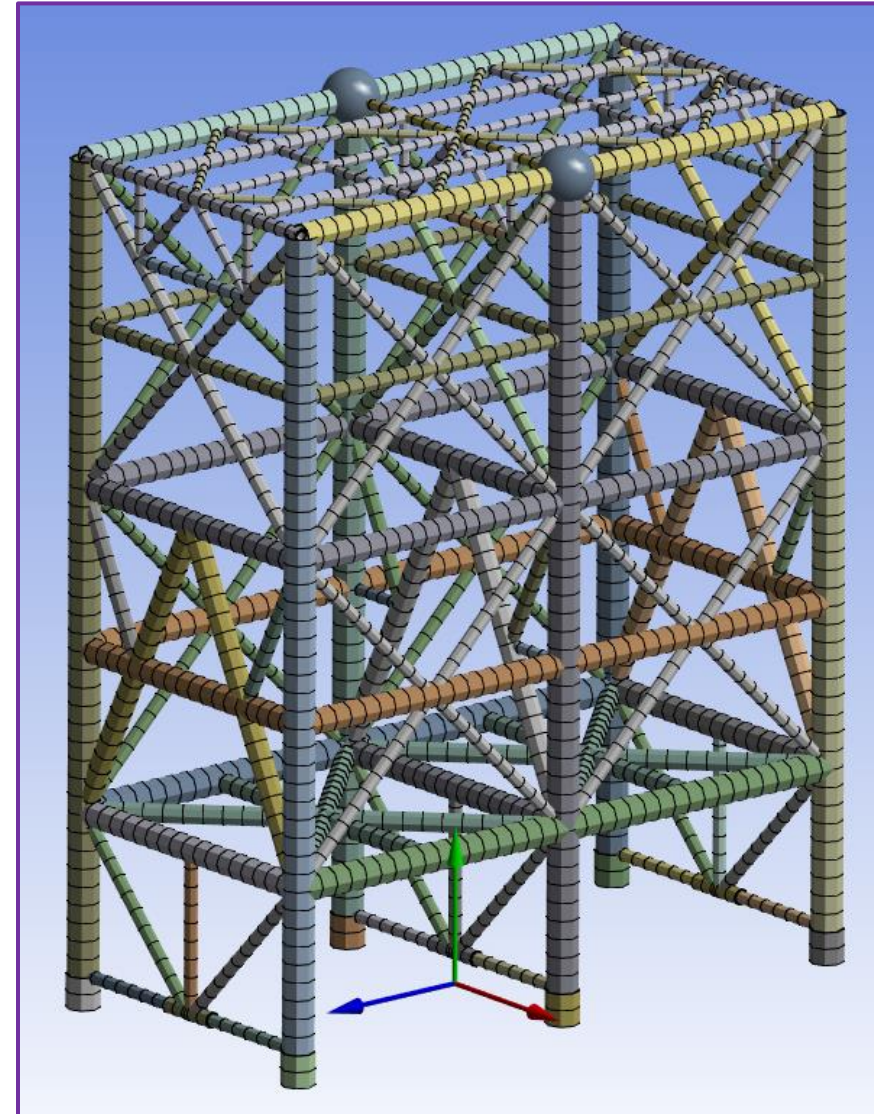
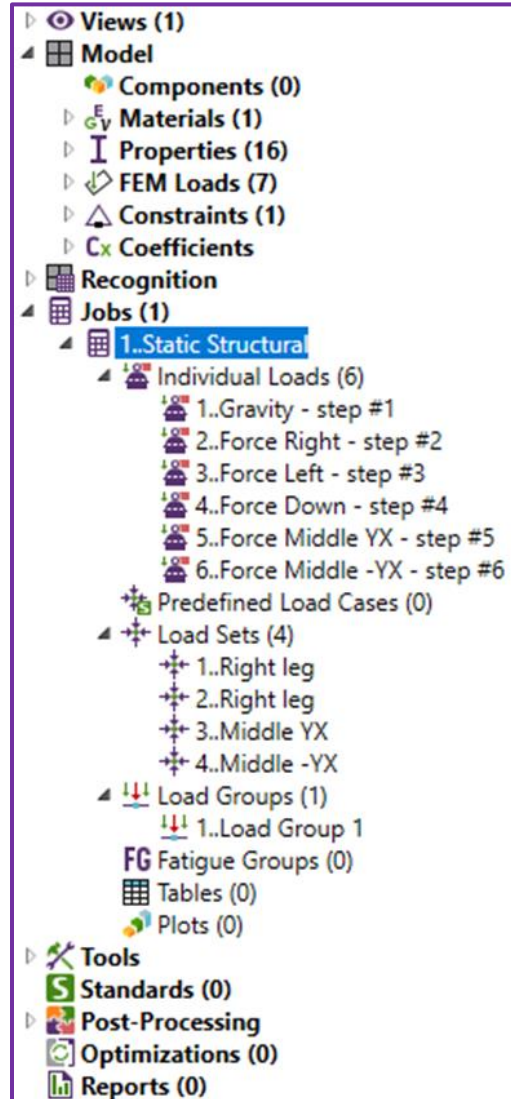


2

Execute right click on Model and select Edit

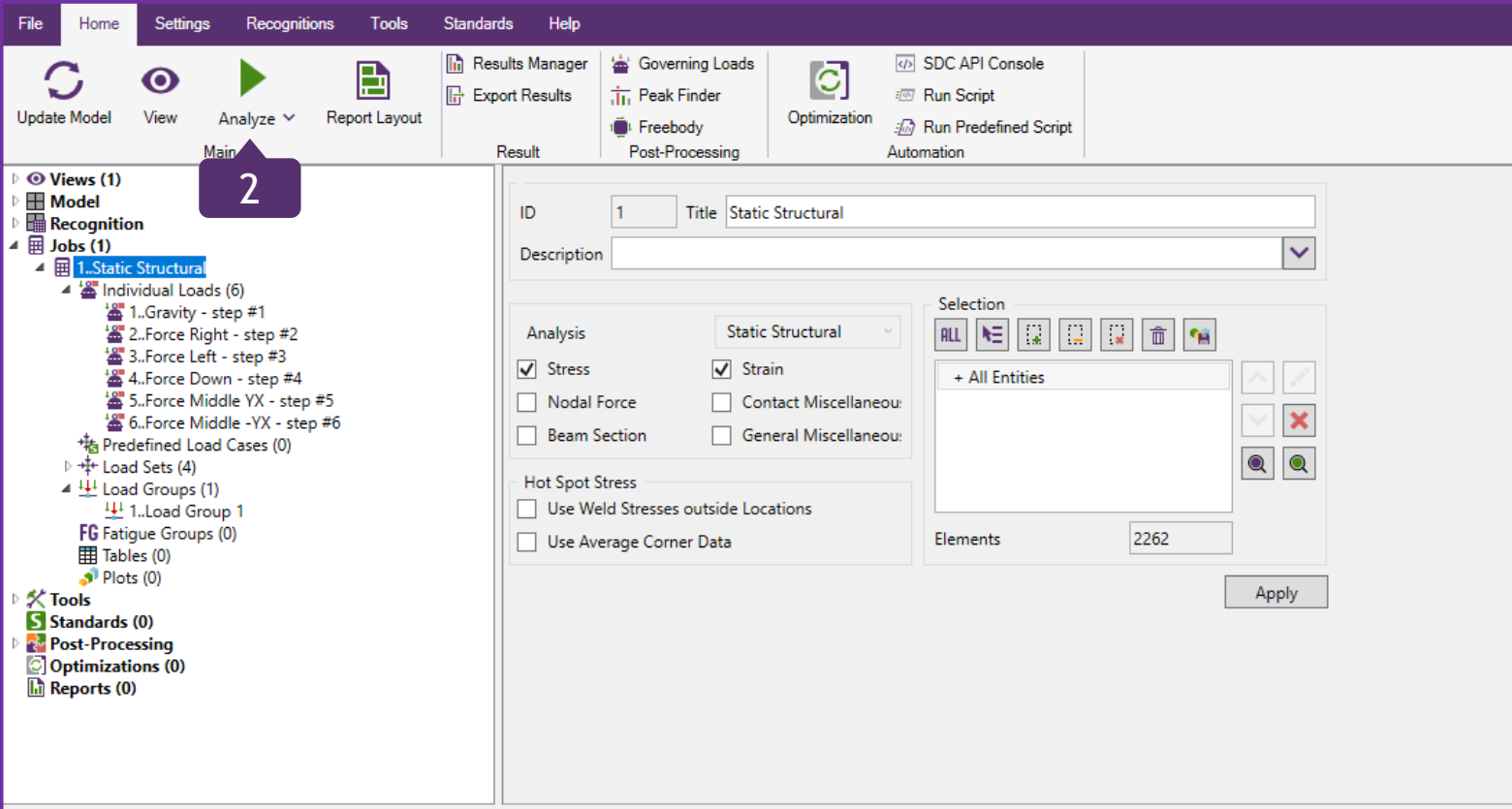


This tutorial uses project with predefined boundary conditions. The model contains only circular tube beams



1 Go to *Home* section on the Ribbon

2 Press  on the toolbar to analyze Job



The screenshot shows the SDC Verifier software interface. The 'Home' ribbon is active, and the 'Analyze' button is highlighted. The 'Jobs' tree on the left shows '1..Static Structural' selected. The right panel shows the 'Static Structural' analysis settings. The bottom status bar shows 'Nodes: 4367 Elements: 2262' and a log of analysis steps.

Job 1 analysis started and finished.

17:14:00 Saving backup file...
17:14:00 C:\Users\user\AppData\Local\Temp\JointCheck.tmp\JointCheck_files\dp0\SDCv\ACT\API RP 2A_autobackup_14Aug2024_05-13PM.ansb saved
17:14:00 C:\Users\user\AppData\Local\Temp\JointCheck.tmp\JointCheck_files\dp0\SDCv\ACT\API RP 2A_dailybackup_14Aug2024.ansb saved
17:28:59 Saving backup file...
17:28:59 C:\Users\user\AppData\Local\Temp\JointCheck.tmp\JointCheck_files\dp0\SDCv\ACT\API RP 2A_autobackup_14Aug2024_05-28PM.ansb saved
17:28:59 C:\Users\user\AppData\Local\Temp\JointCheck.tmp\JointCheck_files\dp0\SDCv\ACT\API RP 2A_dailybackup_14Aug2024.ansb saved
17:34:53 Static Structural Analysis analysis started
17:35:03 Static Structural Analysis analysis finished
Nodes: 4367 Elements: 2262 C:\Users\user\AppData\Local\Temp\JointCheck.tmp\JointCheck_files\dp0\global\MECH\SYS.mechdb MKS (Meter/Kg/Second) Ansys

Joint Check is an offshore check that verifies strength of tubular structure under tension or compression members according to the standards.

Joint is a node where two or more incline elements are connected.

Connection is a set of elements of the same plane around a joint node.

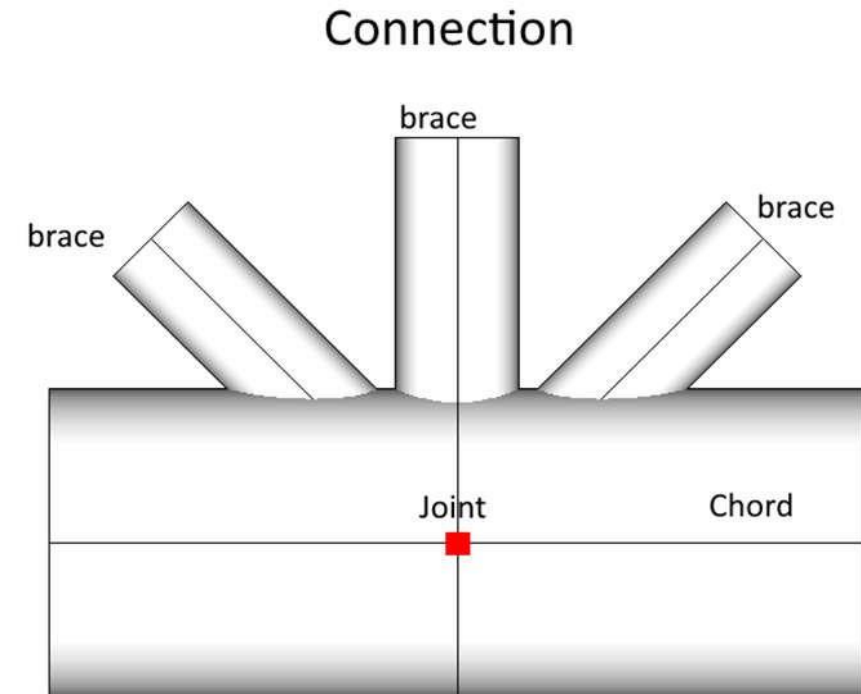
Chord is a set of non-welded elements that form straight line.

Brace is a welded to a chord element.

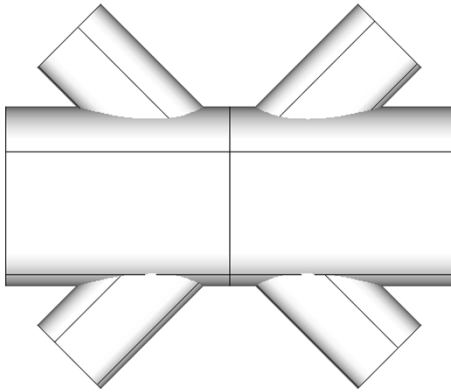
Joint check is based on the connections.

Each connection is a set of elements near joint node. Connections consists of Chord and braces. Brace contains only 1 element with ID defined in brackets (#). Connection can contain braces from both sides of the chord.

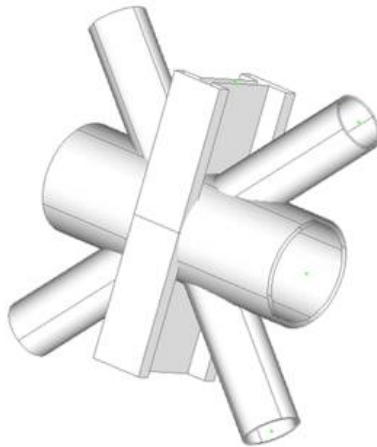
The information is displayed in the second brackets:
U- upper braces; L- lower braces.



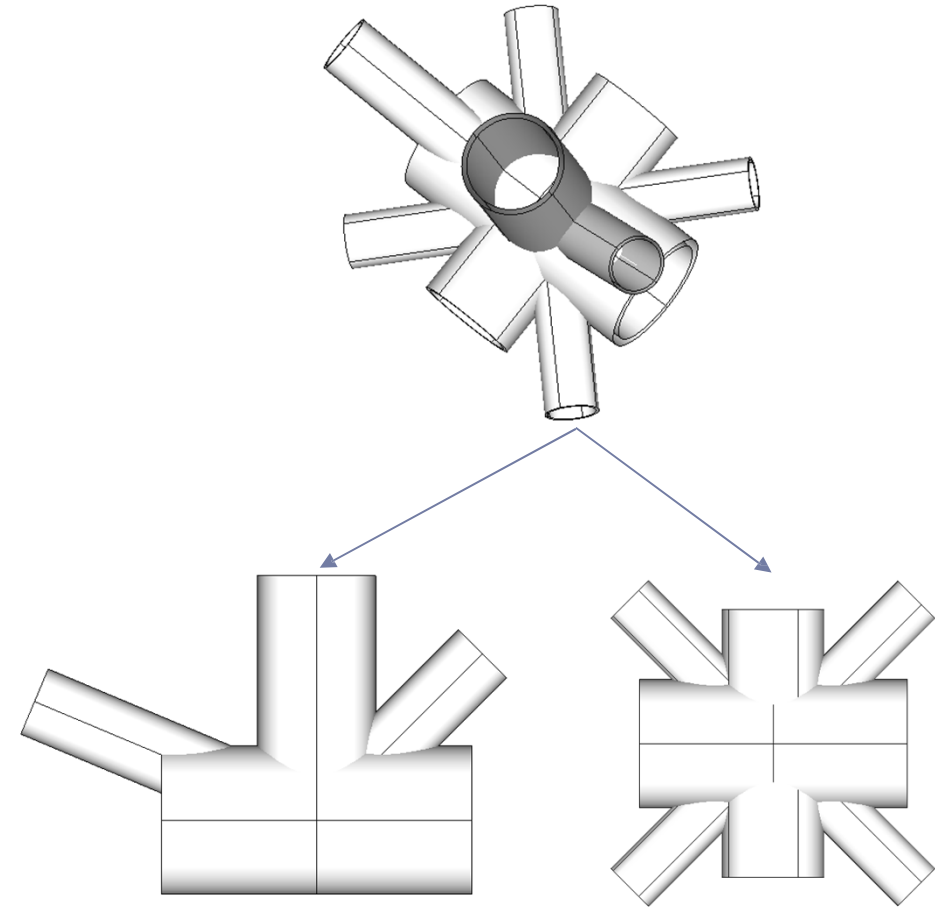
2D Connection. Set of elements of one plane



Connection can include only circular tube shape elements. Otherwise, connection will not be recognized. Example of unrecognized connection:



3D Connection. It will be split on 2D Connections



Add Joint Check API LRFD (1st, 1993)

