SDC VERIFIER

Tutorial

Plate Buckling DNV 2010

Updated on: 12 July 2023

Tested with: SDC Verifier 2023 R1

Simcenter Femap with Nastran 2022.2 MP2

Content

- In this tutorial an DNV 2010 Plate Buckling Check is reviewed in details.

- A part of plate model of the ship has been used as a start FEM model.

- Individual Loads, Load Sets and Load Group (Envelope) are created.

- Recognition of plates, using Panel Finder is carried out.

- Plate Buckling tables and plots are created.

- Reporting: preparing and generating final report.

Open the Starter Model

1 Launch SDC Verifier for FEMAP ✅

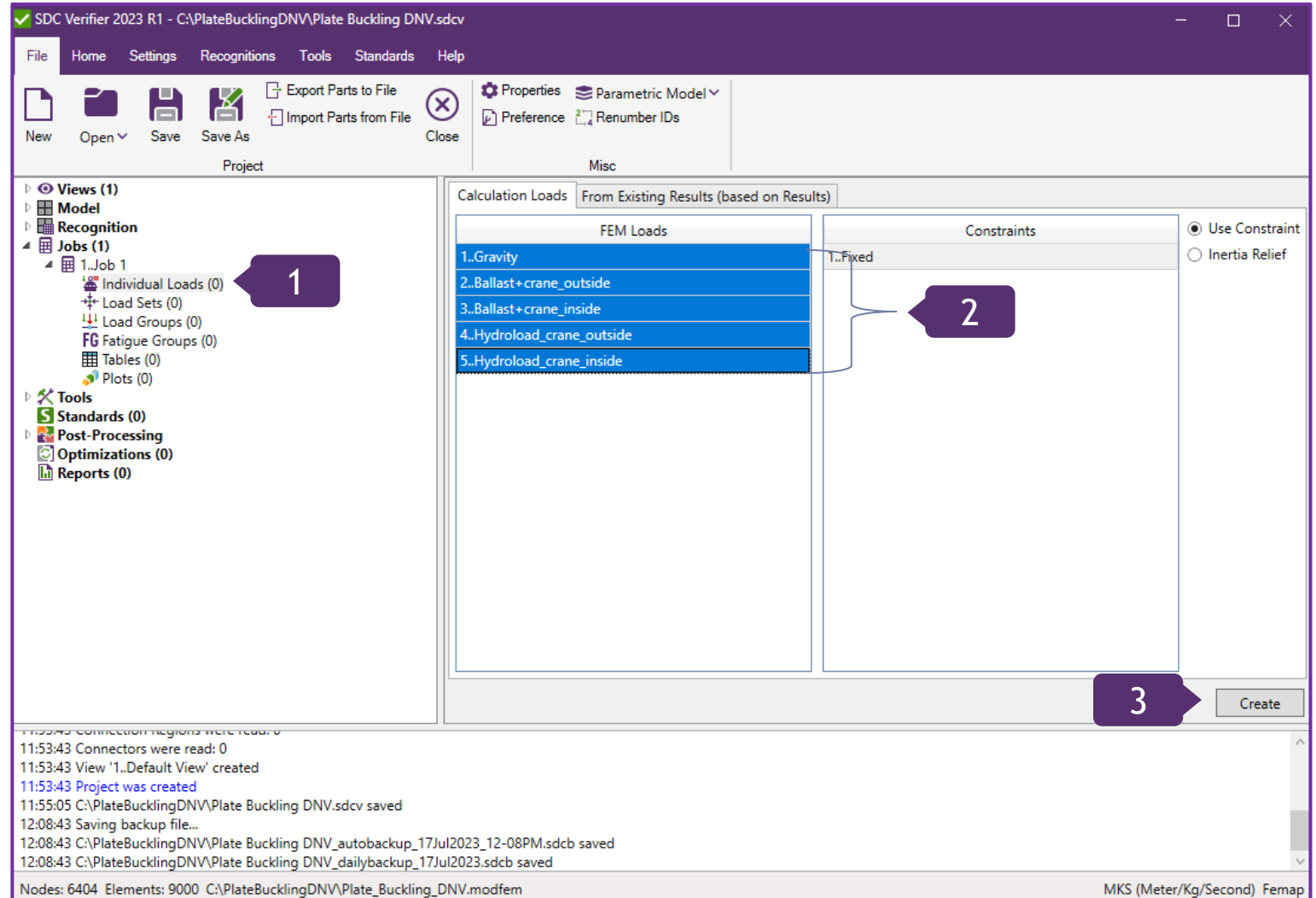**2** Select project *Plate_Buckling_DNV*

3 Press *Open*
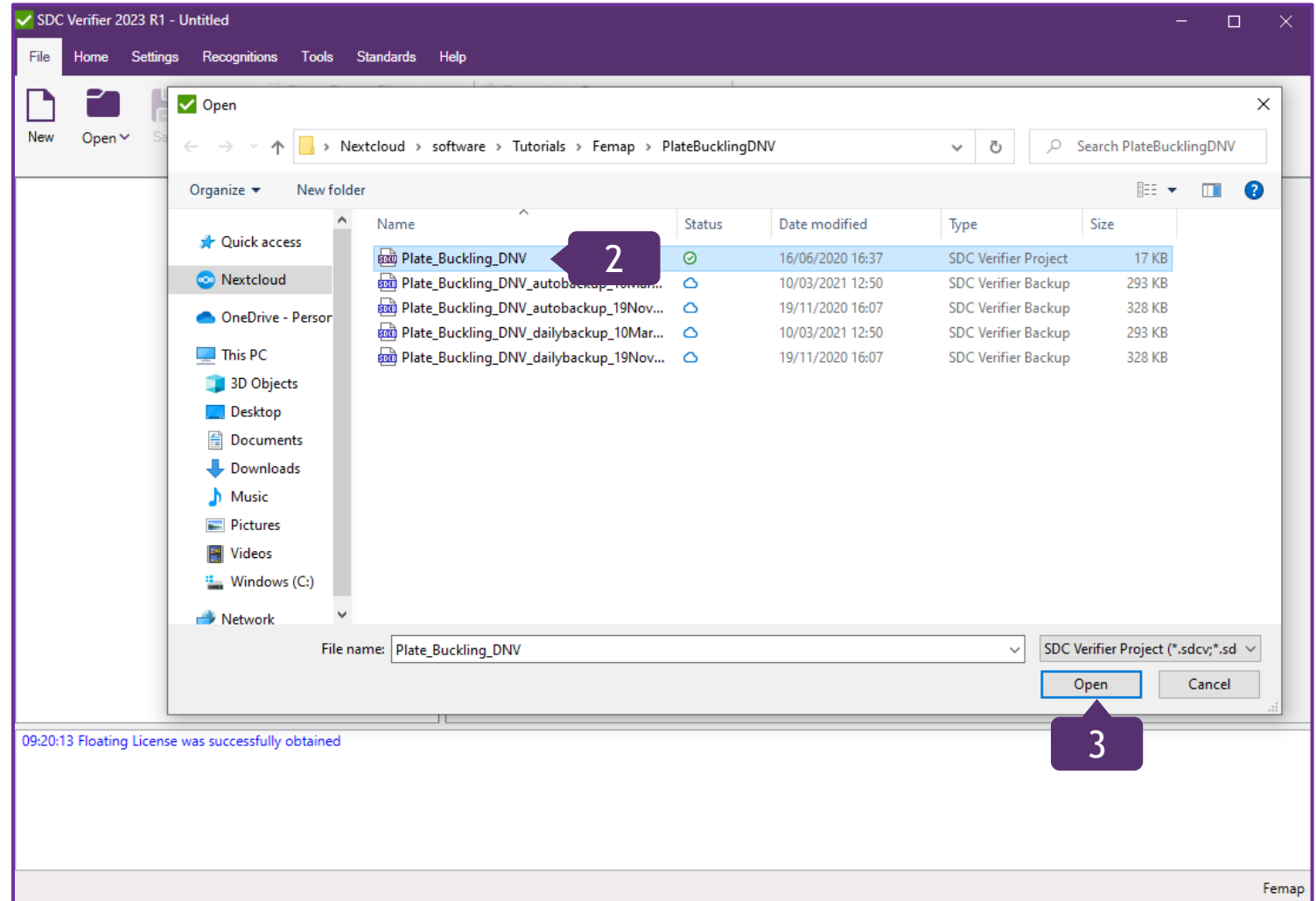
1 Select *Individual Loads* in Jobs (1) => 1..Job 1 in the *Model Tree*
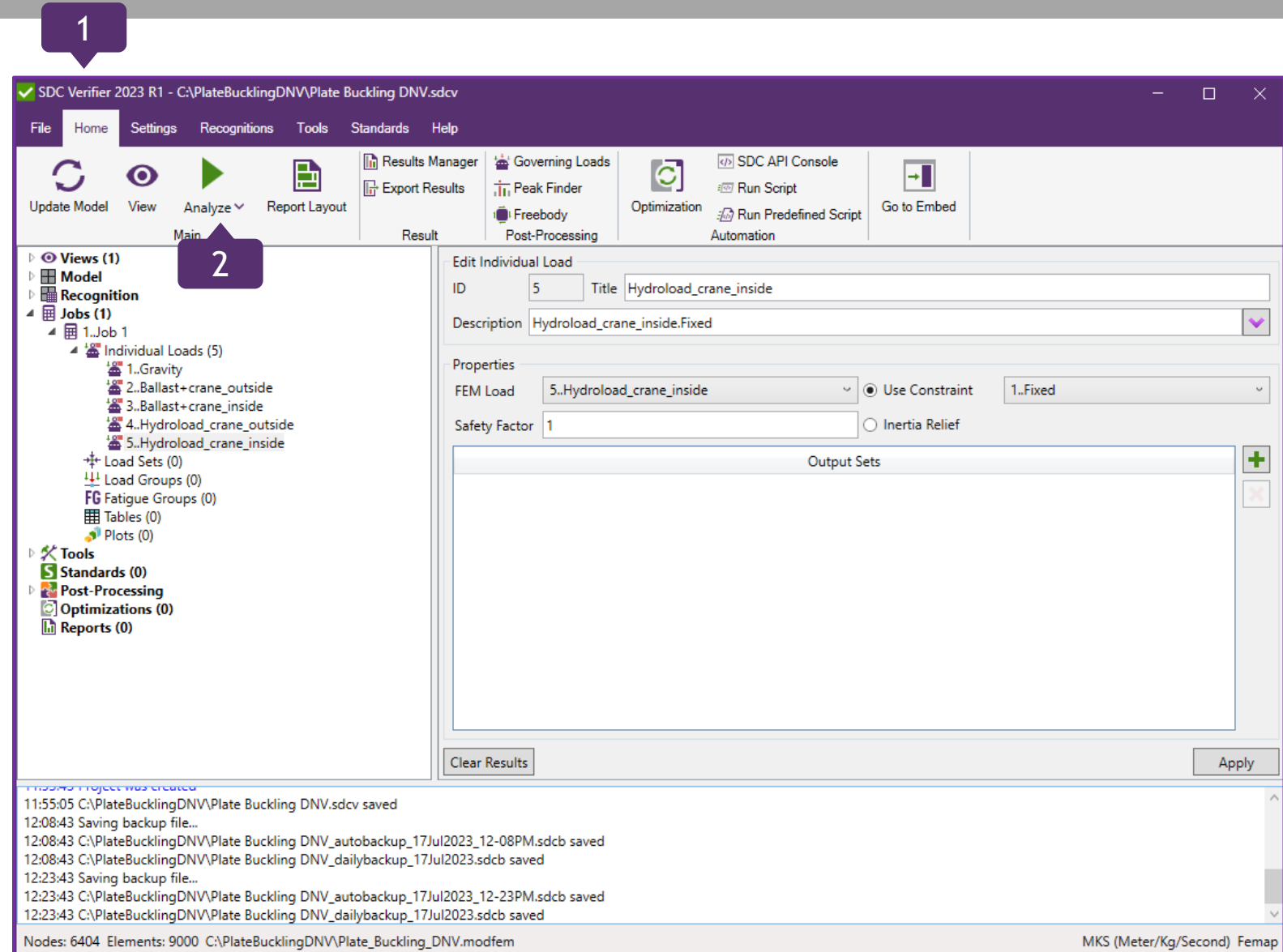
2 Select *5 FEM Loads*

3 Press *Create*

To Analyze Job

1 Go to *Home* section on the Ribbon.

2 Press ▶ on the toolbar to analyze job.

Load Sets

1 Right click on *Load Sets => Create/Edit multiple*

2 Fill in "4" into *Count* and press [+] to add four Load Sets.
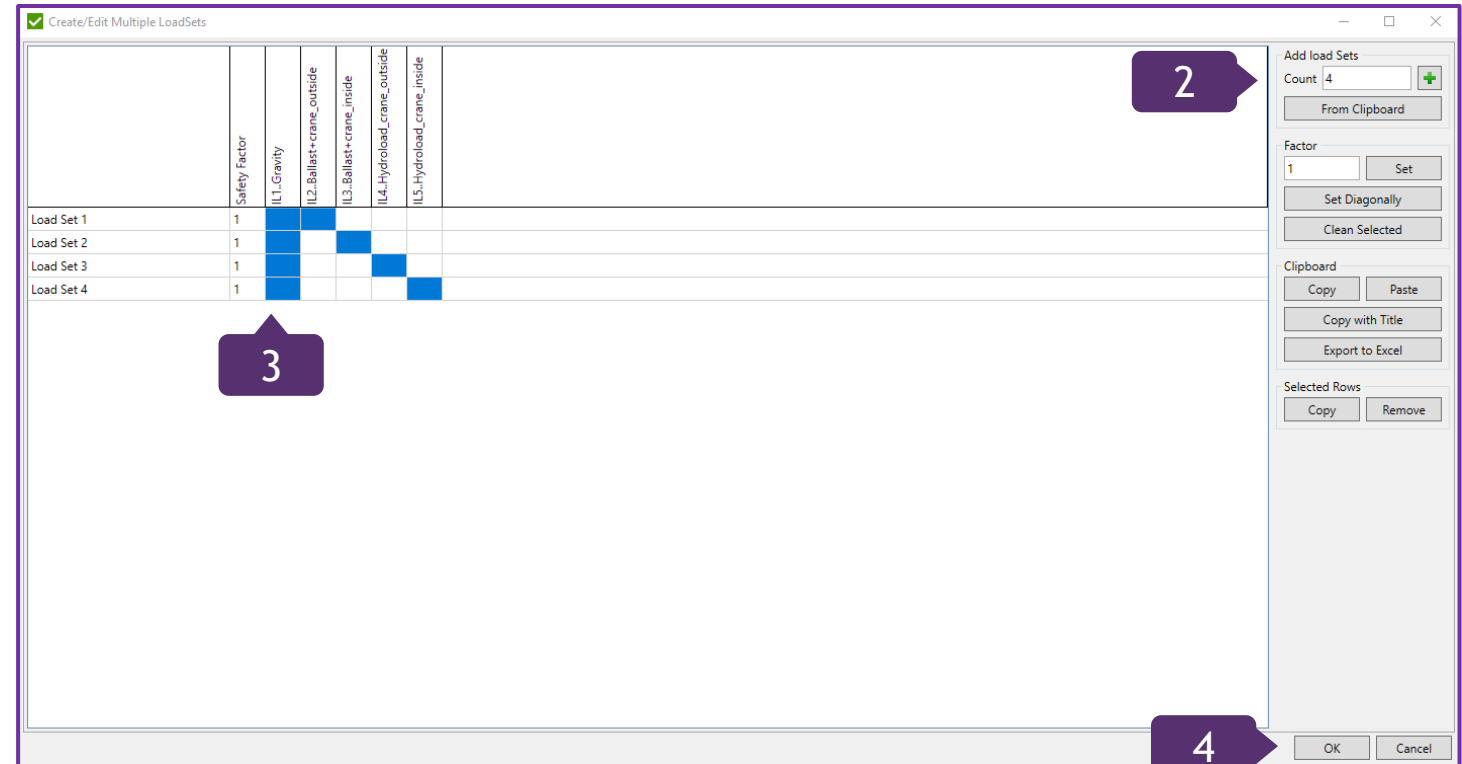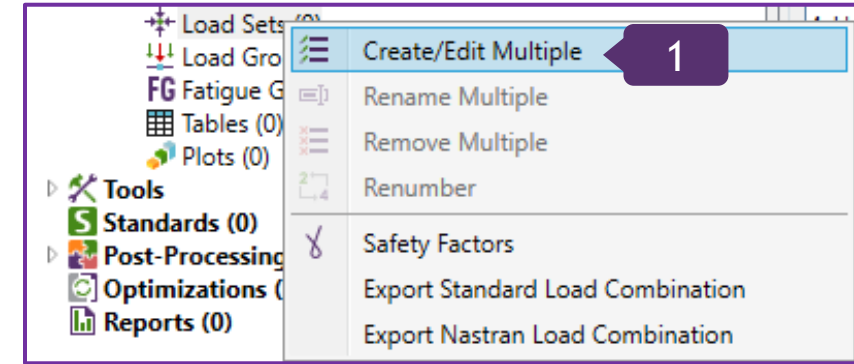
3 Select highlighted cells in table like shown on the picture and press *Set* to define Factors of Load Sets.

4 Press *OK*

Note: Load Sets are created with default titles "Load Set #". It is possible to rename them.

Alternatively, titles and factors can be pasted from Clipboard using *Paste* button.
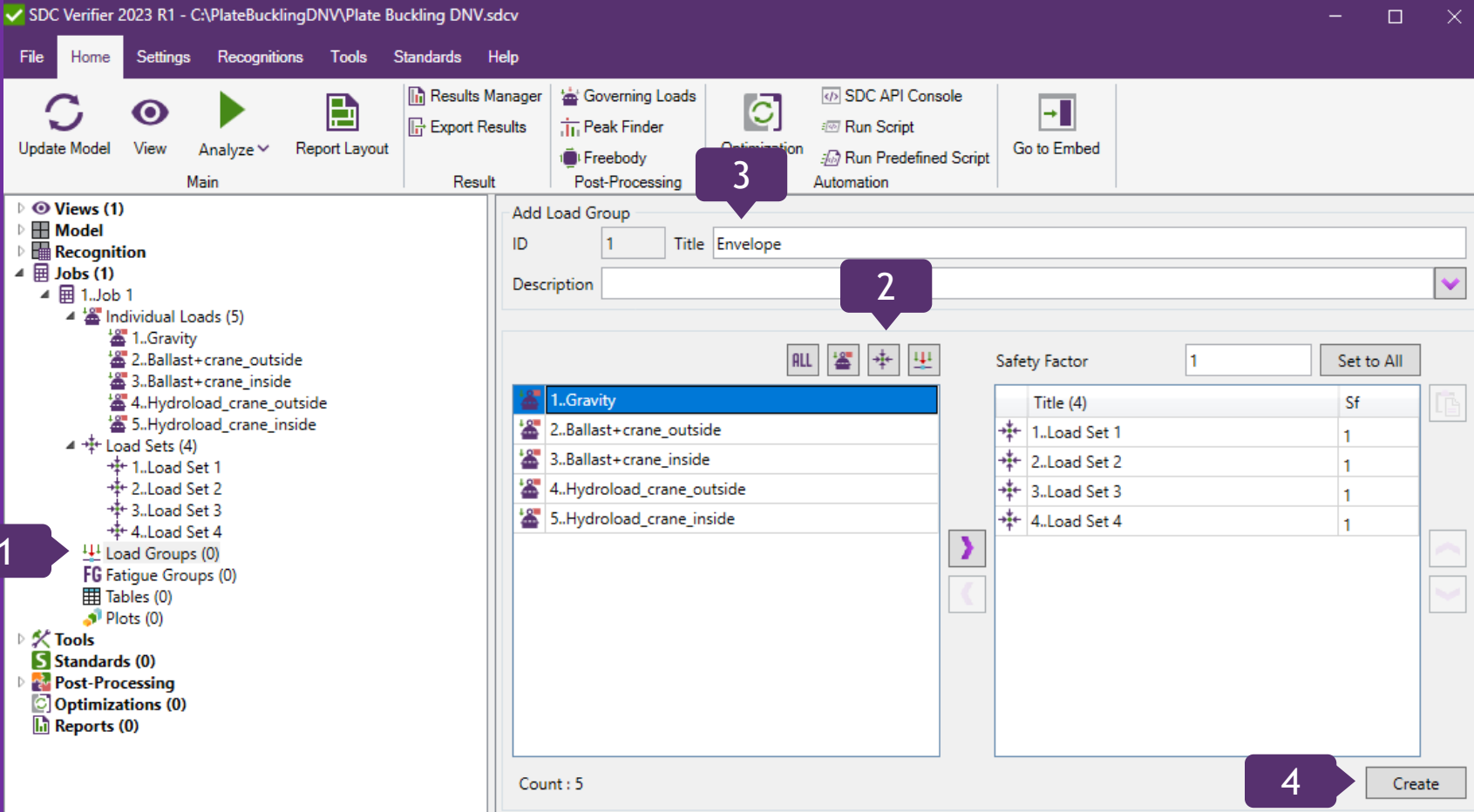
Load Groups

1 Click on *Load Groups (0)*

2 Press ⊕ to select *All Load Sets*

3 Title: *Envelope*

4 Press *Create*

Note: Load Sets and Load Groups are analyzed by SDC Verifier.