1

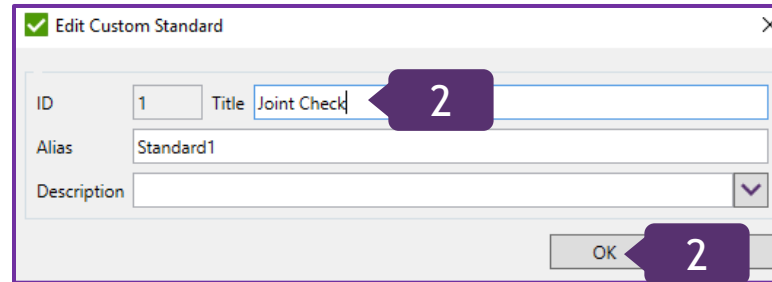
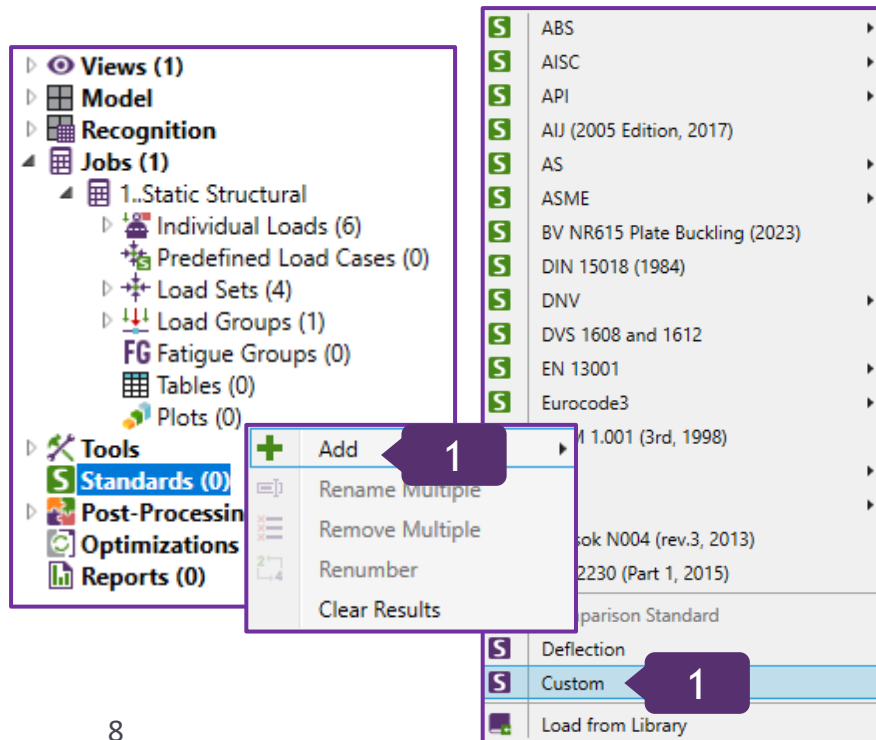
Execute right click on *Standards* and select *Add => Custom*

2

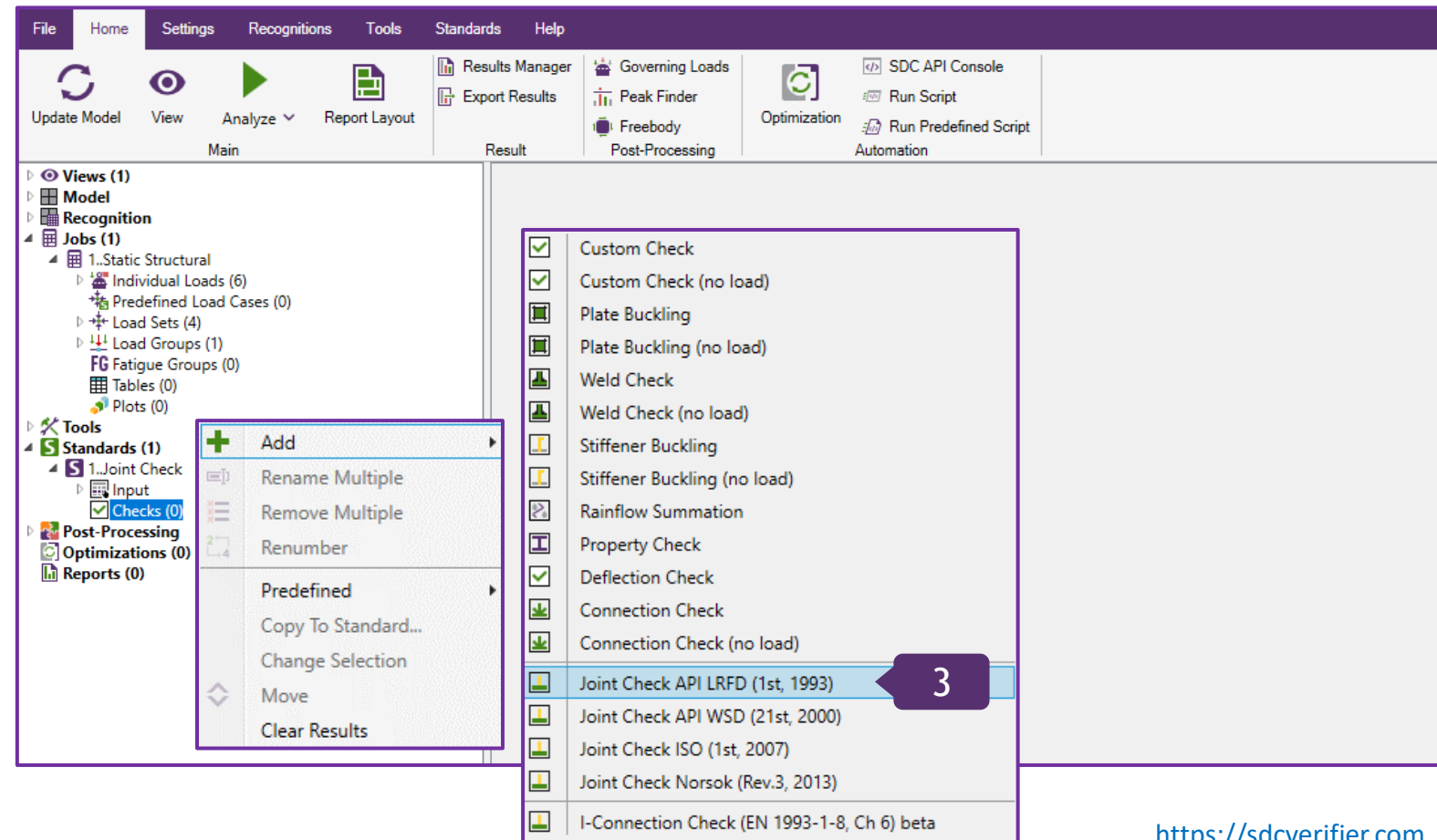
Title: *Joint Check*;
Press *OK*

3

In 1..*Joint Check*, execute right click on *Checks (0)* => *Add* => *Joint Check API LRFD (1st, 1993)*



Joint Check API LRFD is a part of the standard API RP 2A-LRFD (1st, Jul 1993). This is the reason why the first step was to create Custom Standard.



1

Press *Find Connections*

Joint Check Settings are common for all available types of joint checks: API, ISO and Norsok.

Joint nodes to be checked. Part of the model can be checked by selecting the required joints.

Maximum distance between joint nodes of one connection. Include connections that are formed by multiple joints. The recommended distance is $D/4$. It is possible to set custom distance.

Angle between braces treated as in one plane. Braces that are located in different planes of one connection with an angle A to each other will be treated as in-plane connection.

Chord maximum curvature angle defines the maximum allowable straightness of the chord. Default angle is 3 degrees.

Forces tolerance is maximum allowable difference between axial tension and compression forces that are perpendicular to the chord from one side of the connection. If forces are balanced, all braces are considered to be K joints.

Calculate all braces as TY. Ignore all loading conditions and set all brace types to TY if turned on.

Joint Check

General

ID: 1 Title: Joint Check 1

Alias: Check1

Description: ok according to API RP 2A LRFD (1st, 1993)

Joint Nodes to be Checked

Selection: All Entities

Recognition Settings

Maximum Distance between Joint Nodes of one Connection on the Chord:

☒ Use D/4 (D - Chord Diameter)

☐ Custom Distance: 0.1

Angle between Braces Treated as in One Plane. A = [0 to 90]: 15

Chord Maximum Curvature Angle [0 to 15]: 3

Joint Type Recognition Settings

Forces Tolerance, %: 1

☐ Calculate All Braces as TY

Find Connections

Check Connections Design

1

Select **150..Connection 150**;
Press 

2

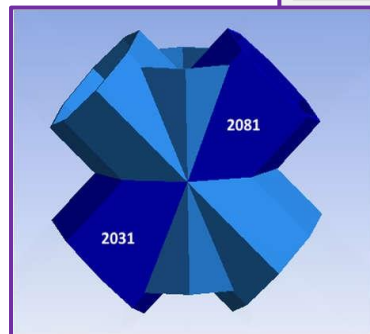
Press **Preview Connection**

3

Press  to remove all conditions in
Chord and Braces selections

All connections in the list are recommended to be checked as all elements of each connection are of the same diameters and thicknesses. Depending on the welding process, it is possible to modify connection and set chord and braces manually.

Two separate connections will be created automatically for cross type of joint with equal dimensions. With chord parallel and perpendicular.



Joint Check

General
ID: 1 Title: Joint Check 1
Alias: Check1
Description: ck according to API RP 2A LRFD (1st, 1993)
Joint Nodes to be Checked
Selection: All Entities
Recognition Settings
Maximum Distance between Joint Nodes of one Connection on the Chord:
☒ Use D/4 (D - Chord Diameter)
☐ Custom Distance: 0.1




Check Connections Design




It is recommended to check design of following connections to avoid inappropriate results

ID	Connections
57..	Connection 57
79..	Connection 79
112..	Connection 112
122..	Connection 122
128..	Connection 128
130..	Connection 130
149..	Connection 149
150..	Connection 150

Edit Connection

General
ID: 150 Title: Connection 150

Chord Elements
ALL   
+ 2 Elements(2081, 2031)

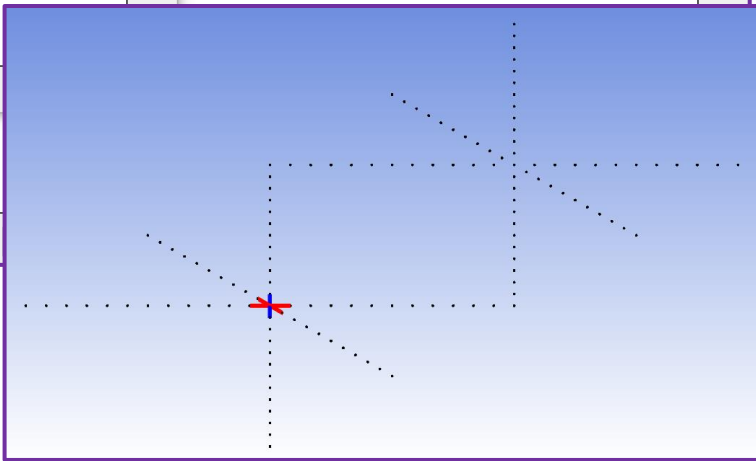
Braces
ALL   
+ 4 Elements

Elements: 2

Brace or Chord	Angle	Thickness	Diameter	Minimum Fy	Is Overlapped	Resistance coef.
Chord (#2081, 2031)		0.01	0.3	250000000		
Brace (#2059) (U)	45	0.01	0.3		No	
Brace (#1984) (U)	90	0.01	0.3		Yes	0.9
Brace (#1985) (L)	45	0.01	0.3		No	
Brace (#2019) (L)	90	0.01	0.3		Yes	0.9

☐ Use chord custom parameters (empty fields are used as original)
Diameter: Thickness:
Fy: Minimum Thickness:

Diagram



Add Chord Elements

1

To add entities with Ansys Mechanical, press  and select *Elements by Text*

2

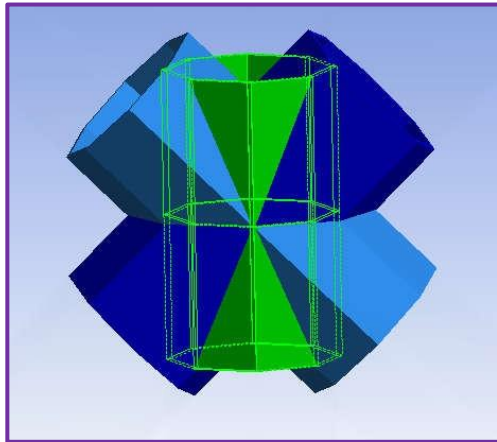
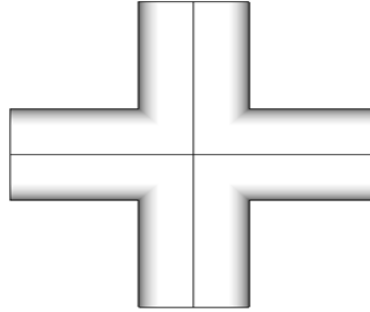
Operation: *Add*;
Type: *Elements*

3

Insert Mesh Elements Ids *2081, 2031*

4

Press *OK*



Add Condition

Ids

Operation: **Add** 2

Type: **Elements**

Example: Inside of Range: "3-7"; Outside of Range: "3:7" Separate Ids: "3 7" or "3, 7";

2081, 2031 3

4



OK Cancel

Edit Connection

General

ID: 150 Title: Connection 150

Chord Elements

ALL   Elements

Select Members by Element(s)





Select Buckling Plates by Element(s)

Select Welds by Element(s)

Elements by Text 1

Elements: 0

Braces

ALL    

Elements: 0

Brace or Chord	Angle	Thickness	Diameter	Minimum Fy	Is Overlapped	Resistance coef.
Chord (#2081, 2031)		0.01	0.3	250000000		
Brace (#2059) (U)	45	0.01	0.3		No	
Brace (#1984) (U)	90	0.01	0.3		Yes	0.9
Brace (#1985) (L)	45	0.01	0.3		No	
Brace (#2019) (L)	90	0.01	0.3		Yes	0.9

☐ Use chord custom parameters (empty fields are used as original)


Diameter: Thickness:

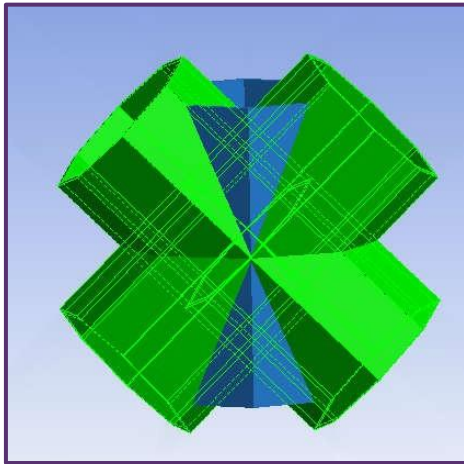
Fy: Nominal Thickness:

Get original parameters

Calculate Set Braces Overlapping Preview Connection OK Cancel

Add Chord Elements

- 1 To add entities with Ansys Mechanical, press  and select *Elements by Text*
- 2 Operation: *Add*;
Type: *Elements*
- 3 Insert Mesh Elements Ids *2059, 1984, 1985, 2019*
- 4 Press *OK*



Add Condition

Ids

Operation: **Add**

Type: **Elements**

Example: Inside of Range: "3-7"; Outside of Range: "3:7" Separate Ids: "3 7" or "3, 7";

2059, 1984, 1985, 2019

OK Cancel

Edit Connection

General
ID: 150 Title: Connection 150

Chord Elements
+ 2 Elements(2031, 2081)

Braces
+ 2 Elements(2031, 2081)

Elements: 2

Elements: 0

1 **Elements by Text**

Brace or Chord	Angle	Thickness	Diameter	Minimum Fy	Is Overlapped	Resistance coef.
Chord (#2081, 2031)		0.01	0.3	250000000		
Brace (#2059) (U)	45	0.01	0.3		No	
Brace (#1984) (U)	90	0.01	0.3		Yes	0.9
Brace (#1985) (L)	45	0.01	0.3		No	
Brace (#2019) (L)	90	0.01	0.3		Yes	0.9

☐ Use chord custom parameters (empty fields are used as original)

Diameter: Thickness:

Fy: Nominal Thickness:

Get original parameters

Calculate Set Braces Overlapping Preview Connection OK Cancel

1 Press *Calculate*

2 Press *OK*

3 Press *OK*

4 Press *Close*

Edit Connection

General
ID: 150 Title: Connection 150

Chord Elements
+ 2 Elements(2031, 2081)
Elements: 2

Braces
+ 4 Elements
Elements: 4

Brace or Chord	Angle	Thickness	Diameter	Minimum Fy	Is Overlapped	Resistance coef.
Chord (#2081, 2031)		0.01	0.3	250000000		
Brace (#2059) (U)	45	0.01	0.3		No	
Brace (#1984) (U)	90	0.01	0.3		Yes	0.9
Brace (#1985) (L)	45	0.01	0.3		No	
Brace (#2019) (L)	90	0.01	0.3		Yes	0.9

☐ Use chord custom parameters (empty fields are used as original)

Diameter: Thickness:
Fy: Nominal Thickness:

Get original parameters

Calculate Set Braces Overlapping Preview Connection OK Cancel

SDC Verifier

Parameters were calculated

OK

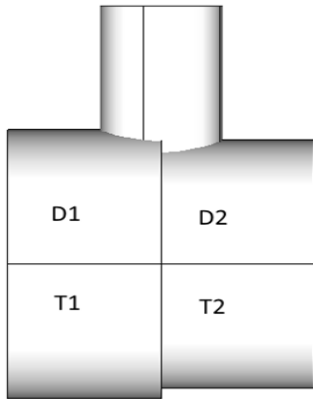
Check Connections Design

It is recommended to check design of following connections to avoid inappropriate results

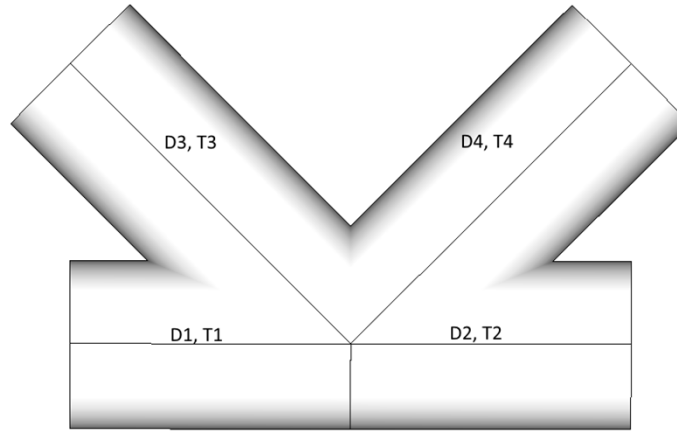
Connections
57..Connection 57
79..Connection 79
112..Connection 112
122..Connection 122
128..Connection 128
130..Connection 130
149..Connection 149
150..Connection 150

Close

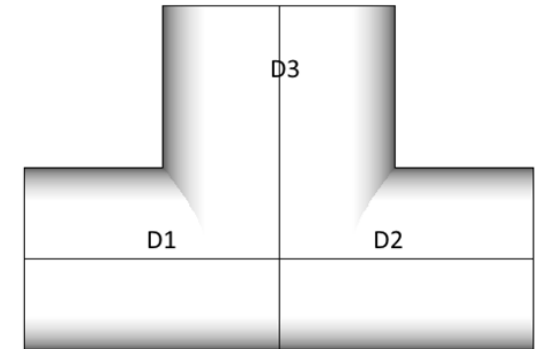
When Chord is formed by elements with different properties around the joint node and $D1 \neq D2$, $D = \min(D1, D2)$; $T = \min(T1, T2)$ are considered for calculations.