Panel Finder. To Recognize Sections

1 Execute *Recognition - Panel Finder* from the **Model Tree**

2 Click on *Find*

Recognition
- Joint Finder
- Beam Member Finder
- Beam Sections Finder
- Panel Finder **1**
- Weld Finder
- Connection Finder
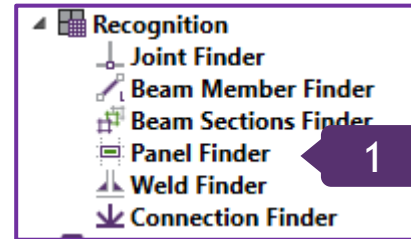
All Frames, Longitudinals and Desks are recognized automatically.

Panel Finder

Recognition | Filter

Sections
☑ Show X ☑ Show Y ☑ Show Z ☑ Show Custom

Title	Type	Coord [m]	Panels
Section X 1 (X = 70)	X	70	17
Section X 2 (X = 71.68)	X	71.68	13
Section X 3 (X = 73.36)	X	73.36	17
Section X 4 (X = 75.04)	X	75.04	8
Section X 5 (X = 76.72)	X	76.72	16
Section Y 6 (Y = -14.15)	Y	-14.15	7
Section Y 7 (Y = -9.65)	Y	-9.65	1
Section Y 8 (Y = -8.95)	Y	-8.95	5
Section Y 9 (Y = -1.79)	Y	-1.79	4
Section Y 10 (Y = 0)	Y	0	4
Section Y 11 (Y = 5.37)	Y	5.37	2
Section Y 12 (Y = 8.95)	Y	8.95	4
Section Y 13 (Y = 11.65)	Y	11.65	16
Section Y 14 (Y = 14.15)	Y	14.15	9
Section Z 15 (Z = 0)	Z	0	20
Section Z 16 (Z = 2.2)	Z	2.2	28
Section Z 17 (Z = 9.05)	Z	9.05	8
Section Z 18 (Z = 11.9)	Z	14.15	2

Analyze

Section Details

Panels | Plates | Stiffeners

Title	Length [m]	Width [m]	Direction	Stiffeners along Length	Stiffeners along Width	Rectangular	Same Material
Plate 1.1.1 (Y = -8.5; Z = 1.1)	2.2	0.895	(0;0;-1)	0	0	Edges: 4	Yes
Plate 1.1.2 (Y = -7.61; Z = 1.1)	2.2	0.895	(0;0;-1)	0	0	Edges: 4	Yes
Plate 1.1.3 (Y = -6.71; Z = 1.1)	2.2	0.895	(0;0;-1)	0	0	Edges: 4	Yes
Plate 1.1.4 (Y = -5.82; Z = 1.83)	0.895	0.7333	(0;-1;0)	0	0	Edges: 4	Yes
Plate 1.1.5 (Y = -4.92; Z = 1.1)	2.2	0.895	(0;0;-1)	0	0	Edges: 4	Yes
Plate 1.1.6 (Y = -5.82; Z = 0.37)	0.895	0.7333	(0;1;0)	0	0	Edges: 4	Yes
Plate 1.1.7 (Y = -4.03; Z = 1.83)	0.895	0.7333	(0;1;0)	0	0	Edges: 4	Yes
Plate 1.1.8 (Y = -3.13; Z = 1.1)	2.2	0.895	(0;0;-1)	0	0	Edges: 4	Yes
Plate 1.1.9 (Y = -4.03; Z = 0.37)	0.895	0.7333	(0;1;0)	0	0	Edges: 4	Yes
Plate 1.1.10 (Y = -2.24; Z = 1.1)	2.2	0.895	(0;0;-1)	0	0	Edges: 4	Yes
Plate 1.2.1 (Y = 12.75; Z = 6.26)	2.5	0.6083	(0;1;0)	0	0	Edges: 6	Yes
Plate 1.2.2 (Y = 12.9; Z = 5.7)	2.5	0.6083	(0;1;0)	0	0	Edges: 4	Yes
Plate 1.2.3 (Y = 12.07; Z = 6.92)	0.8333	0.6083	(0;-1;0)	0	0	Edges: 4	Yes
Plate 1.2.4 (Y = 12.9; Z = 5)	2.5	0.8	(0;1;0)	0	0	Edges: 4	Yes
Plate 1.2.5 (Y = 13.73; Z = 6.62)	0.8333	0.4867	(0;1;0)	0	0	Edges: 4	Yes
Plate 1.2.6 (Y = 12.07; Z = 7.53)	0.8333	0.6083	(0;-1;0)	0	0	Edges: 4	Yes
Plate 1.2.7 (Y = 12.07; Z = 4.2)	0.8333	0.8	(0;-1;0)	0	0	Edges: 4	Yes

Set Parameters...

Settings | Find

OK | Cancel

2

Panel Finder. Custom Section

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1 **Show Custom:** *ON* **(the rest are OFF)**

2 **Select all Sections in the list**
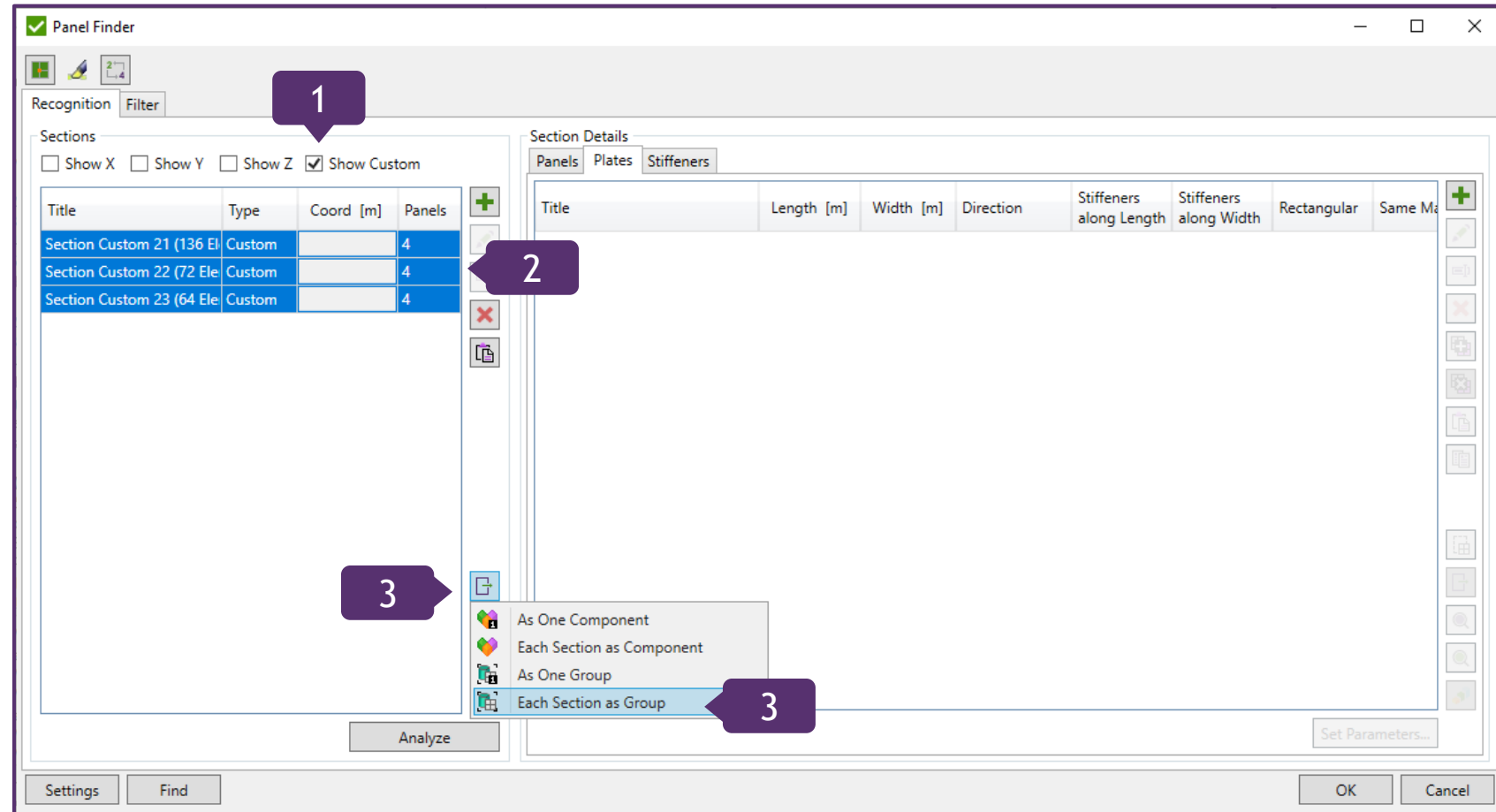
3 **Press** ⬚ **and** ⬚ **to export selected sections to groups**

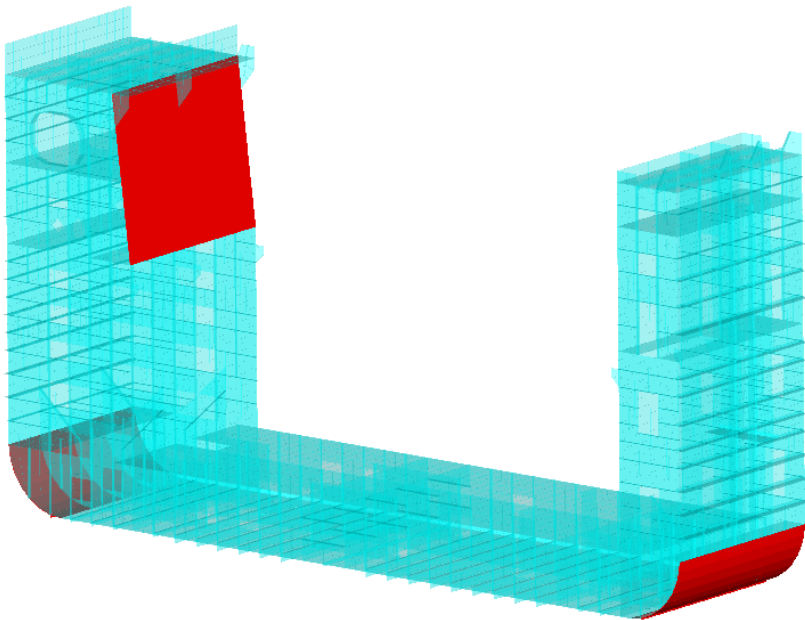Custom Section should be used for inclined/curved sections and selections like hull.

Panel Finder. Custom Section (Continuation)

4 Press 🔍
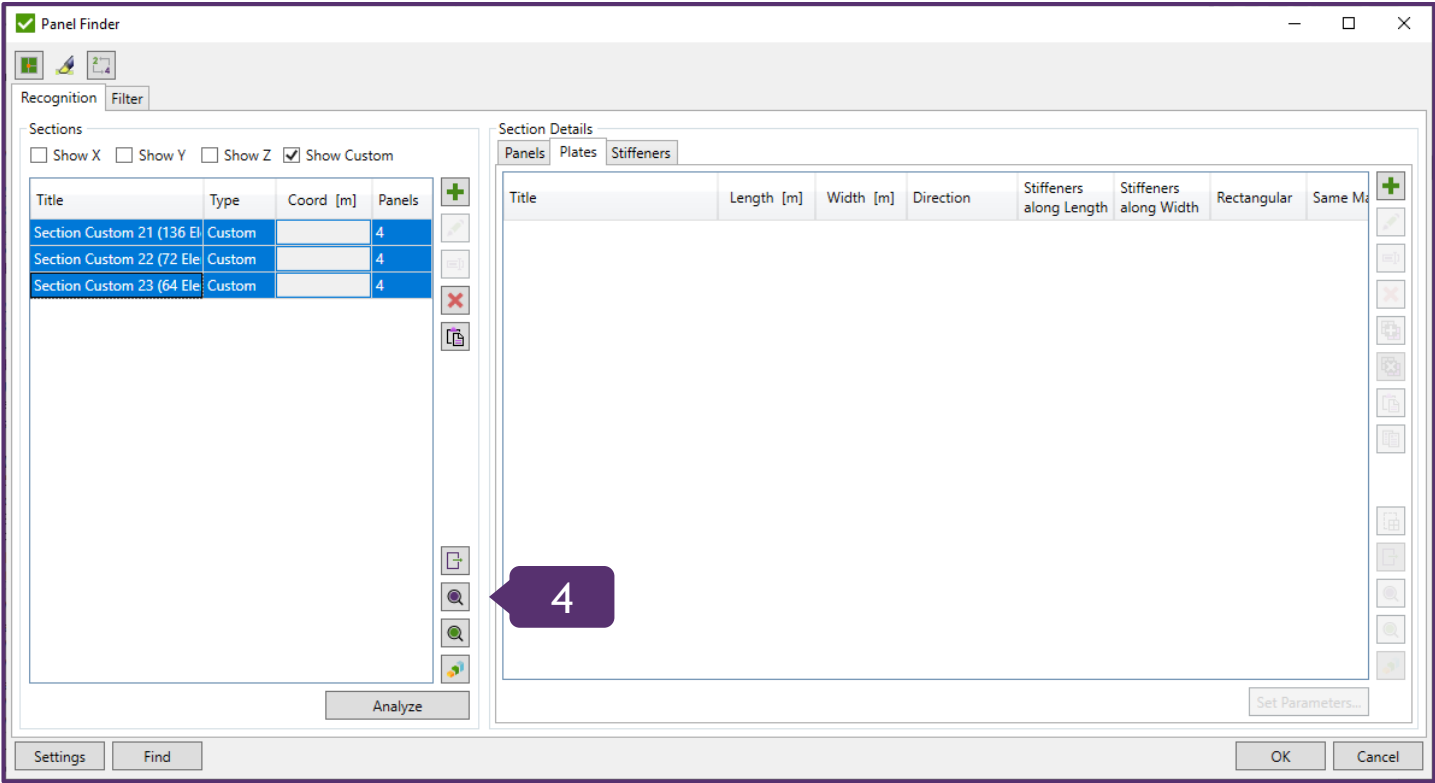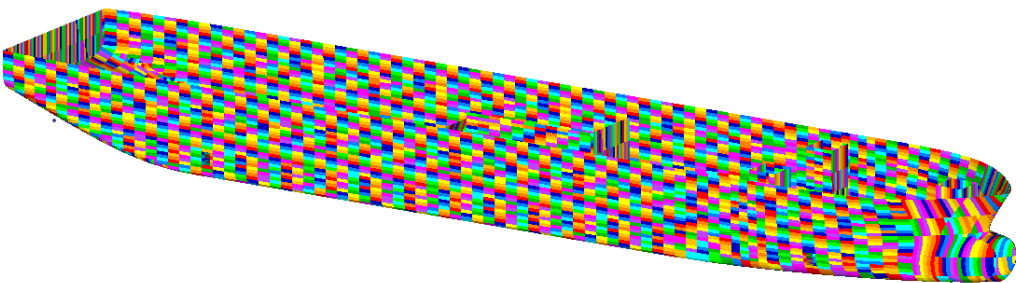
Example: It is possible to create custom section, based on hull selection:

Panel Finder. To find Free Edges

Note: Before plates recognition, the model should be checked on free edges. Incorrect plate dimensions/direction, plates with undefined dimensions and, as result, wrong buckling factor may result in possible consequences of free edges.

1 Click 🔲 to detect Free edges

2 Press *Find*

3 Press 🔍 to preview elements with free edges

Two elements, connected to one

Mesh does not coincide
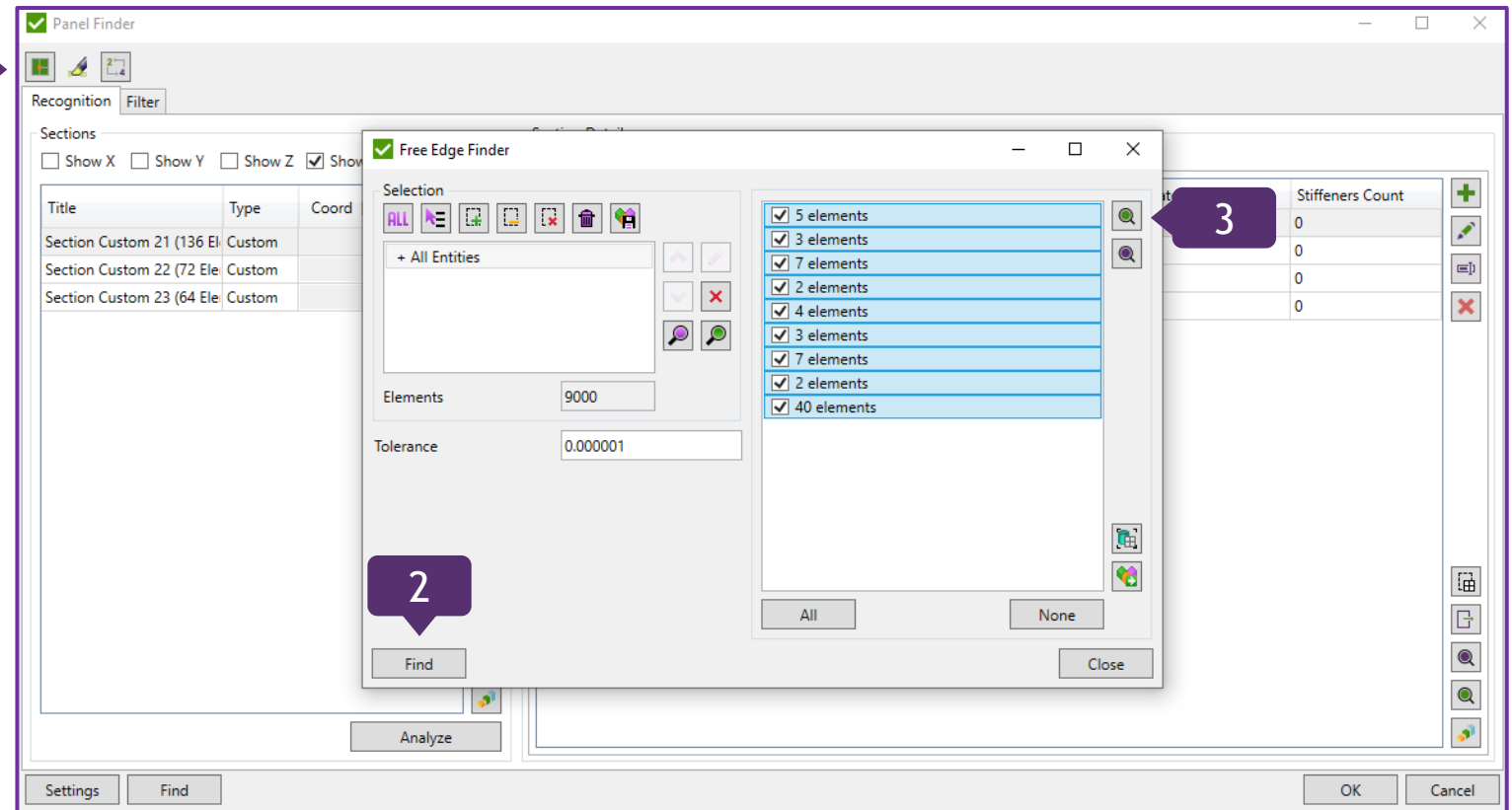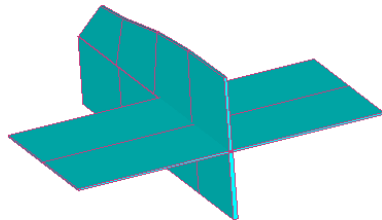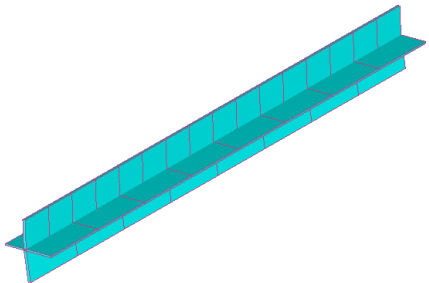
Note: Free edges should be fixed by remeshing the model and run recognition of plates. (In tutorial we skipped the step with remeshing, but for commercial project, it is a crucial step to do).