In case when :
 $D1 = D2 = D3 = D4$;
 $T1 = T2 = T3 = T4$;
When all diameters of connection are equal, Thicknesses are compared. Element with thickness = $T4$ is recognized as chord.



$D1 = D2$, $D1 < D3$. For such case, $D3$ is recognized as chord as it has bigger diameter. Naturally, pipe of bigger diameter cannot be welded to smaller. Such connections are recommended to be checked.



$D1 = D2 = D3 = D4$;
 $T1 = T2 = T3$; $T4 > T1$;
When all diameters of the connection are equal, thicknesses are compared. Element with thickness = $T4$ is recognized as a chord.

In both cases, such types of connections are recommended to be checked.

Navigation. Fill *Connection ID* and Press *Navigate* to find a connection in the table

Connection info. Chord, Braces, and their properties

Joint Check

General
ID: 1 Title: Joint Check 1
Alias: Check 1
Description: ck according to API RP 2A LRFD (1st, 1993)

Navigation
Connection ID: Navigate

Joint Nodes to be Checked
Selection: All Entities

Recognition Settings
Maximum Distance between Joint Nodes of one Connection on the Chord:
☒ Use D/4 (D - Chord Diameter) 0.1
☐ Custom Distance

Angle between Braces Treated as in One Plane, A = [0 to 90]: 15

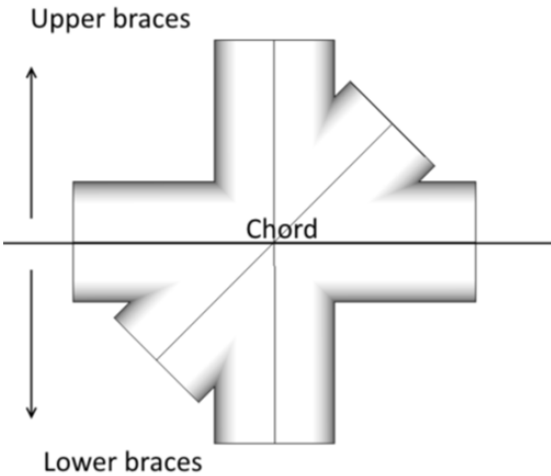
Chord Maximum Curvature Angle [0 to 15]: 3

Joint Type Recognition Settings
Forces Tolerance, %: 1
☐ Calculate All Braces as TY

ID	Title	Brace or Chord	Angle	Thickness	Diameter	T > t	Is Overlapped	Resistance coef.
1	Connection 1	Chord (#18, 1)		0.019	0.4			
		Brace (#1045) (U)	90	0.01	0.2	Yes	No	
2	Connection 2	Chord (#274, 275)		0.03	0.48			
		Brace (#1361) (U)	26.565051	0.012	0.342	Yes	Yes	0.9
		Brace (#9) (U)	90	0.019	0.4	Yes	No	
		Brace (#736) (U)	44.274776	0.01	0.2	Yes	Yes	0.9
3	Connection 3	Chord (#274, 275)		0.03	0.48			
		Brace (#2070) (U)	90	0.01	0.3	Yes	No	
4	Connection 4	Chord (#274, 275)		0.03	0.48			
		Brace (#688) (U)	45	0.01	0.2	Yes	Yes	0.9
		Brace (#238) (U)	90	0.01	0.46	Yes	No	
5	Connection 5	Chord (#401, 410)		0.03	0.48			
		Brace (#331) (U)	26.565051	0.012	0.342	Yes	Yes	0.9
		Brace (#10) (U)	90	0.019	0.4	Yes	No	
		Brace (#964) (U)	44.274776	0.01	0.2	Yes	Yes	0.9
6	Connection 6	Chord (#401, 410)		0.03	0.48			
		Brace (#892) (U)	45	0.01	0.2	Yes	Yes	0.9
		Brace (#204) (U)	90	0.01	0.46	Yes	No	
7	Connection 7							
8	Connection 8							
9	Connection 9							
10	Connection 10							

Find Connections Clear Results Set Resistance Coefficients Overall Table Set Brace Load Transfer OK Cancel

Add, Edit, Preview and Remove selected connections

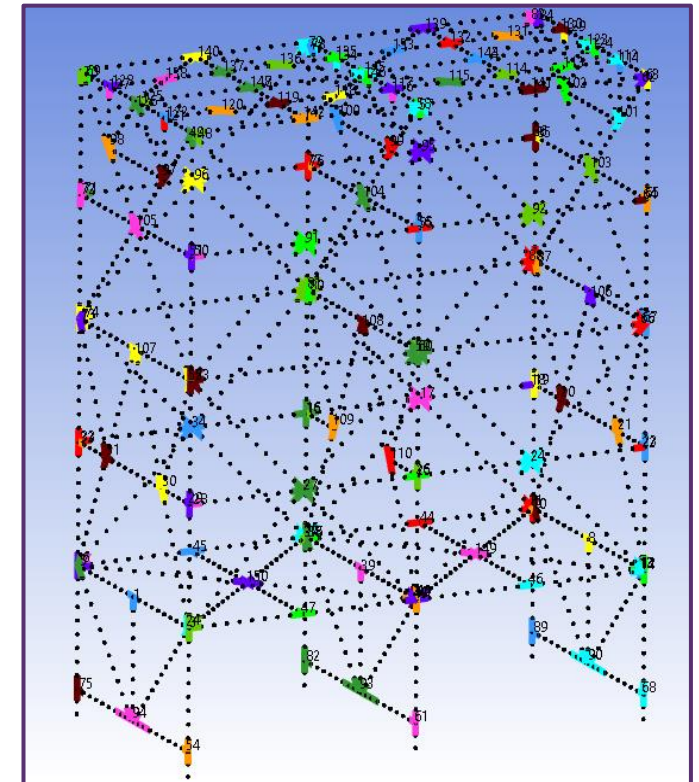


Selection and recognition settings

#401,410 - IDs of related elements in the model.
(U) - Upper (0°-180°) braces (L) - Lower (180°-360°) braces

- # 2

2



Set Overlapped Braces and Resistance Coef.

1

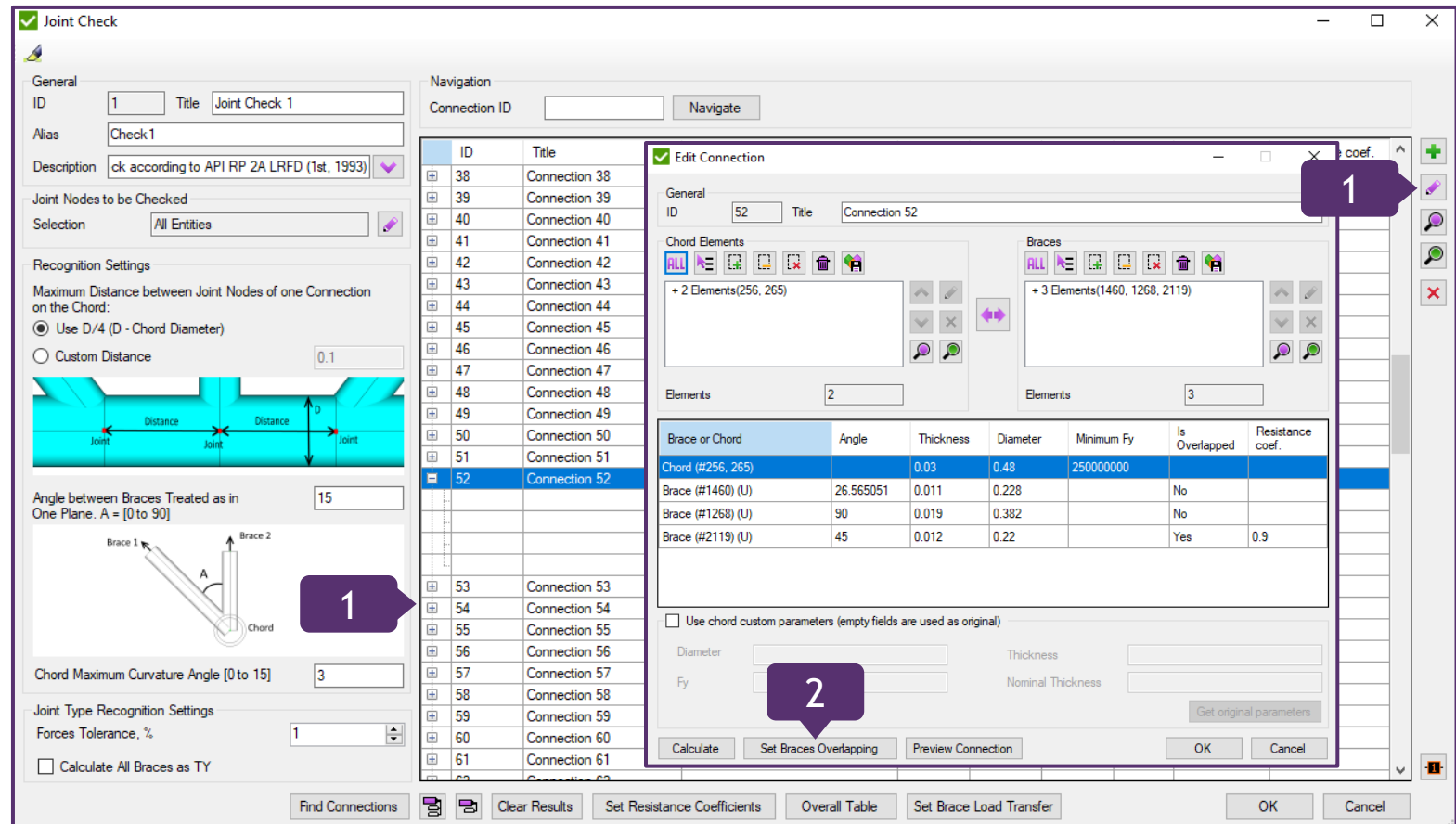
Select Connection 52 and press  to edit it

2

Press *Set Braces Overlapping*

The resistance coefficient depends on the strength of the welding and is used in calculations of overlapping (Section E.3.2 API 2A RP LRFD). Table J 2.5 is taken from the Load and resistance factor design specification for structural steel buildings on December 27, 1999 (AISC). The default value is 0.9. It can be applied to overlapped braces.

TABLE J2.5 Design Strength of Welds					
Types of Weld and Stress [a]	Material	Resistance Factor ϕ	Nominal Strength F_{BM} or F_w	Filler Metal Requirements [b, c]	
Complete-Joint-Penetration Groove Weld					
Tension normal to effective area	Base	0.90	F_y	Matching filler metal shall be used. For CVN requirements see footnote [d].	
Compression normal to effective area	Base	0.90	F_y		
Tension or compression parallel to axis of weld					
Shear on effective area	Base Weld	0.90 0.80	$0.60F_y$ $0.60F_{EXX}$	Filler metal with a strength level equal to or less than matching filler metal is permitted to be used.	
Partial-Joint-Penetration Groove Weld					
Compression normal to effective area	Base	0.90	F_y		Filler metal with a strength level equal to or less than matching filler metal is permitted to be used.
Tension or compression parallel to axis of weld [e]					
Shear parallel to axis of weld	Base Weld	ϕ 0.75	ϕ $0.60F_{EXX}$		
Tension normal to effective area	Base Weld	0.90 0.80	F_y $0.60F_{EXX}$	Filler metal with a strength level equal to or less than matching filler metal is permitted to be used.	
Fillet Welds					
Shear on effective area	Base Weld	ϕ 0.75	ϕ $0.60F_{EXX}$ [g]		
Tension or compression parallel to axis of weld [e]	Base	0.90	F_y	Filler metal with a strength level equal to or less than matching filler metal is permitted to be used.	
Plug or Slot Welds					
Shear parallel to faying surfaces (on effective area)	Base Weld	ϕ 0.75	ϕ $0.60F_{EXX}$		Filler metal with a strength level equal to or less than matching filler metal is permitted to be used.



Joint Check

General
ID: 1 Title: Joint Check 1
Alias: Check1
Description: ck according to API RP 2A LRFD (1st, 1993)

Joint Nodes to be Checked
Selection: All Entities

Recognition Settings
Maximum Distance between Joint Nodes of one Connection on the Chord:
☒ Use D/4 (D - Chord Diameter)
☐ Custom Distance: 0.1

Angle between Braces Treated as in One Plane. A = [0 to 90]: 15

Chord Maximum Curvature Angle [0 to 15]: 3

Joint Type Recognition Settings
Forces Tolerance, %: 1
☐ Calculate All Braces as TY

Edit Connection

General
ID: 52 Title: Connection 52

Chord Elements
+ 2 Elements(256, 265)

Braces
+ 3 Elements(1460, 1268, 2119)

Brace or Chord	Angle	Thickness	Diameter	Minimum Fy	Is Overlapped	Resistance coef.
Chord (#256, 265)		0.03	0.48	250000000		
Brace (#1460) (U)	26.565051	0.011	0.228		No	
Brace (#1268) (U)	90	0.019	0.382		No	
Brace (#2119) (U)	45	0.012	0.22		Yes	0.9

☐ Use chord custom parameters (empty fields are used as original)

Diameter: Thickness: Fy: Nominal Thickness: Get original parameters

Calculate Set Braces Overlapping Preview Connection OK Cancel

Set Overlapped Braces and Resistance Coef. (Continuation)

3 Press *Set Overlapped (Yes)* to relevant Braces

4 Press *Close*

5 Press *OK*

Set Braces Overlapping

Overlapped brace conditions:

1. Minimum thickness;
2. Minimum diameter (if thicknesses are equal);
3. Maximum brace angle (if diameters are equal);
4. Random brace is taken in calculations if any condition is satisfied;

Resistance coef.

Brace #	Thickness	Diameter	Brace Angle	Is Overlapped	Resistance coef.
#1 (ElemID = 1460) (U)	0.011	0.228	26.565051177...	No	
#2 (ElemID = 1268) (U)	0.019	0.382	90	No	
#3 (ElemID = 2119) (U)	0.012	0.22	45	Yes	0.9

Alternatively, coefficients to multiple connections can be set by pressing *Set Resistance Coefficients* button in Joint Check window.