Panel Finder. To recognize plates

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1 In Selection Details press *Plates*

2 Show X: *ON* (the rest is OFF)

3 Select *Section X3*

Tip: If it is necessary to recognize plates only for one section, press *Analyze*

Section ID. Panel ID. Plate ID

Plate is rectangle with all corners = 90°

Plate has elements more than from one property

Plate Dimensions and Thicknesses

Dimensions: Results depend on plate dimensions and direction. Therefore, it is important to understand how Panel Finder performs recognition. Length is considered the longest edge of plate, and width is the longest perpendicular to the longest edge:
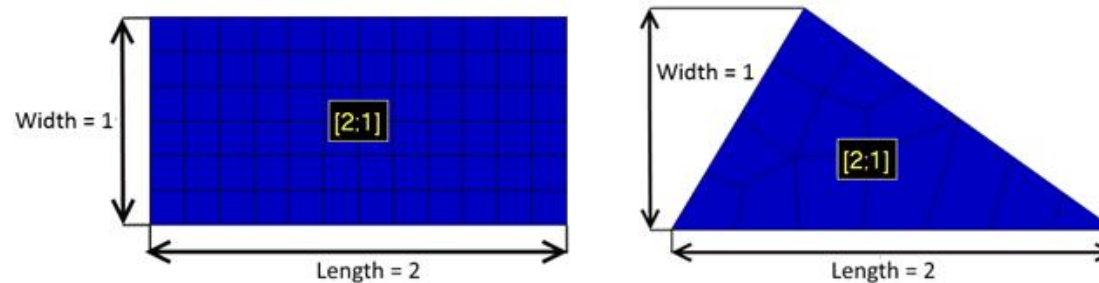
Plate Thickness: Calculations are performed on every element, and thickness is taken directly from each element. It is possible to set thickness manually for plate. In this case, element thickness will be ignored and user defined thickness will be used.
Example: a plate with 2 properties 0.01 and 0.02 thicknesses. Left picture displays property labels with property thicknesses and the right one presents plate buckling plot of thickness parameter:
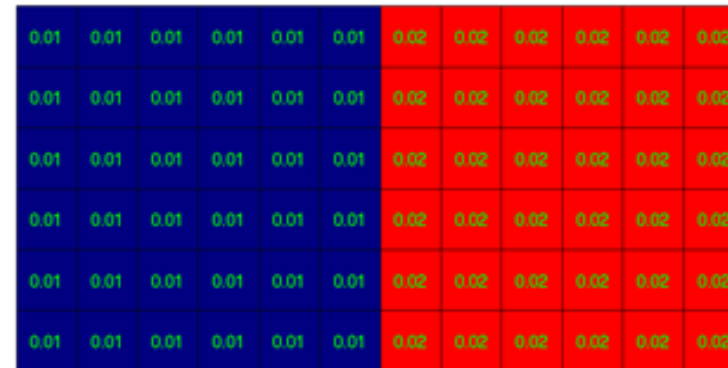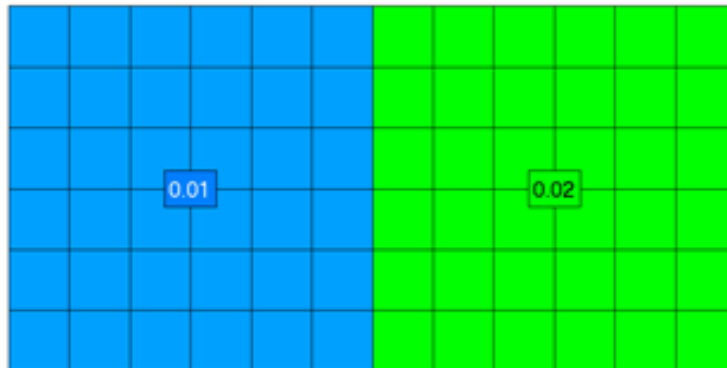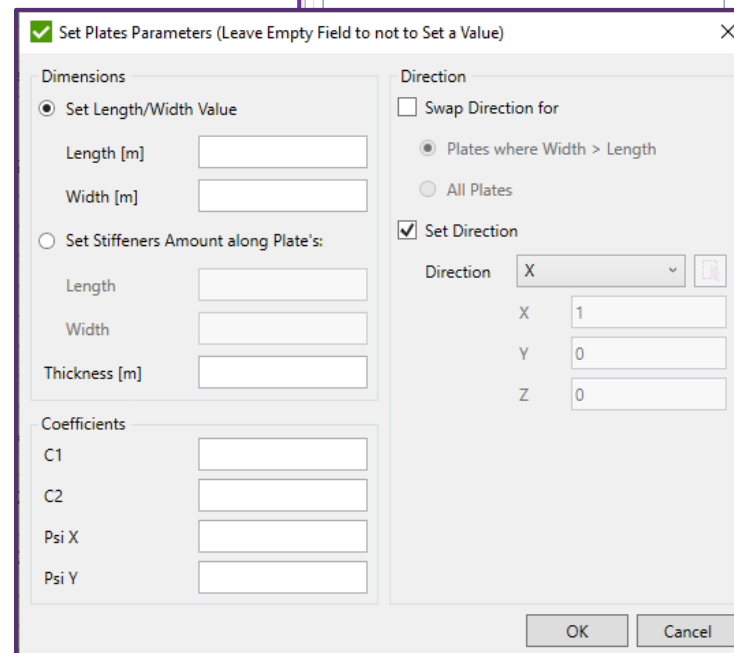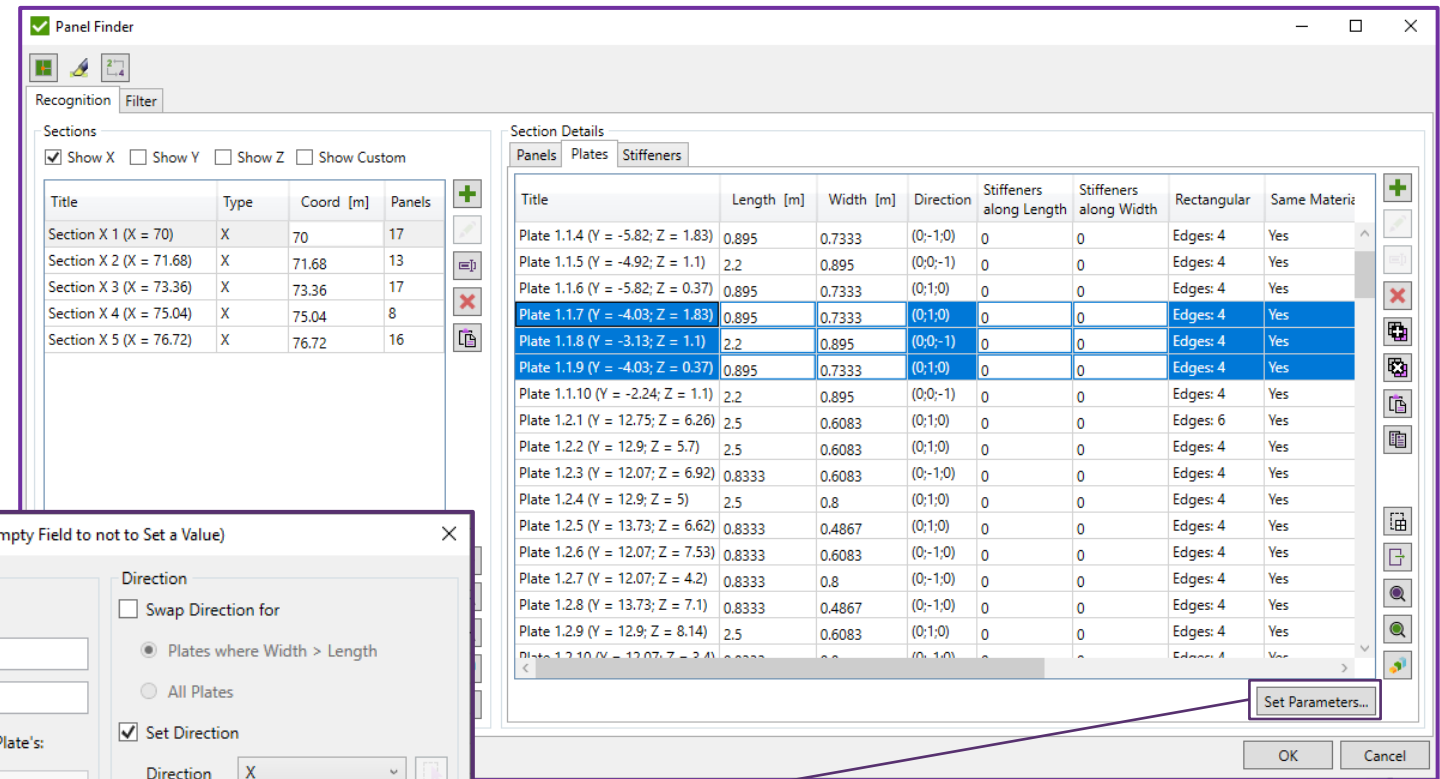
Plate Buckling Dimensions by CSR
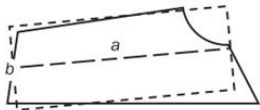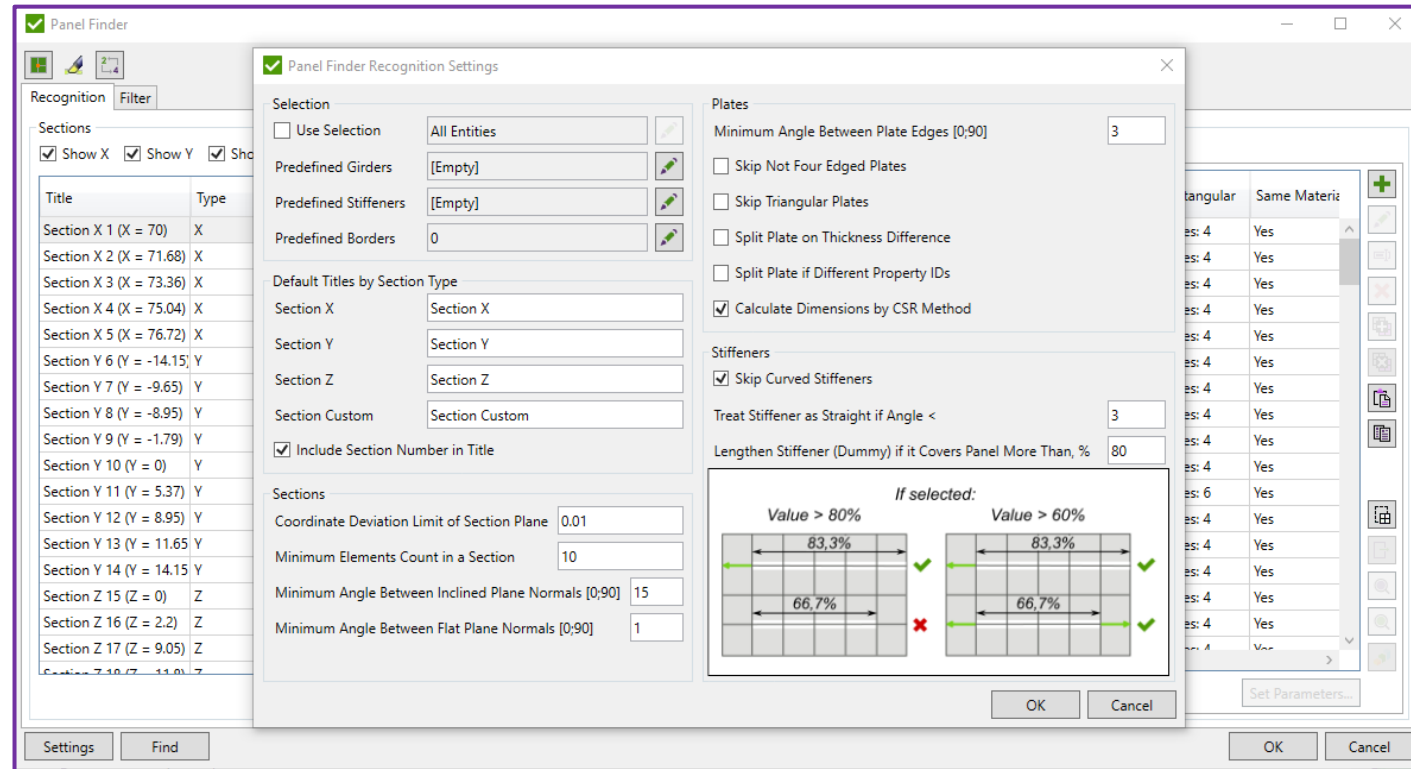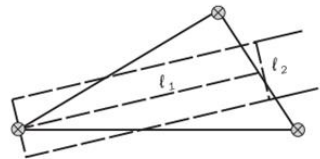
Editing plates manually