Edit Connection

General
ID: 52 Title: Connection 52

Chord Elements
+ 2 Elements(256, 265)

Braces
+ 3 Elements(1460, 1268, 2119)

Brace or Chord	Angle	Thickness	Diameter	Minimum Fy	Is Overlapped	Resistance coef.
Chord (#256, 265)		0.03	0.48	250000000		
Brace (#1460) (U)	26.565051	0.011	0.228		No	
Brace (#1268) (U)	90	0.019	0.382		No	
Brace (#2119) (U)	45	0.012	0.22		Yes	0.9

☐ Use chord custom parameters (empty fields are used as original)

Diameter Thickness
Fy Nominal Thickness

1

Press OK

Load transfer has an influence on a chord stability. Axial branch capacity is calculated using Can and Nominal chord element parameters (Section E.3.4 API 2A RP LRFD)

E.3.4 Load Transfer Across Chords. Cross joints, launch leg joints, and other joints in which load is transferred across the chord should be designed to resist general collapse. However, for such joints reinforced only by a joint can having increased thickness T_c and length L (for cases where joint cans are centered on the brace of interest L is defined as shown in Figure E.3-6a) and having brace chord diameter ratio less than 0.9, the allowable axial branch load shall be taken as:

$$P = P(1) + \frac{L}{2.5D} [P(2) - P(1)] \quad \text{for } L < 2.5D \quad (\text{E.3.4-1a})$$

$$P = P(2) \quad \text{for } L > 2.5D \quad (\text{E.3.4-1b})$$

where:

$P(1) = P_a$ from Equation E.3.1-4a using the nominal chord member thickness

$P(2) = P_a$ from Equation E.3.1-4a using thickness T_c

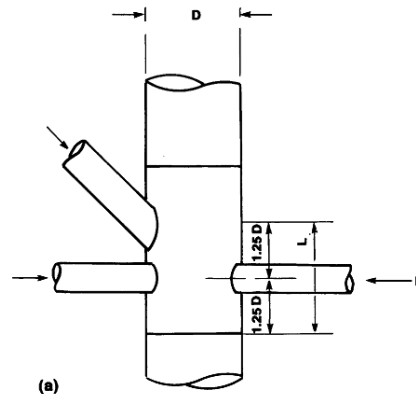
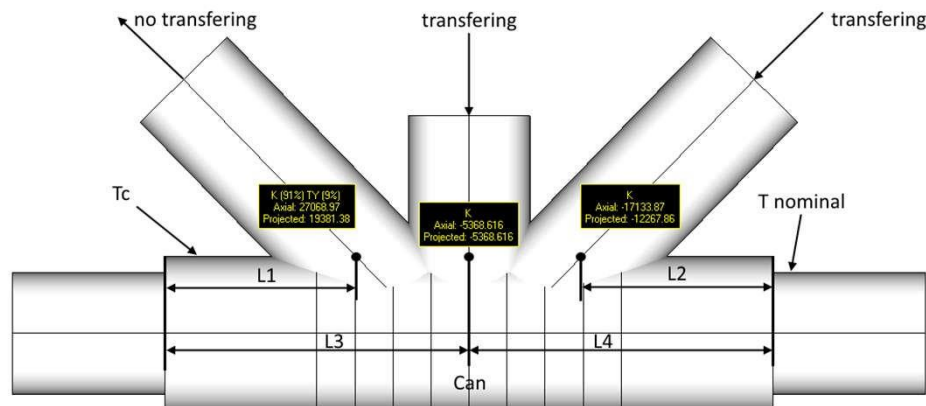


FIG. E.3-6
DEFINITION OF EFFECTIVE CORD LENGTH

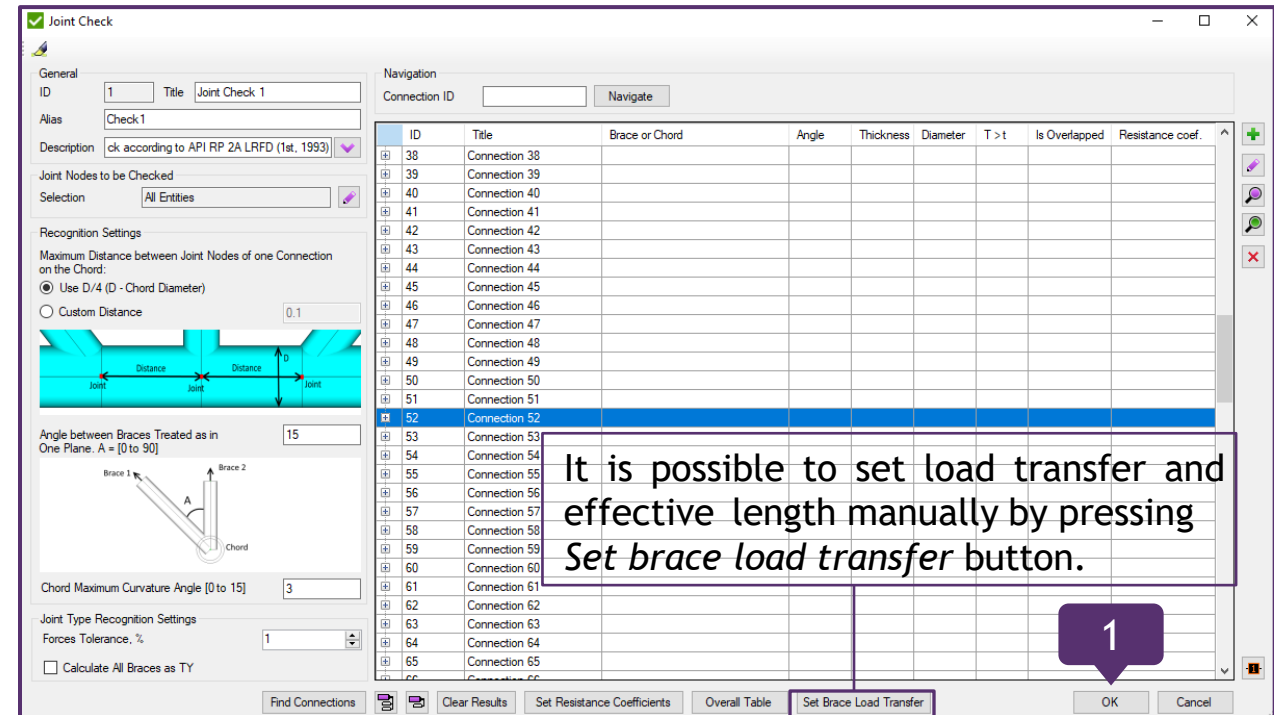


Effective length is calculated for each brace separately. It is the minimum distance from the end of the can till the point of intersection of chord and brace multiplied by 2. $L1, L2 \leq 1.25D$. If $L1$ and $L2$ exceed $1.25D$ distance, can will not be recognized. $T_c \geq T$ nominal.

$L = 2 * L1 = 0.6293$ - effective length for the left brace

$L = 2 * L3 = 2 * L4 = 1$ - effective length for the middle brace

$L = 2 * L2 = 0.6293$ - effective length for the right brace
 T nominal = 0.01; $T_c = 0.02$;

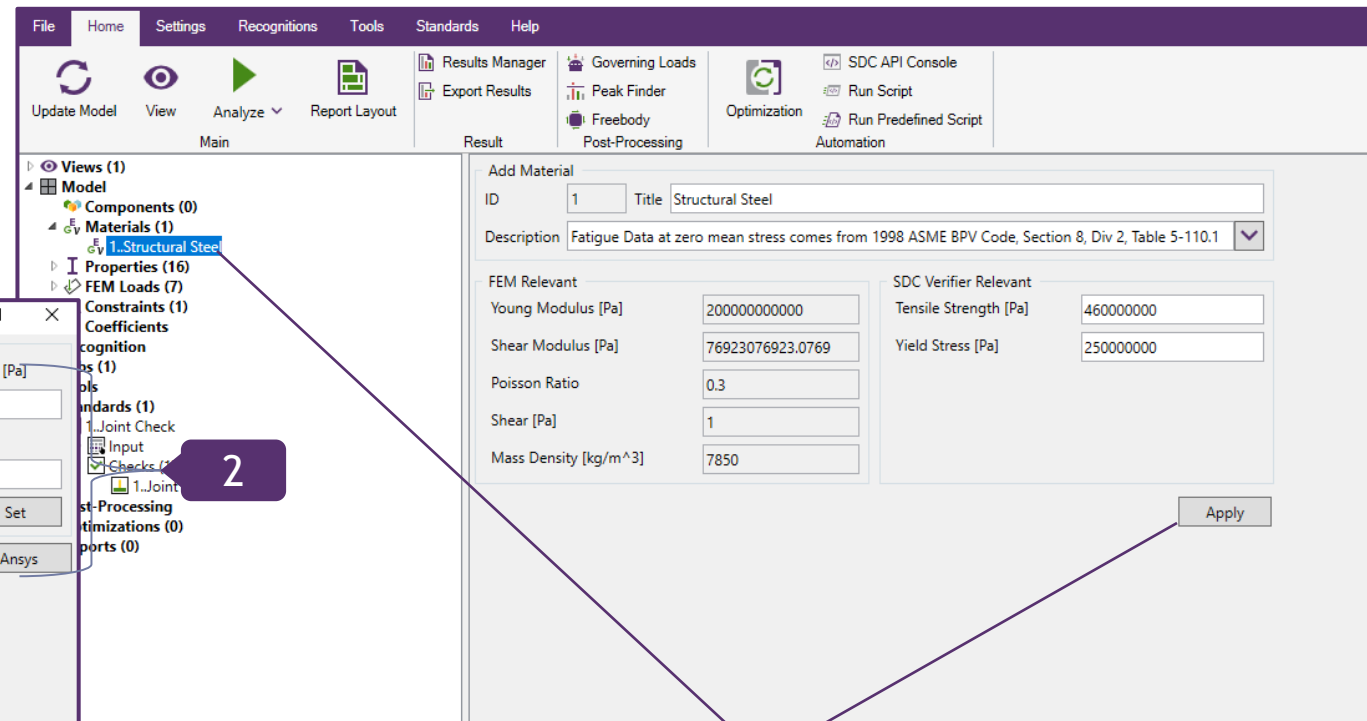
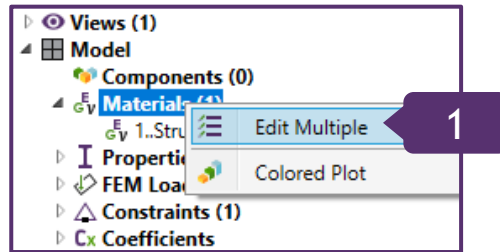


1 In Model section, execute right click on Materials (1) and select Edit Multiple

2 Set required properties and press OK

All results are based on material fatigue parameters Tensile Strength and Yield Stress. Parameters are used to define the allowable static stress of the material. $\text{Allowable} = \text{Min}(\text{Yield Stress}, \text{Tensile Strength} * 2 / 3)$. For ISO and Norsok joint checks:

$\text{Allowable} = \text{Min}(\text{Yield Stress}, \text{Tensile Strength} * 0.8)$.



Alternatively, it is possible to set values for selected materials in the Main Window. Select material, fill parameters and press Apply.

Joint classification as K, T & Y, or cross (X) should apply to individual braces according to their load pattern for each load case. To be considered a K-joint, the punching load in a brace should be essentially balanced by loads on other braces in the same plane on the same side of the joint. In T and Y joints the punching load is reacted as beam shear in the chord. In cross joints the punching load is carried through the chord to braces on the opposite side. For braces that carry part of their load as K-joints, and part as T & Y or cross joints interpolate based on the portion of each in total. Examples are shown in Figure E.3-2. See Commentary on Joint Classifications.

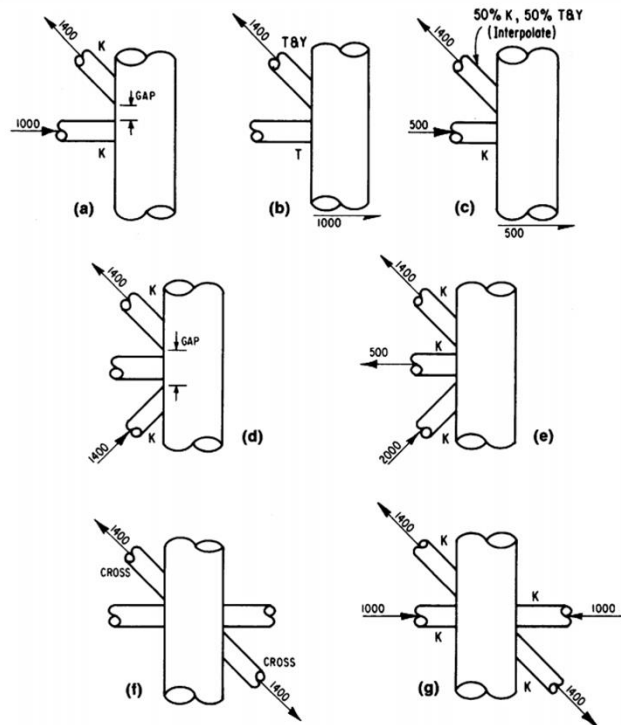


FIG. E.3-2
EXAMPLES OF JOINT CLASSIFICATION

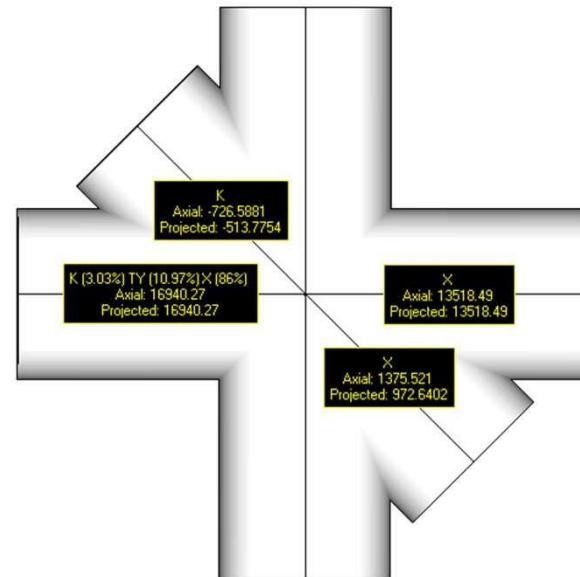
Joint type is based on type of loading. By checking if forces of connection are balanced joint types are classified on K, TY and X (Cross).

K - tension and compression loads are balanced.

TY - tension or compression load goes as shear force in a chord.

X (Cross) - Connection has to contain braces from the both sides to check on cross joint. If balanced forces of all braces of one side and balanced forces of all braces of other side are equal, all braces are classified as X (Cross).

Interpolation - the order of joint type recognition is the following: K -> X (Cross) -> TY. Each brace can have all 3 types of joint type taken as percentage of axial load of brace to summation of all braces loads.



Projected - axial force that is perpendicular to the chord.

If Projected = 0 - brace type is set to TY.

If percentage is not mentioned, 100% is taken for the type.

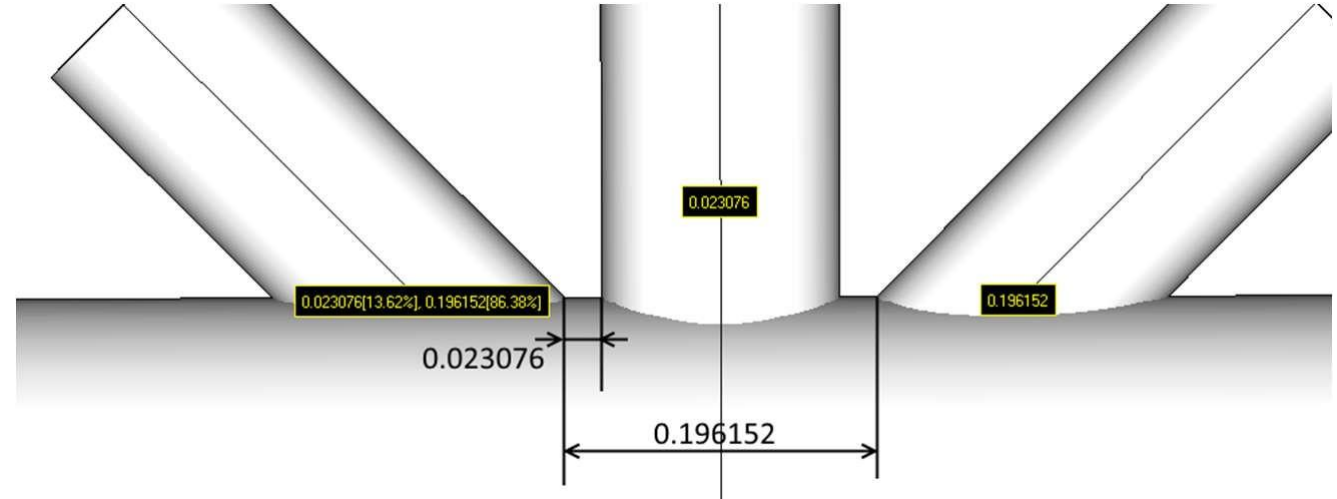
Gap is the distance between two differently loaded braces (tension and compression) on a shell of a chord. Depending on load, it is possible that brace can have two or more gaps to consider. Each gap percentage depends on the percentage of a taken load:

$$percentage = \begin{cases} \frac{projected}{F_{Compression}}, & projected < 0 \\ \frac{projected}{F_{Tension}}, & projected \geq 0 \end{cases}$$

Projected - axial force of the brace, perpendicular to the chord;

F_{Tension} - sum of all positive projected axial forces;

F_{Compression} - sum of all negative projected forces;



Joint Check Expand Table

1

In Standards => 1..Joint Check => Checks (1), execute right click on 1..Joint Check 1 and select **Table (expand/extreme)**

2

Press  and select Load Set => **Load Set** => 1..All loads combination;
Press OK

3

Filter by Parameter: **Overall Utilization Factor**
Sort by Parameter: **Overall Utilization Factor**