When modifying plates, it is possible to edit Length / Width / Thickness / Coefficients / Direction.

Also, there is possibility to define parametric stiffeners along the Length and Width.

If thickness is changed, in the table below you can see the original thickness that was recognized from model:

If the direction of plate should be modified, define global axis or custom vector and press *Set Direction*.

1 Select *Section X3*

2 Select *All Plates*

3 Press

4 Click on *Colors + Labels of Ids*

Panel Finder. Stiffeners Plot

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1 Select *Stiffeners*

2 Select All *Stiffeners*

3 Press 🔳

4 Click on *Colors + Labels of Ids*

Panel Finder

Recognition | Filter

Sections
☑ Show X ☐ Show Y ☐ Show Z ☐ Show Custom

Title	Type	Coord [m]	Panels
Section X 1 (X = 70)	X	70	17
Section X 2 (X = 71.68)	X	71.68	13
Section X 3 (X = 73.36)	X	73.36	17
Section X 4 (X = 75.04)	X	75.04	8
Section X 5 (X = 76.72)	X	76.72	16

Section Details

Panels | Plates | **Stiffeners**

Title	Length [m]	Width [m]	Lg [m]	Lt [m]	Is Same Y Axis	Is Curved	Property
Stiffener 3.1.1 [73.36; -8.06; 1.1]	2.2	0.895	0	2.2	Yes	No	300305..150x1
Stiffener 3.1.2 [73.36; -7.16; 1.1]	2.2	0.895	0	2.2	Yes	No	300302..100x1
Stiffener 3.1.3 [73.36; -6.26; 1.1]	2.2	0.895	0	2.2	Yes	No	300302..100x1
Stiffener 3.1.4 [73.36; -5.37; 1.1]	2.2	0.895	0	2.2	Yes	No	300302..100x1
Stiffener 3.1.5 [73.36; -4.48; 1.1]	2.2	0.895	0	2.2	Yes	No	300302..100x1
Stiffener 3.1.6 [73.36; -3.58; 1.1]	2.2	0.895	0	2.2	Yes	No	300305..150x1
Stiffener 3.1.7 [73.36; -2.68; 1.1]	2.2	0.895	0	2.2	Yes	No	300302..100x1
Stiffener 3.2.1 [73.36; 12.9; 6.01]	2.5	0.5272	0	2.5	Yes	No	300302..100x1
Stiffener 3.2.2 [73.36; 13.32; 6.37]	1.667	0.4258	0	1.667	Yes	No	300302..100x1
Stiffener 3.2.3 [73.36; 12.07; 6.62]	0.833	0.6083	0	0.833	Yes	No	300302..100x1
Stiffener 3.2.4 [73.36; 12.9; 5.4]	2.5	0.7042	0	2.5	Yes	No	300302..100x1
Stiffener 3.2.5 [73.36; 12.07; 7.22]	0.833	0.6083	0	0.833	Yes	No	300302..100x1
Stiffener 3.2.6 [73.36; 12.9; 4.6]	2.5	0.8	0	2.5	Yes	No	300302..100x1
Stiffener 3.2.7 [73.36; 13.73; 6.86]	0.833	0.4867	0	0.833	Yes	No	300302..100x1
Stiffener 3.2.8 [73.36; 12.9; 7.83]	2.5	0.5678	0	2.5	Yes	No	300302..100x1
Stiffener 3.2.9 [73.36; 12.07; 3.8]	0.833	0.8	0	0.833	Yes	No	300302..100x1
Stiffener 3.2.10 [73.36; 13.73; 7.35]	0.833	0.4867	0	0.833			

Analyze

Settings | Find

Set Parameters...

OK | Cancel

2

3

4

🔳	Colors Only
🔳	Colors + Labels of Ids
🔳	Colors + Labels of Lengths
🔳	Colors + Labels of Widths
🔳	Length Values (no labels)
🔳	Width Values (no labels)
🔳	Max Girder Length, Lg (no labels)
🔳	Torsional Length, Lt (no labels)
🔳	Sniped or Continuous

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Note: It is very important to check if all plates dimensions were recognized. If in the model there are coincidental nodes, elements or free edges, Panel Finder will not be able to recognize plate dimensions.

1 Click on *Filter* tab

2 Selection: *All Entities*
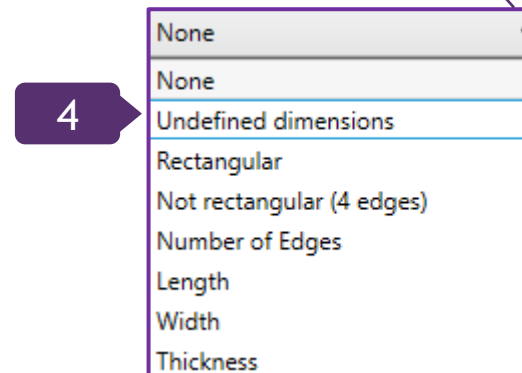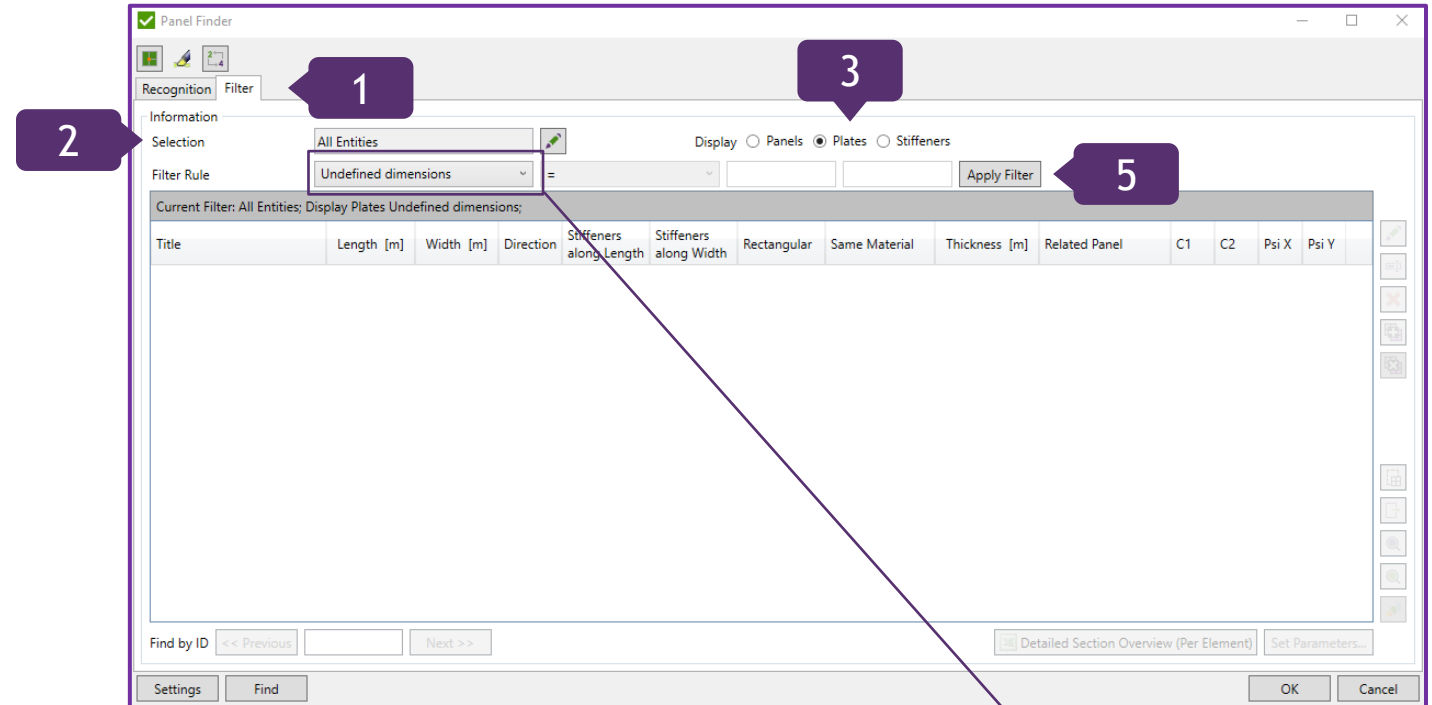
3 Display: *Plates*

4 Filter Rule: *Undefined dimensions*

5 Press *Apply Filter*

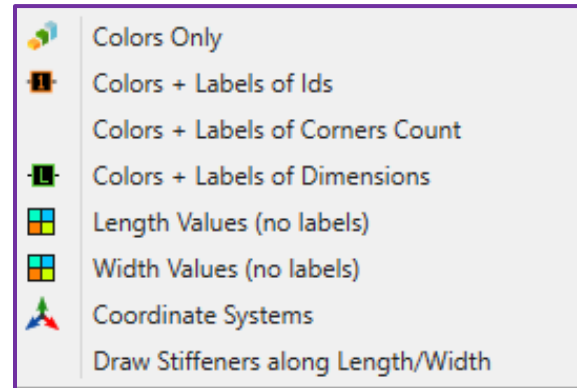**6** Empty table with plates means that there are no plates with undefined dimensions. Press *OK*

Tip: It is also possible to filter plates by shape (triangle, rectangular) or number of edges parameters.

E.g. Plates with numbers of edges > 4 can be displayed.
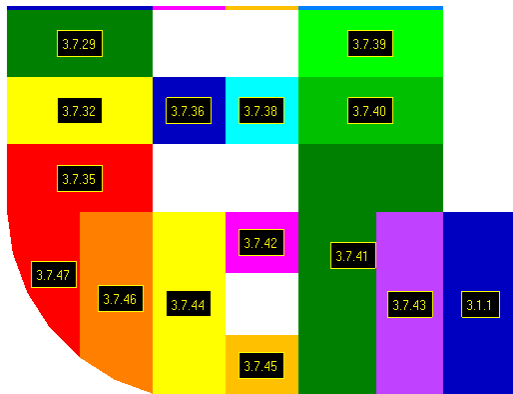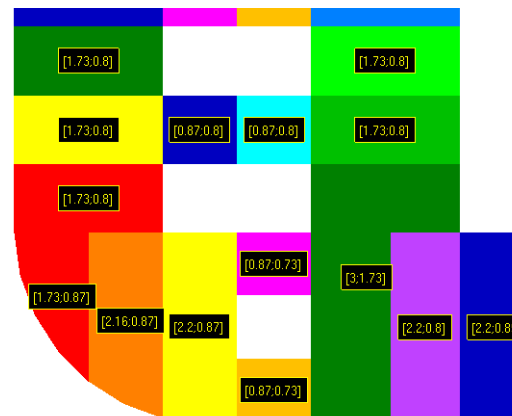Control, using Selection plates from which Sections should be filtered.

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Note: Plate Plot can be displayed with different colors labels (labels of ids, labels of corners count or labels of dimensions). Also, it is possible to show plates in length and width, coordinate systems etc.
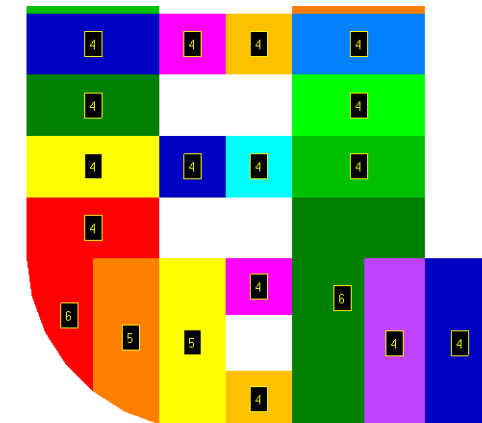

Colors Only
Colors + Labels of Ids
Colors + Labels of Corners Count
Colors + Labels of Dimensions
Length Values (no labels)
Width Values (no labels)
Coordinate Systems
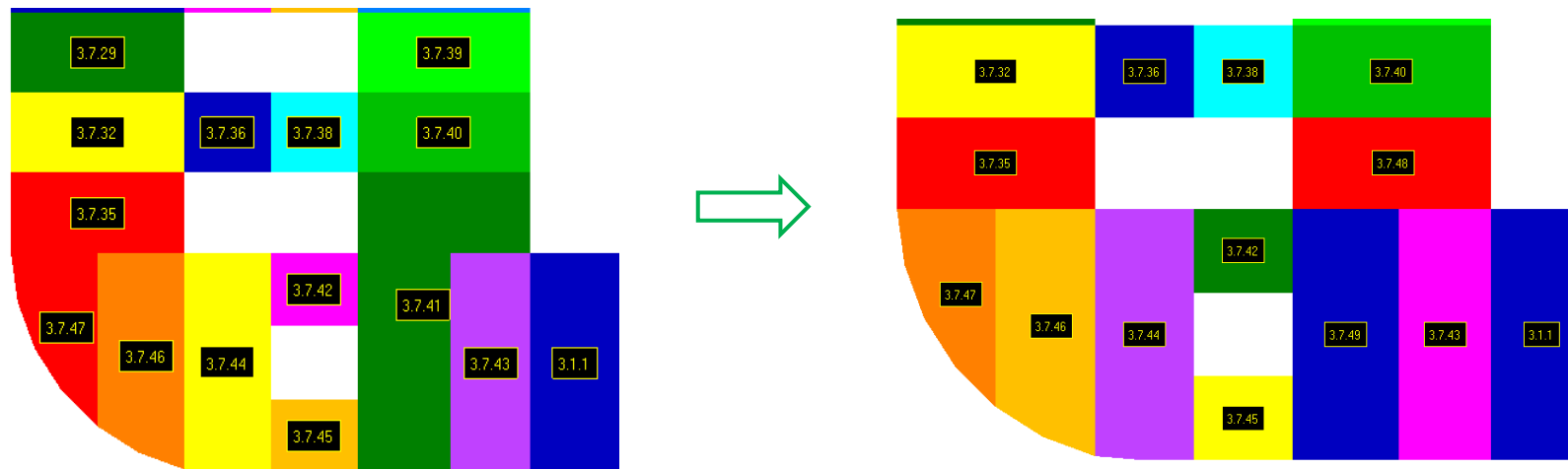Draw Stiffeners along Length/Width

Labels of Ids

Labels of dimensions

Labels of Corners Count

In some cases (e.g. stiffener is not modeled), when a plate is recognized incorrectly, dimensions are bigger than in reality. Consequently, it leads to wrong results. A plate has to be updated manually. In Section X3 plate with Id = 3.7.41 should be split in two plates.

Note: if plates were modified manually, but then a user decided to run recognition of plates - Panel Finder will ask what to do with modified plates:
- Keep plates that were modified;
- Clear everything and recognition from scratch;
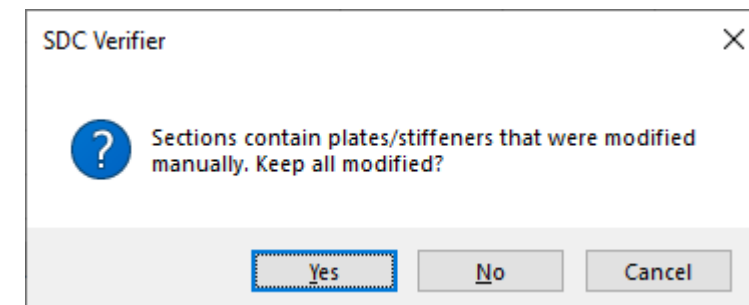
1 In Recognition page, select *Section X1 (X = 70)*

2 Select *Plate 1.9.48*

3 Press ⊞ select *Split by elements*

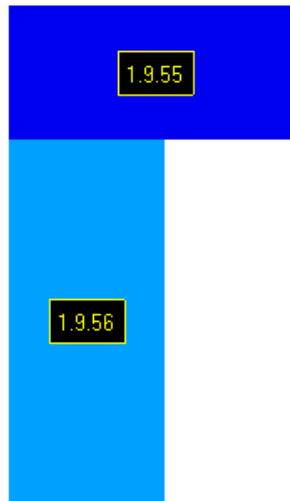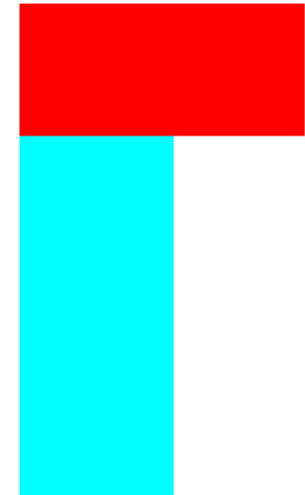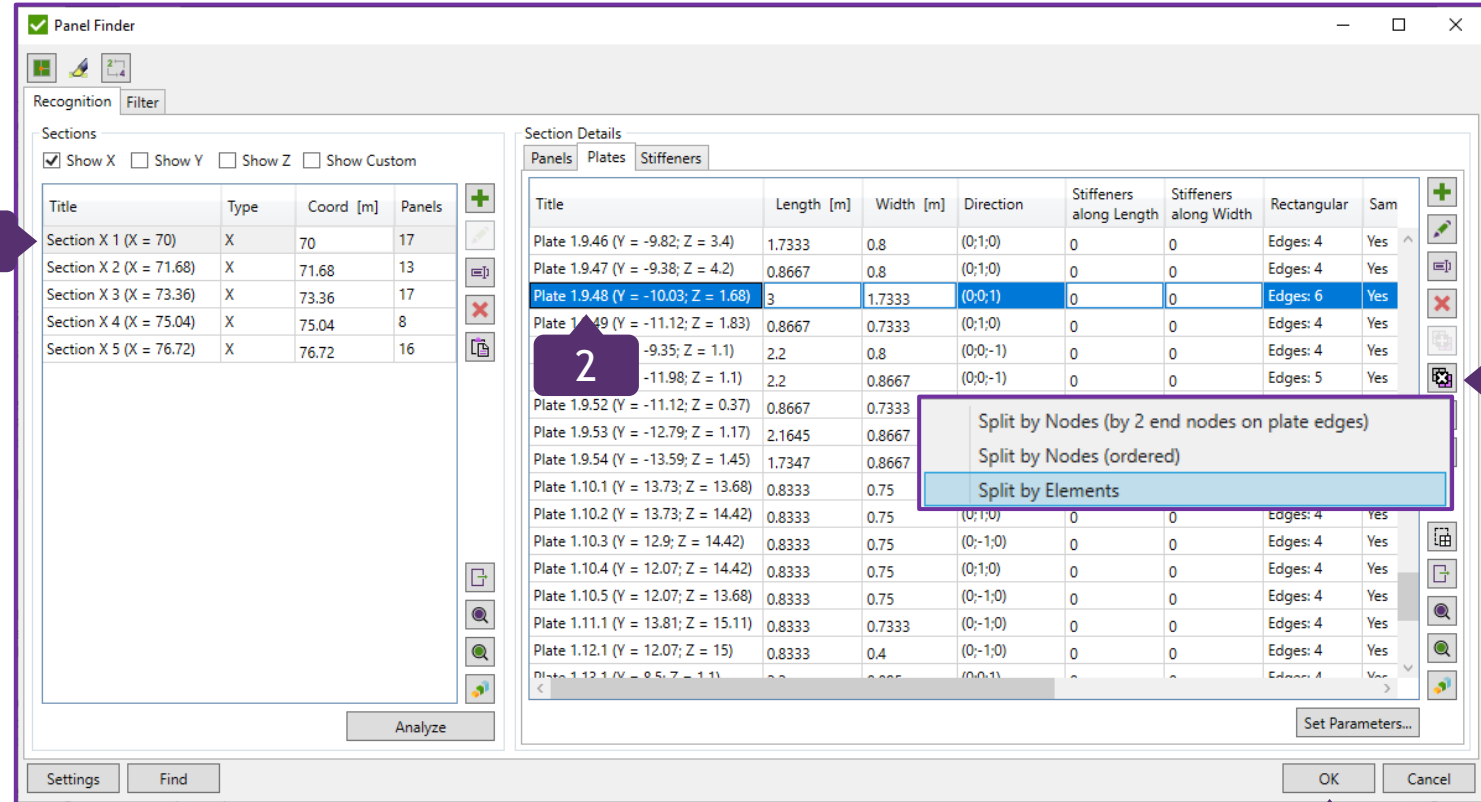**4** Selected plate is displayed in Femap. Select elements for one plate. And press *OK*