4

Press **Fill Table**

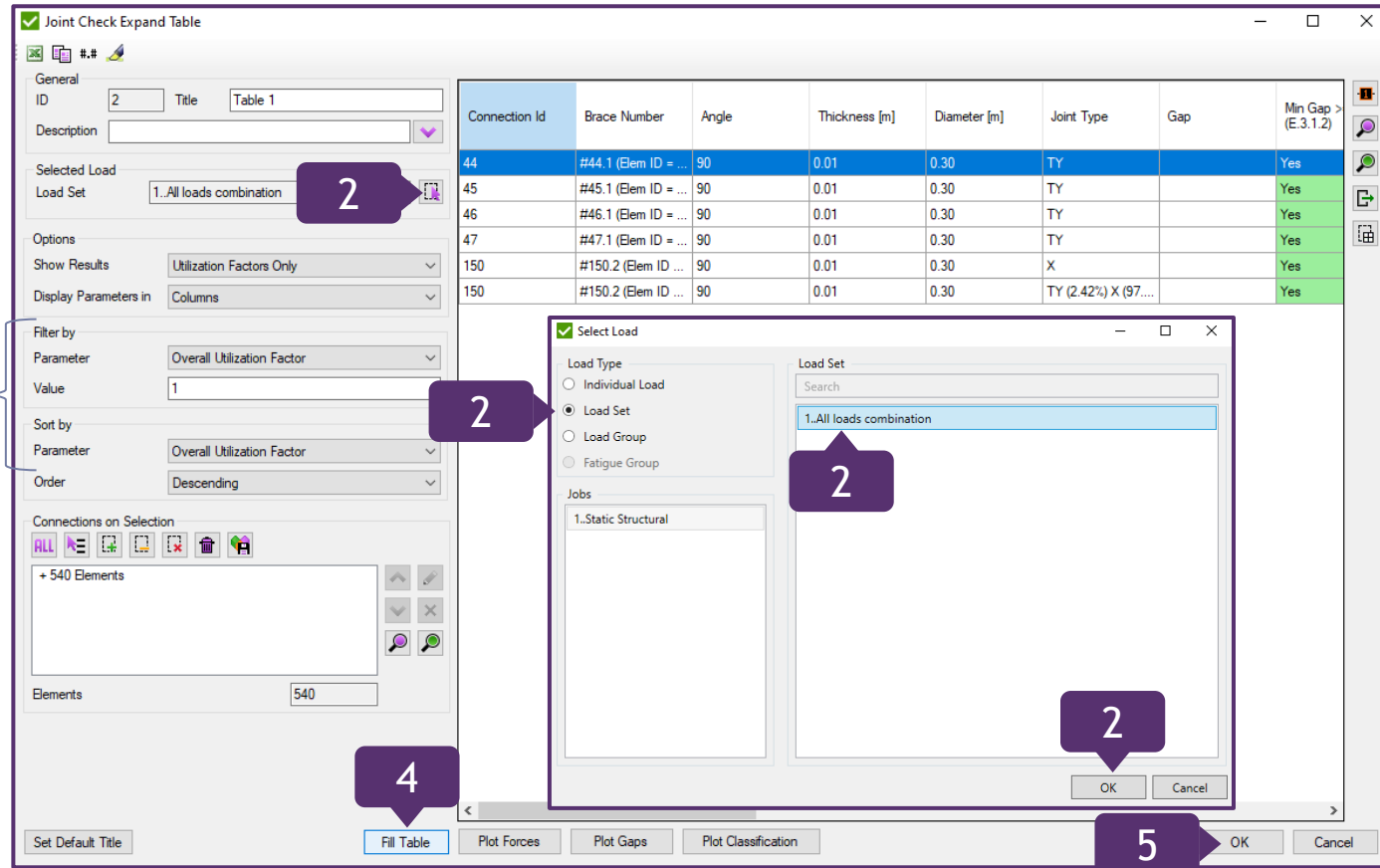
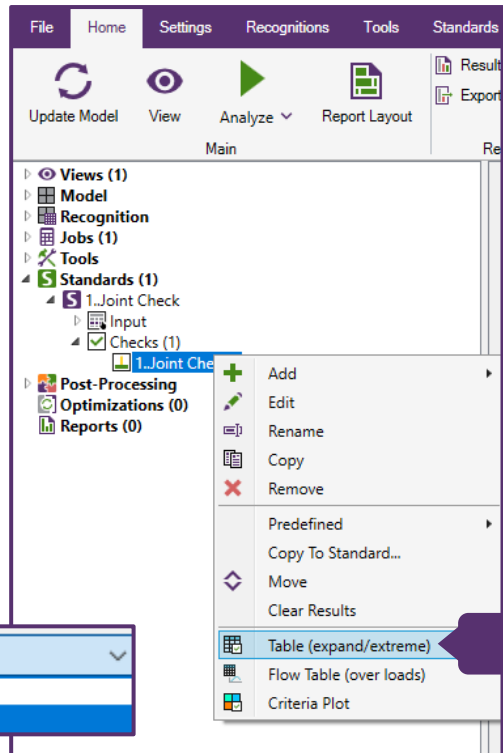
5

Press **OK**

Table build type allows to fill parameters in Columns and connections in Rows and vice versa. Parameters in Rows can be used for a single connection, for example.

Display Parameters in

Columns
Rows
Columns




Plot Forces - plot original, transformed axial forces and brace joint types;
Plot Gaps - plot gaps if there is more than one brace in connection;
Plot Classification - plot brace joint types;

Joint Check Expand Flow Table

1

In Standards => 1..Joint Check => Checks (1), execute right click on 1..Joint Check 1 and select *Flow Table (over loads)*

2

In Loads Count, press  and select *All Loads*

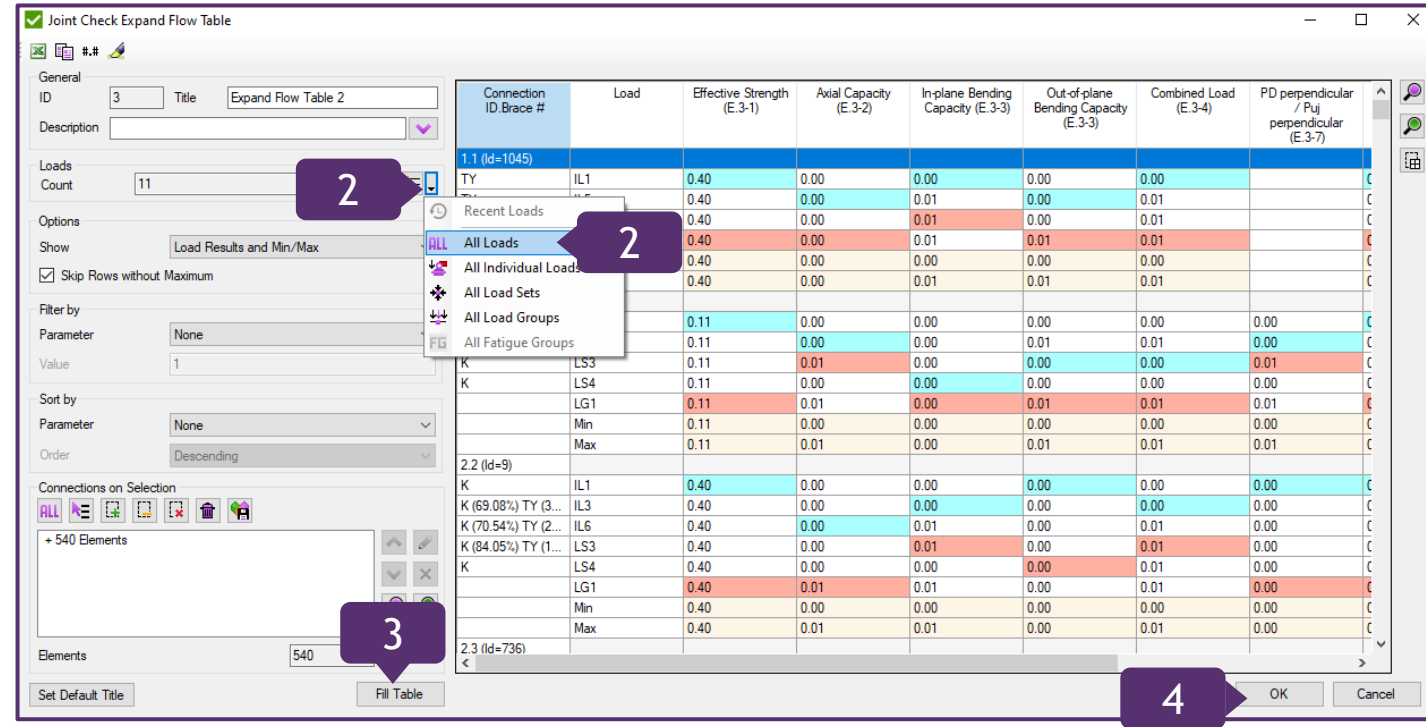
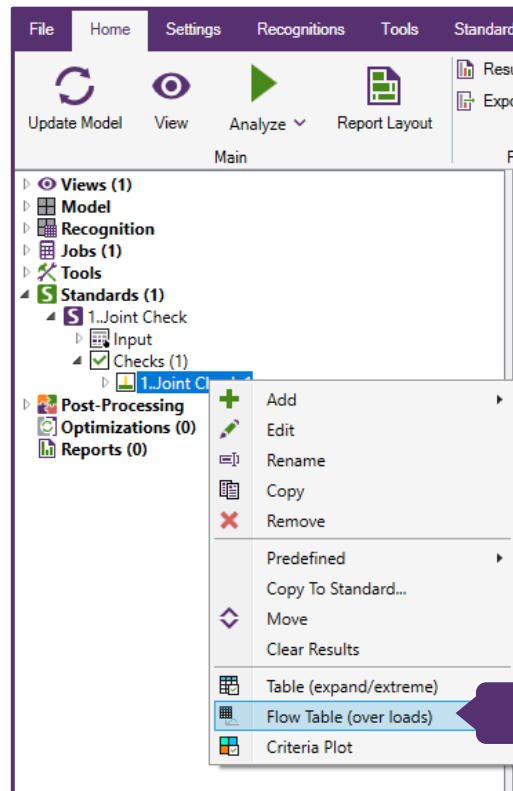
3

Press *Fill Table*

4

Press *OK*

Expand Flow table is used to display multiple load results at once for each selected connection.



Skip rows without maximum refers to the single connection. If load does not cause extreme values on any parameter it will not be displayed.

It is possible to display only Load Results, only Min/Max results or both.

Joint Check Criteria Plot

1

In Standards => 1..Joint Check => Checks (1), execute right click on 1..Joint Check 1 and select *Criteria Plot*

2

Press  and select Load Set => *Load Set* => 1..All loads combination;
Press OK

3

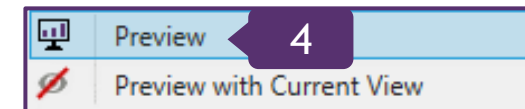
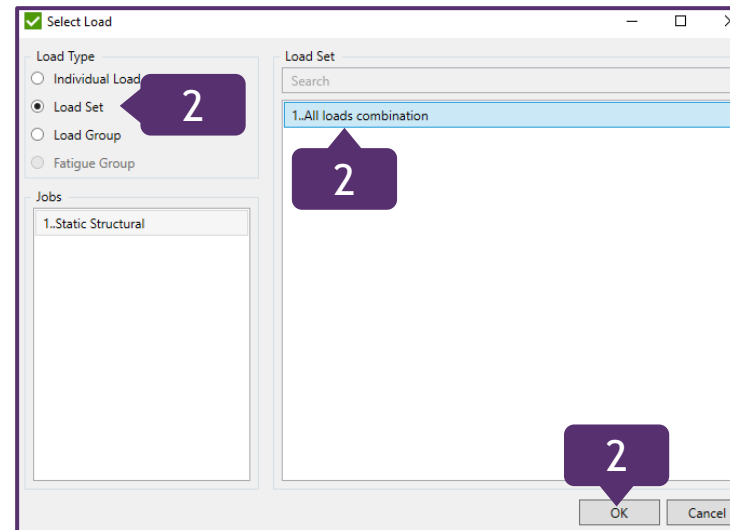
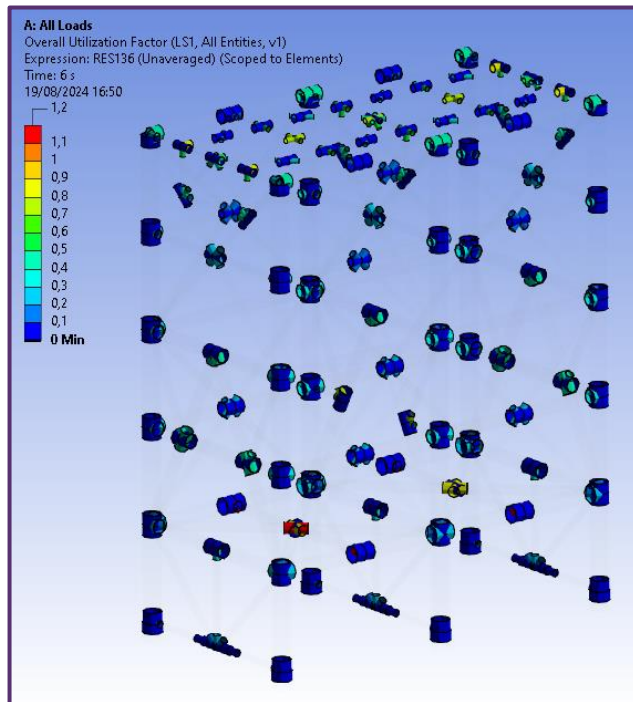
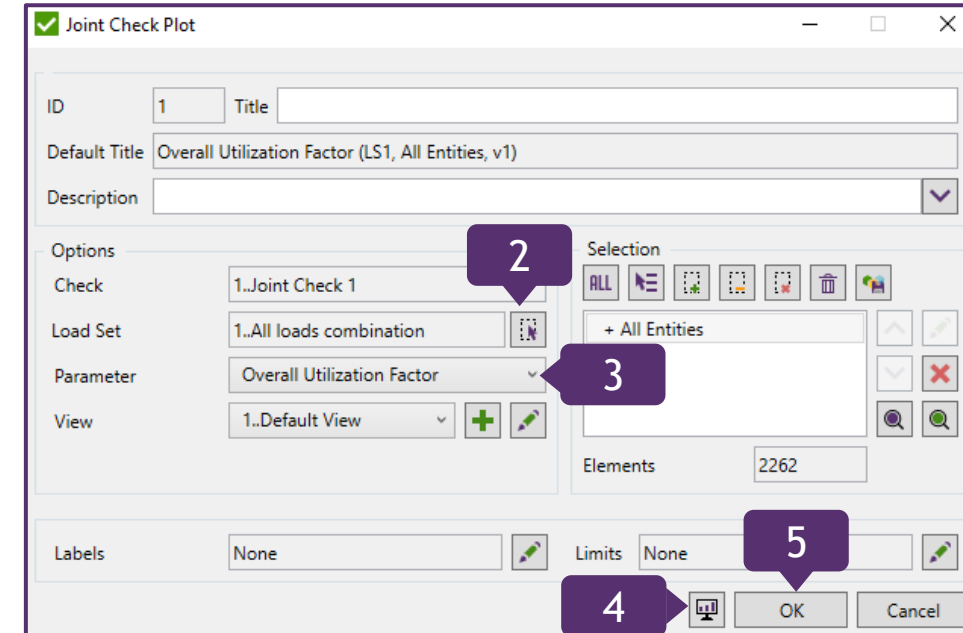
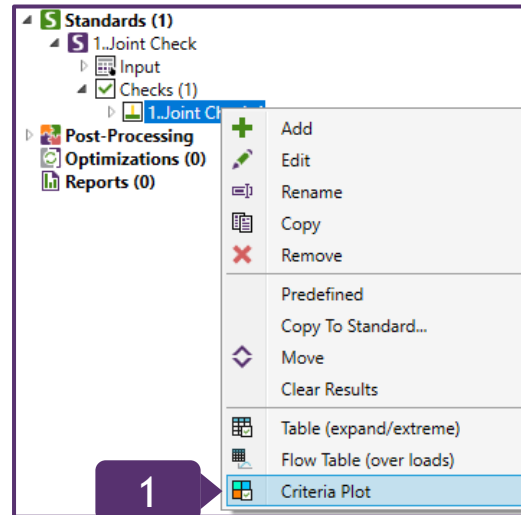
Parameter: Overall Utilization Factor

4

Press  and then Preview

5

Press OK



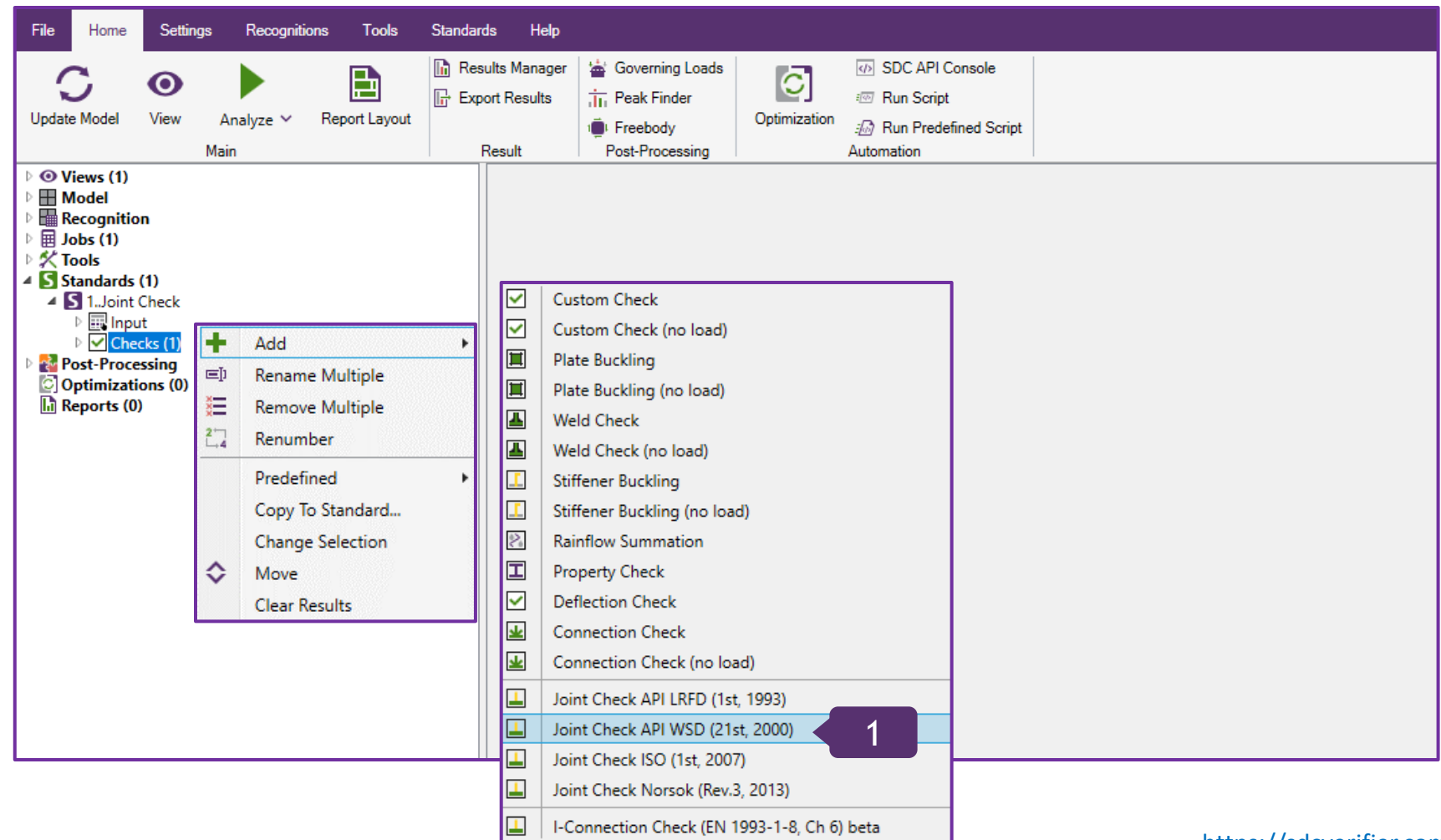
Add Joint Check API WSD (21st, 2000)

1

In 1..Joint Check, execute right click on Checks (1) => Add => Joint Check API WSD (21st, 2000)

Joint Check API WSD is a part of the Standard API RP WSD (21st, published in 2000).

Joint Check API WSD interface is similar to Joint Check API LRFD.

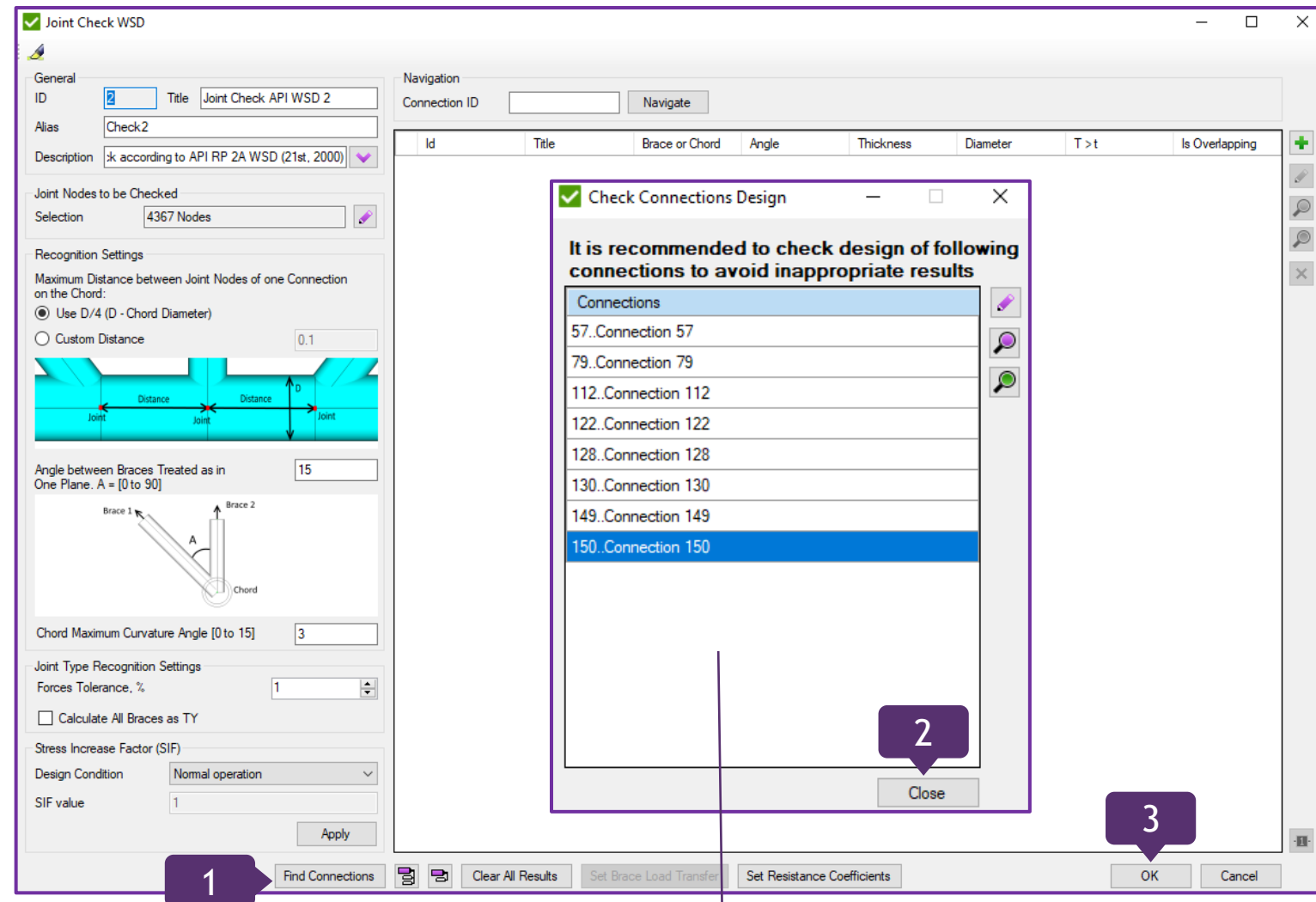


Find connections in Joint Check API WSD 2

1 Press *Find Connections*

2 Press *Close*

3 Press *OK*



The detailed descriptive steps on how to check Connections Design have been presented on slides 10-19.

Joint Check API WSD 2 Criteria Plot

1

In Standards => 1..Joint Check => Checks (2), execute right click on 2..Joint Check API WSD 2 and select *Criteria Plot*

2

Press  and select Load Set => Load Set => 1..All loads combination; Press OK

3

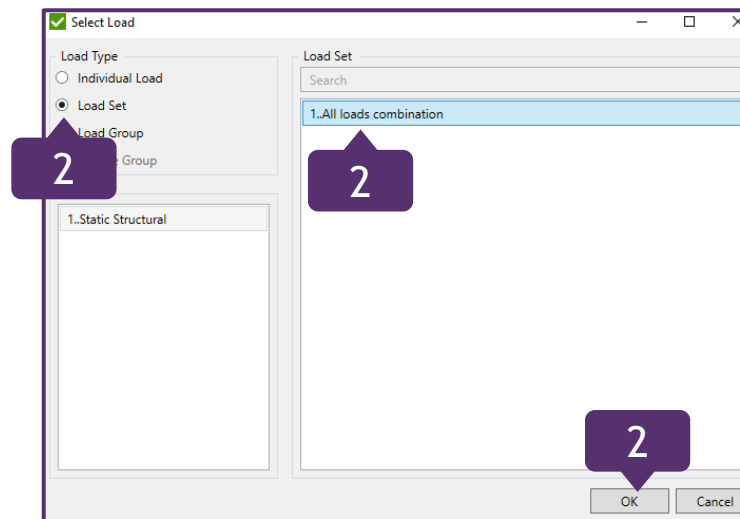
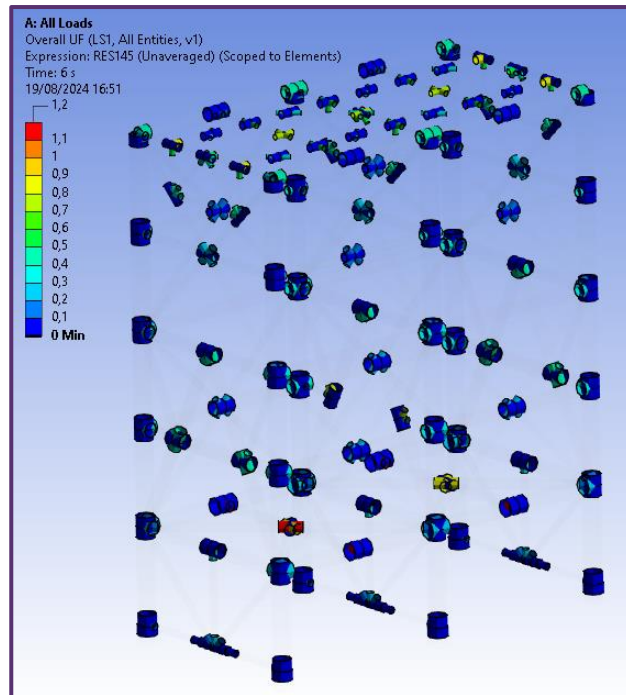
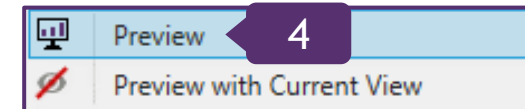
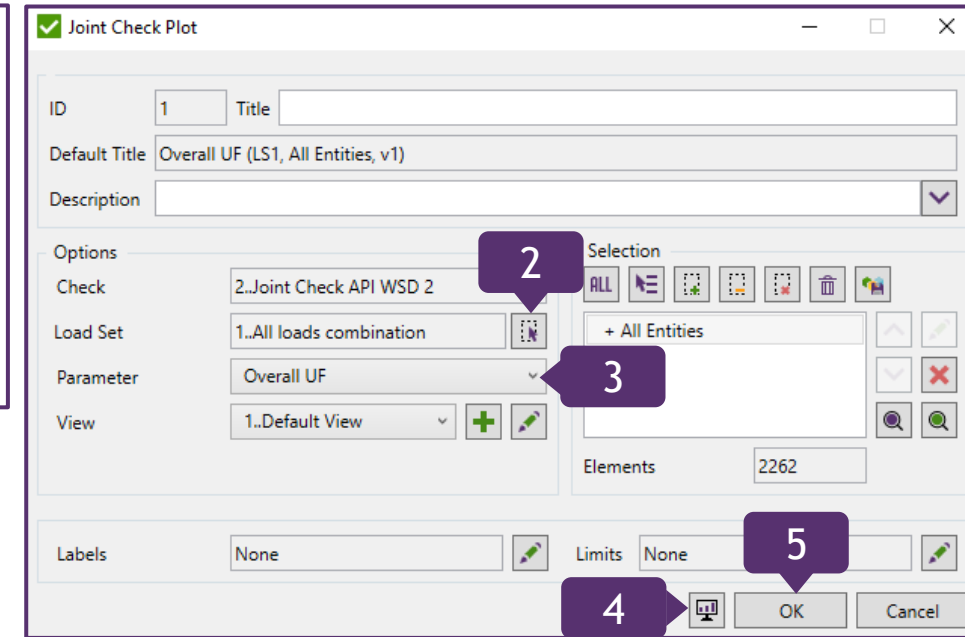
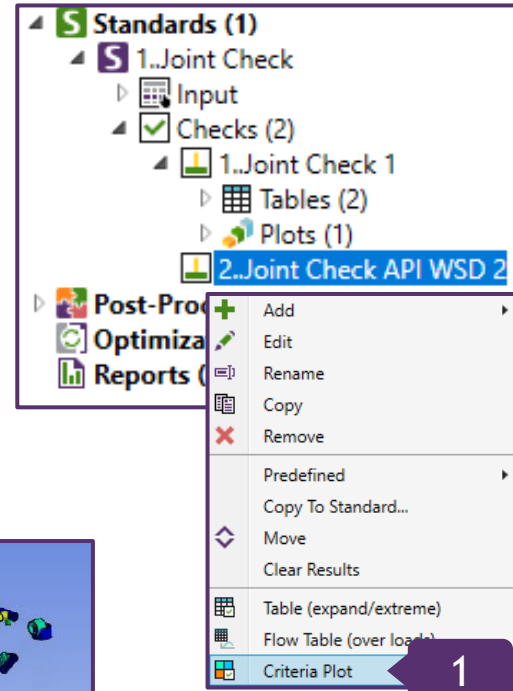
Parameter: Overall UF

4

Press  and then Preview

5

Press OK



Steps on how to add Table (expand/extreme) and Flow Table (over loads) are described in slides 23 and 25.

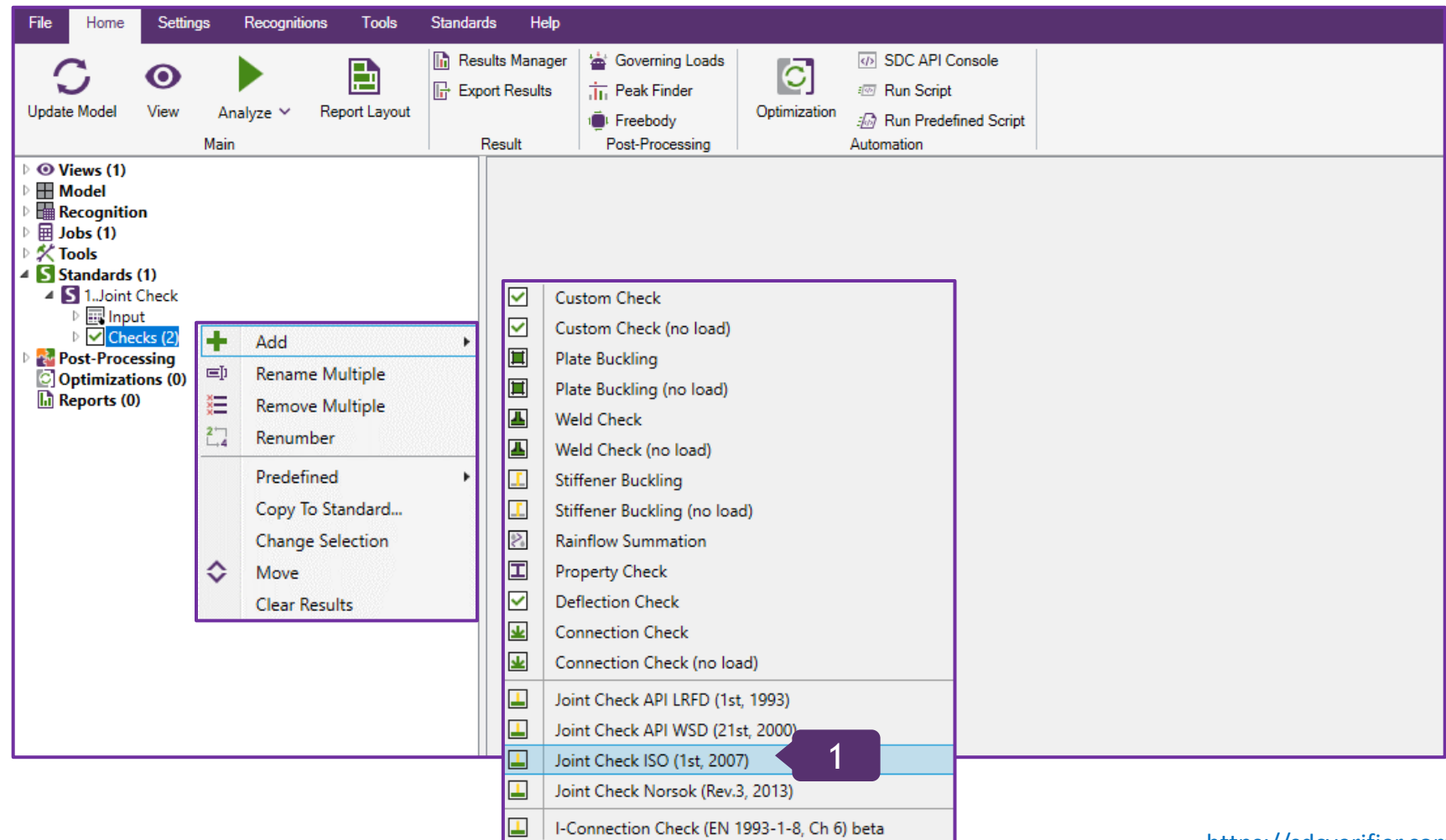
Add Joint Check ISO (1st, 2007)

1

In 1..Joint Check, execute right click on Checks (2) => Add => Joint Check ISO (1st, 2007)

Joint Check ISO is a part of the Standard ISO 19902 (first edition, published 12 DEC 2007).

Joint Check ISO interface is similar to Joint Check API.

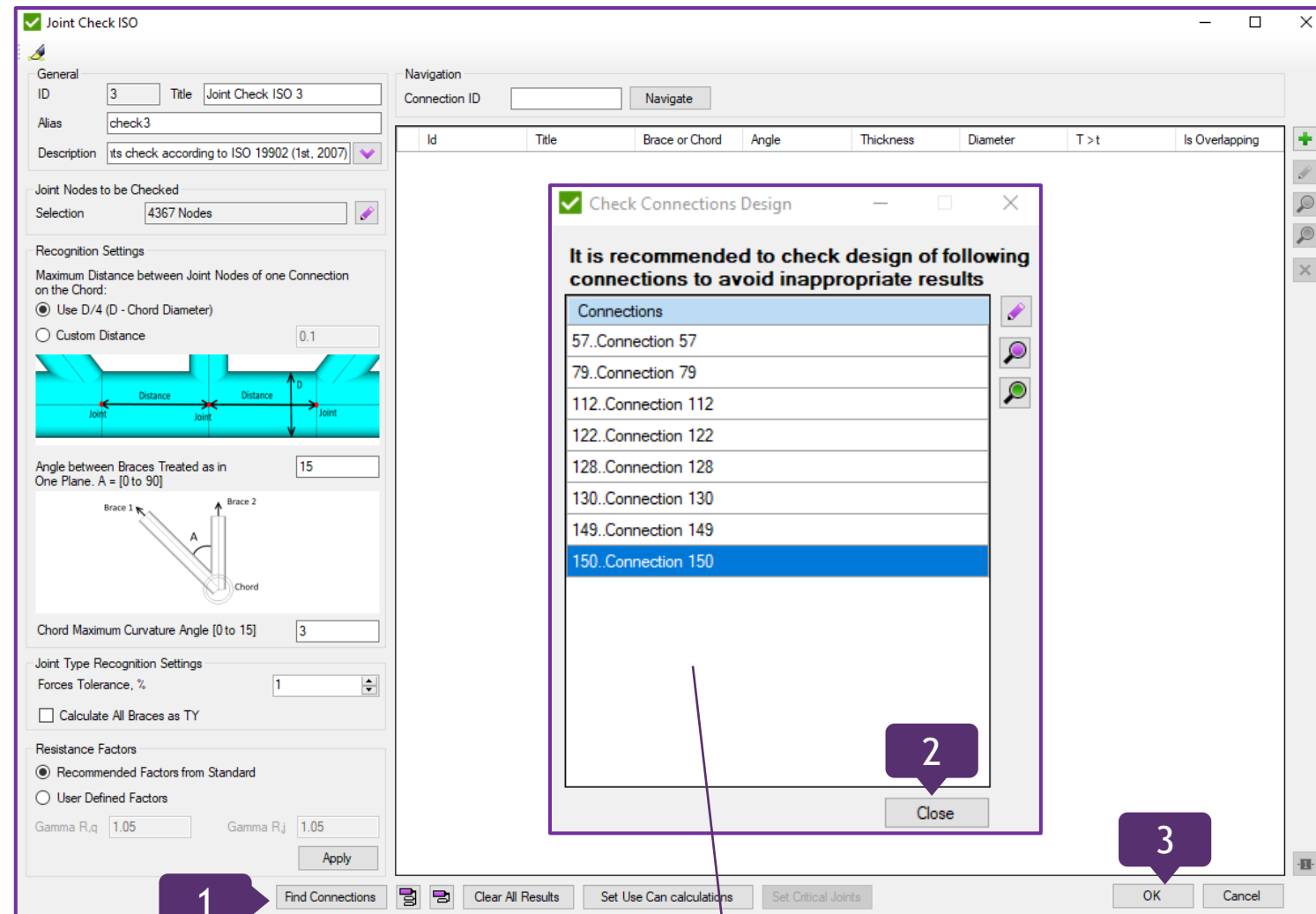


Find connections in Joint Check ISO 3

1 Press *Find Connections*

2 Press *Close*

3 Press *OK*



The detailed descriptive steps on how to check Connections Design have been presented on slides 10-19.

Joint Check ISO 3 Criteria Plot

1

In Standards => 1..Joint Check => Checks (3), execute right click on 2..Joint Check ISO 3 and select *Criteria Plot*

2

Press  and select Load Set => Load Set => 1..All loads combination;
Press OK

3

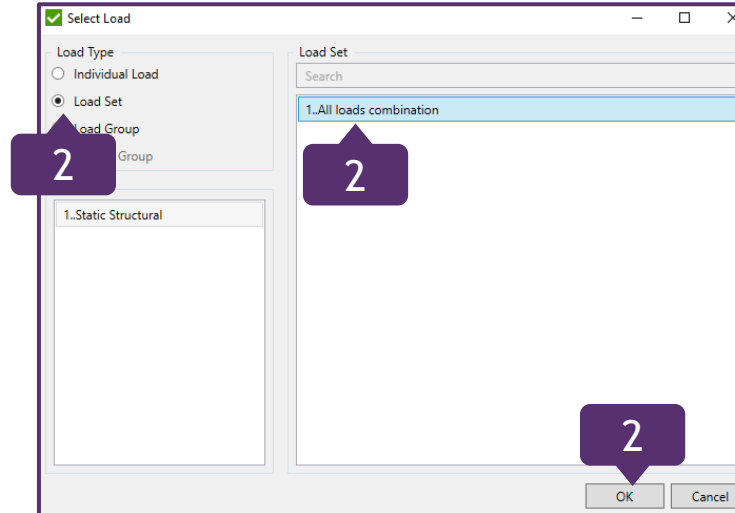
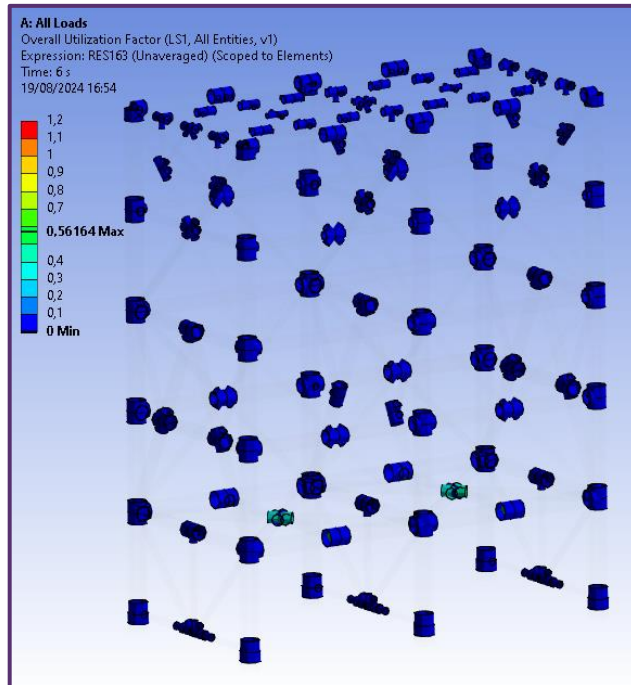
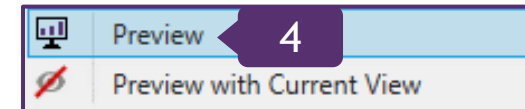
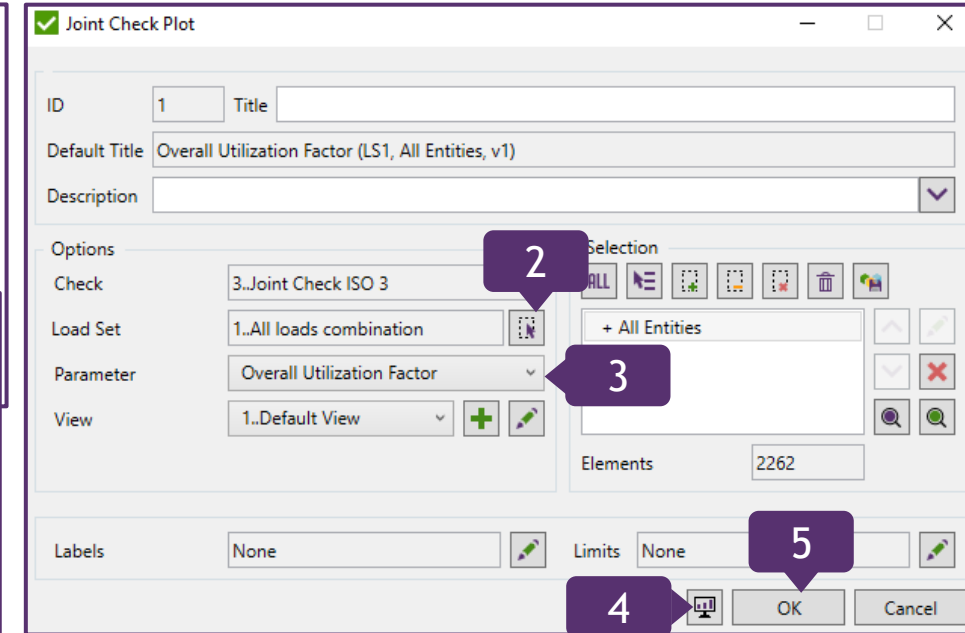
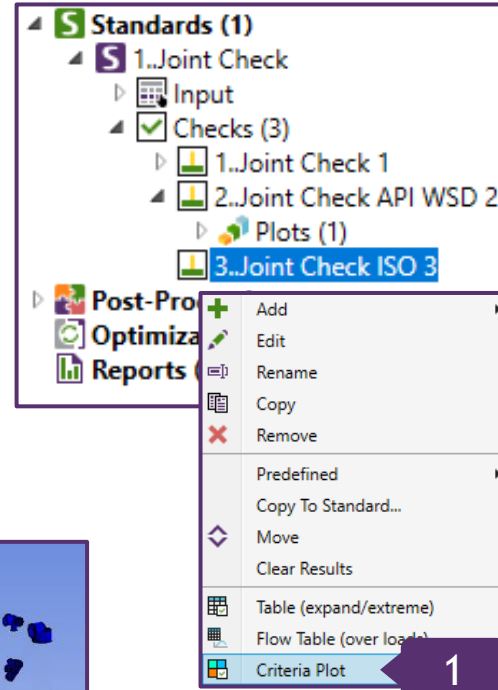
Parameter: *Overall Utilization Factor*

4

Press  and then Preview

5

Press OK



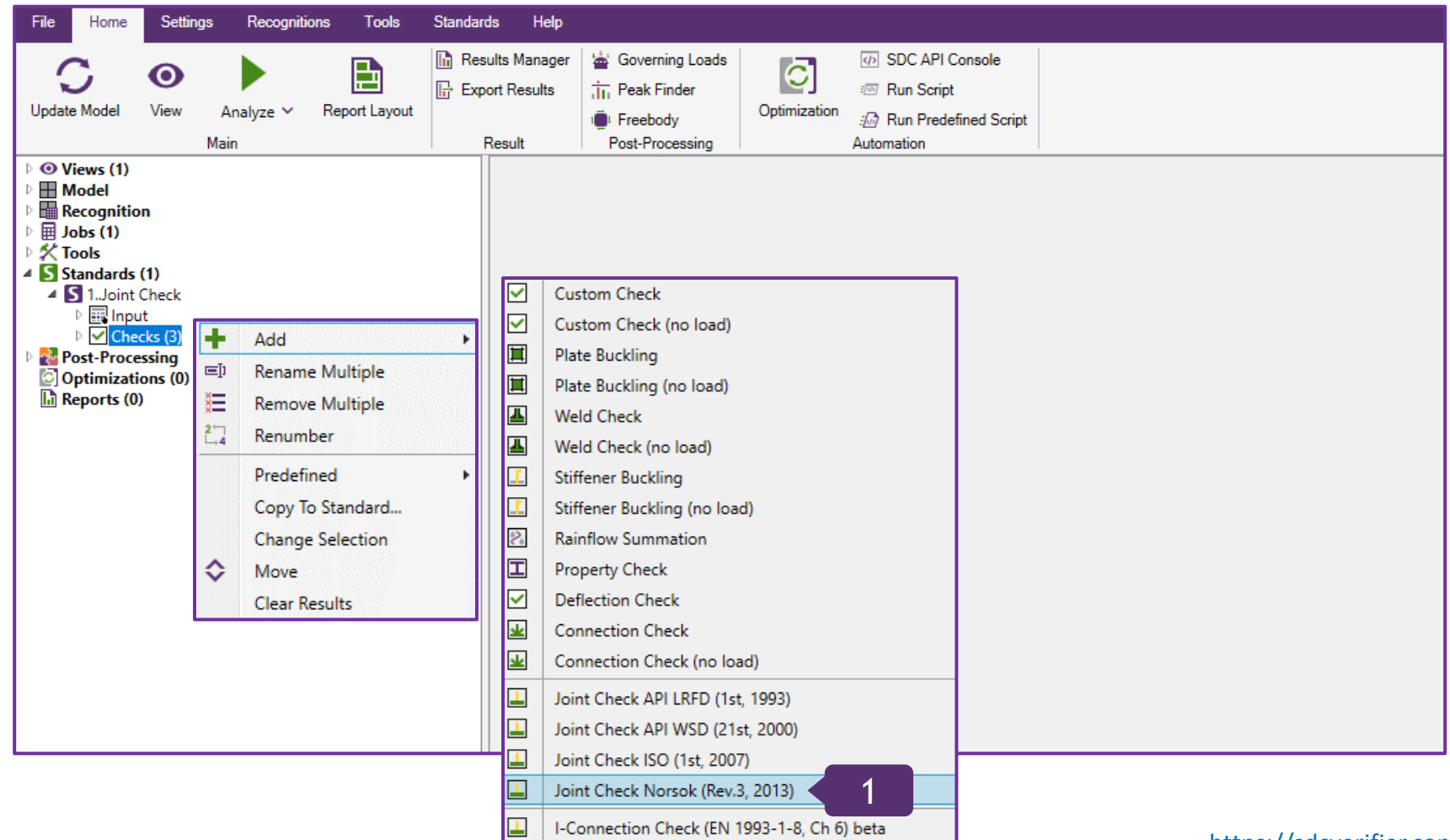
Steps on how to add Table (expand/extreme) and Flow Table (over loads) are described in slides 23 and 25.

1

In 1..Joint Check, execute right click on Checks (3) => Add => Joint Check Norsok (Rev.3, 2013)

Joint Check Norsok is a part of the Standard Norsok N004 (Rev.3, February 2013).

Joint Check Norsok interface is similar to Joint Check API.

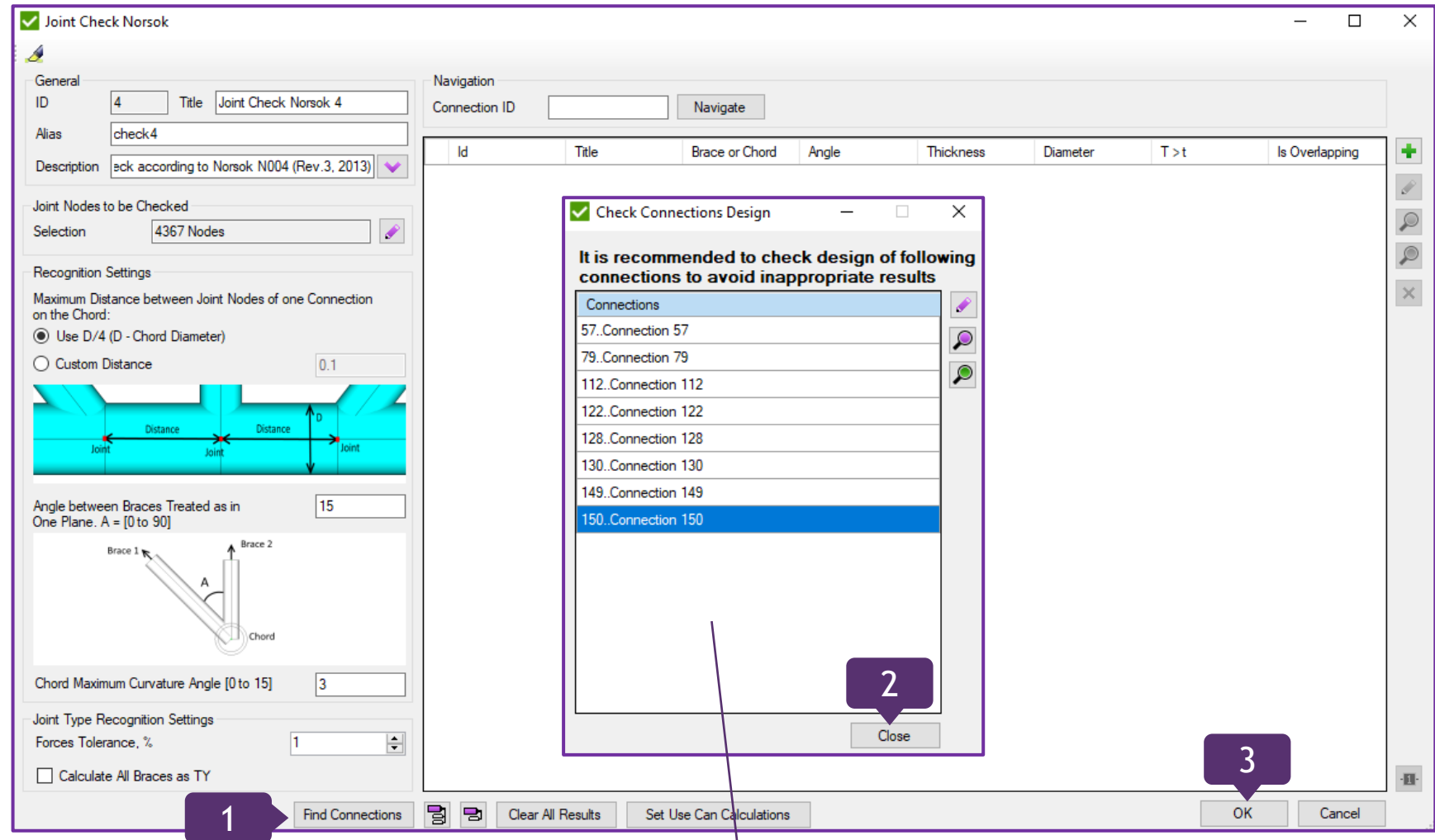


Find connections in Joint Check Norsok 4

1 Press *Find Connections*

2 Press *Close*

3 Press *OK*



The detailed descriptive steps on how to check Connections Design have been presented on slides 10-19.

Joint Check Norsok 4 Criteria Plot

1

In Standards => 1..Joint Check => Checks (4), execute right click on 2..Joint Check Norsok 4 and select *Criteria Plot*

2

Press  and select Load Set => Load Set => 1..All loads combination;
Press OK

3

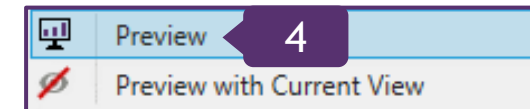
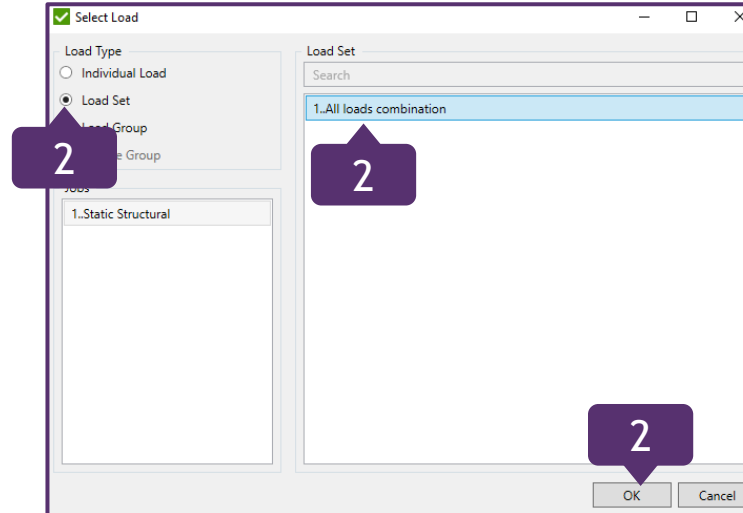
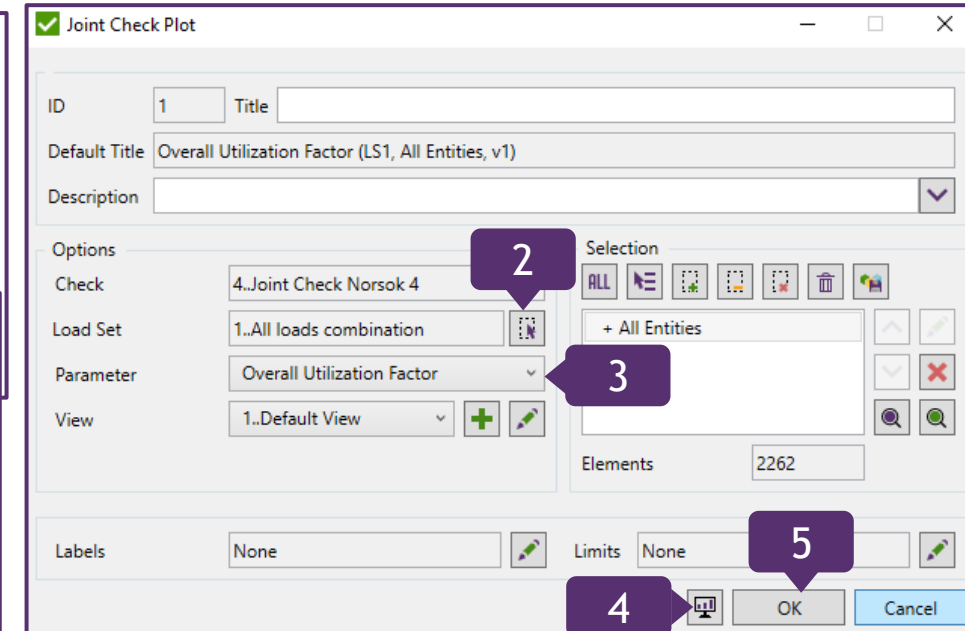
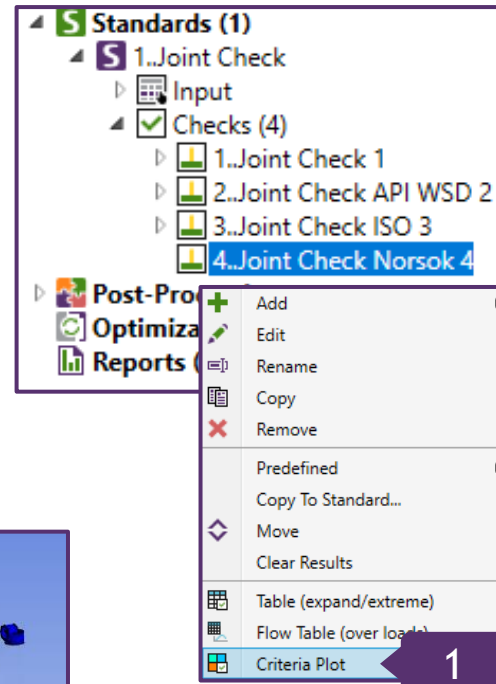
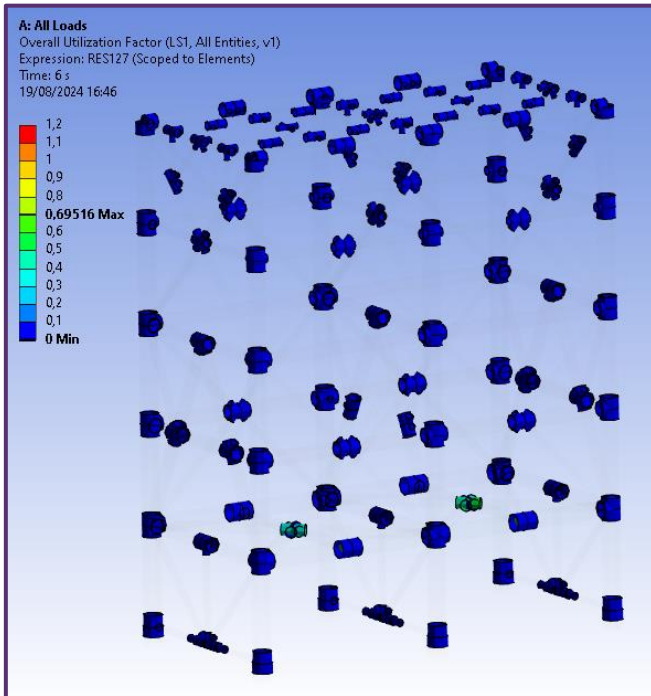
Parameter: Overall Utilization Factor

4

Press  and then Preview

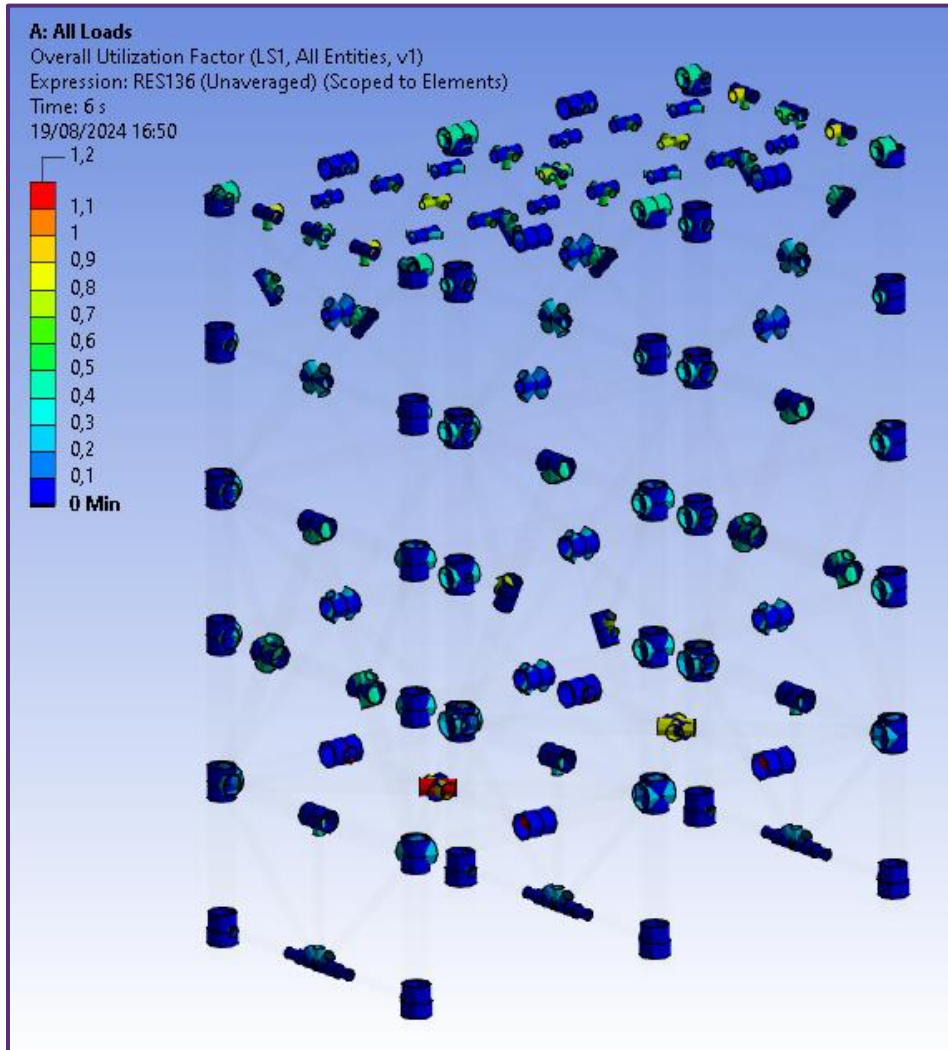
5

Press OK

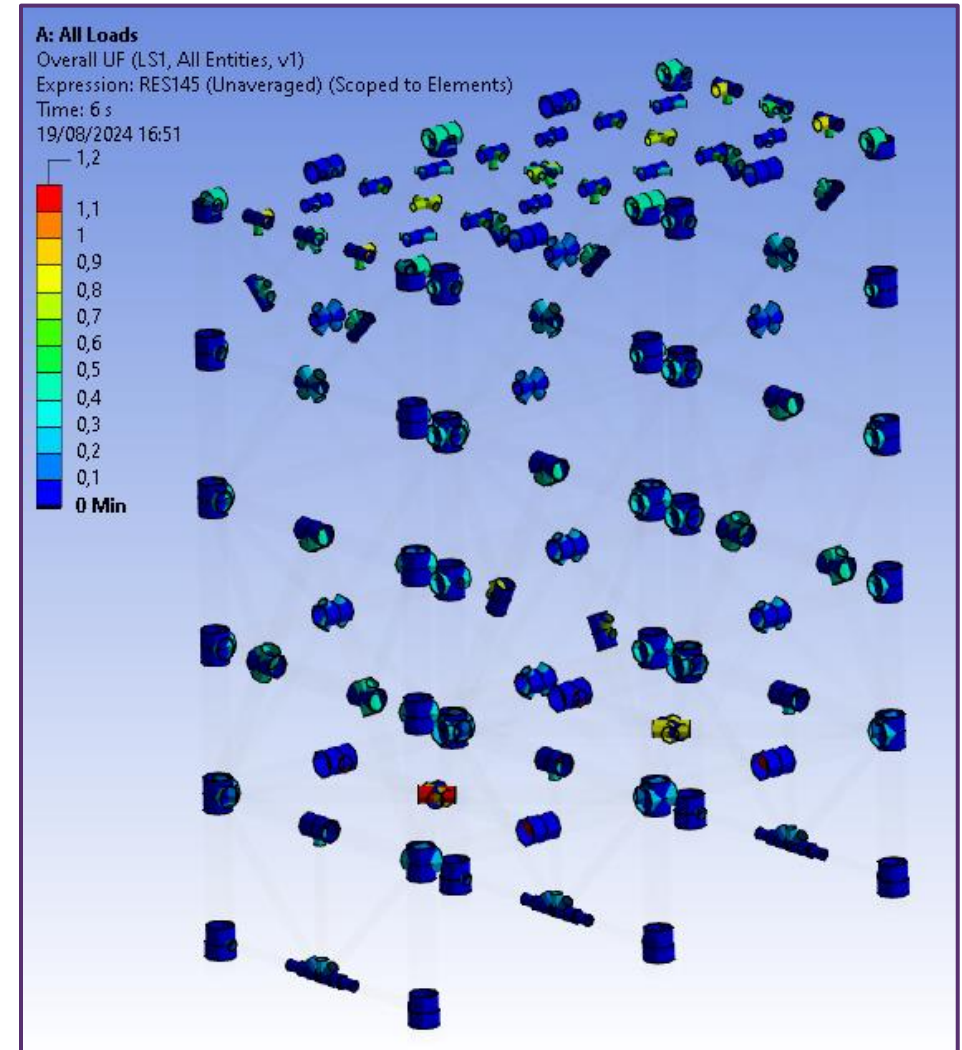


Steps on how to add Table (expand/extreme) and Flow Table (over loads) are described in slides 23 and 25.

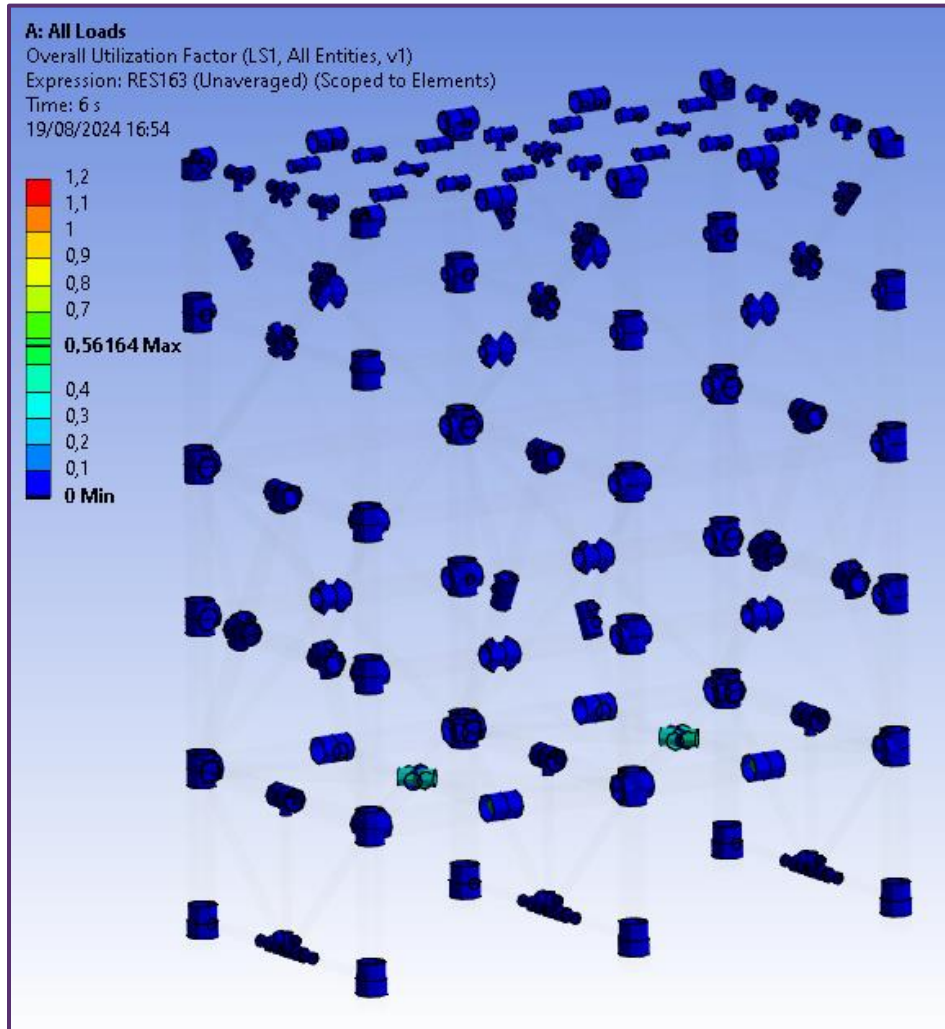
Joint Check 1



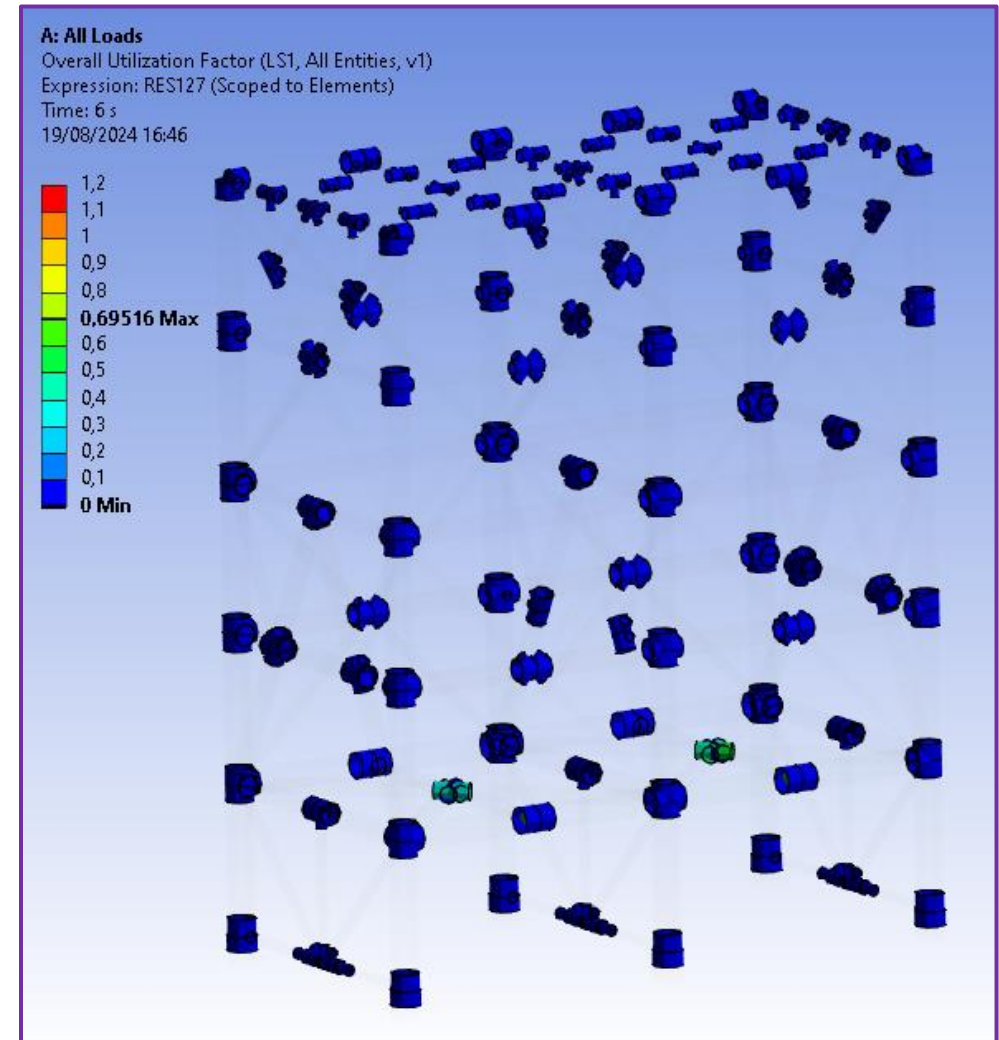
Joint Check API WSD 2



Joint Check ISO 3



Joint Check Norsok 4



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

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