Plate 1.9.48 is replaced with Plates 1.9.55 and 1.9.56. Dimensions and directions are updated automatically.

To Add Plate Buckling DNV 2010 Standard

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1 In the *Model tree* in Standards execute *Add => DNV => DNV RP Plate/Stiffener Buckling (2010)*
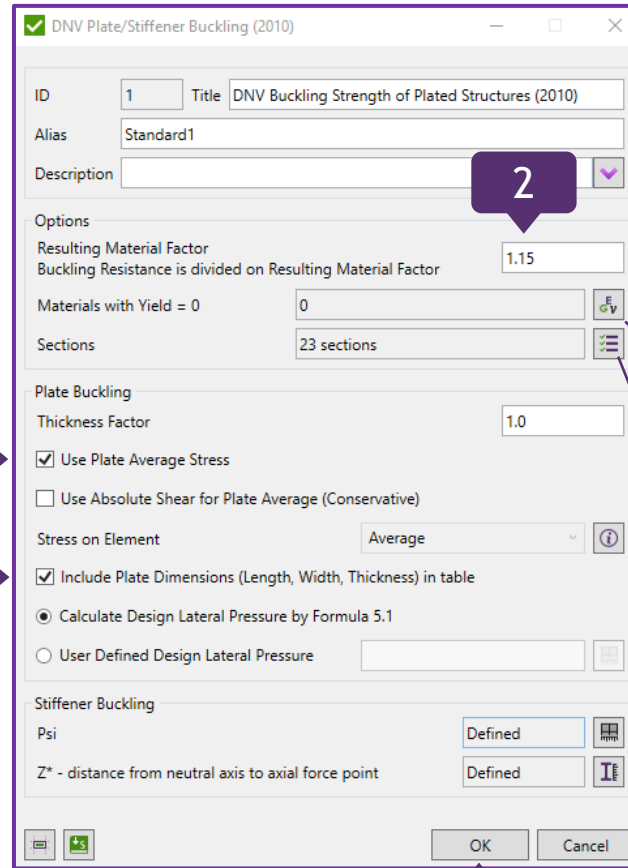
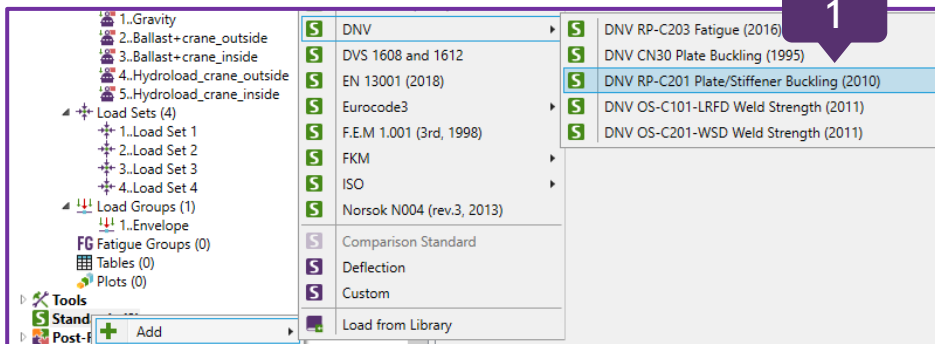**2** Utilization Factor (Eta) = 1.15

3 Use Plate Average Stress*:* On

4 Include Plate Dimensions (Length, Width, Thickness) in the table: On

5 Press *OK*

Thickness factor gives a possibility to increase / decrease all plates thicknesses without reanalyzing the model. E.g. 1.2 means to increase thickness on 20% and decrease stresses.

Materials with Yield Stress = 0 shows how many materials have yield equal to 0. If value is > 0 press to define yield.

By default, all sections will be checked. Click to modify them.

Plate Buckling transforms stresses automatically into plate direction.

Options about element stresses and plate stresses are described in the next slide.
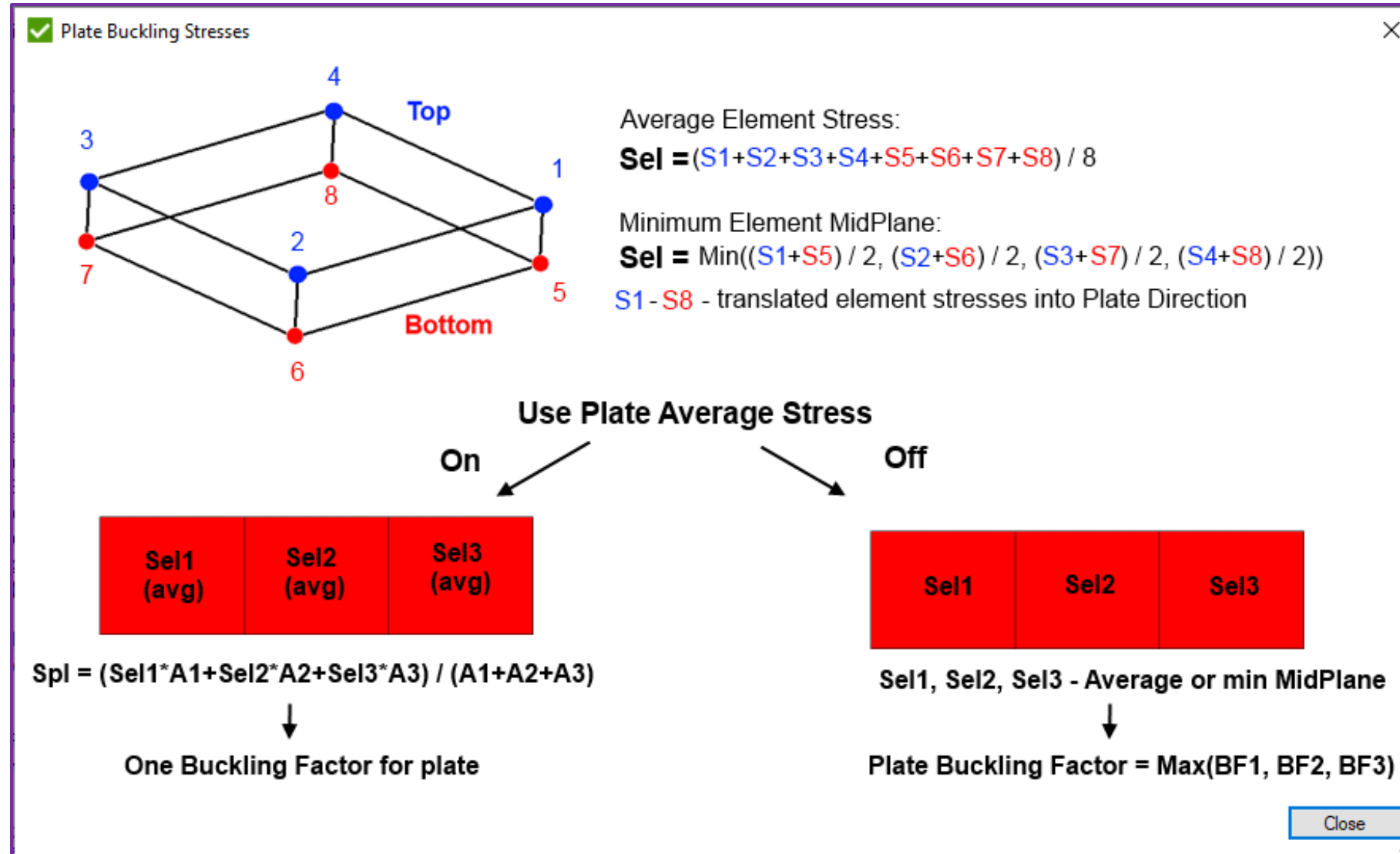
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☑ Plate Buckling Stresses ✕

Average Element Stress:

Sel = $(S1+S2+S3+S4+S5+S6+S7+S8) / 8$

Minimum Element MidPlane:

Sel = $Min((S1+S5) / 2, (S2+S6) / 2, (S3+S7) / 2, (S4+S8) / 2))$

$S1 - S8$ - translated element stresses into Plate Direction

Top
Bottom

Use Plate Average Stress

On → Off →

| Sel1 (avg) | Sel2 (avg) | Sel3 (avg) |

$Spl = (Sel1*A1+Sel2*A2+Sel3*A3) / (A1+A2+A3)$

↓

One Buckling Factor for plate

| Sel1 | Sel2 | Sel3 |

Sel1, Sel2, Sel3 - Average or min MidPlane

↓

Plate Buckling Factor = Max(BF1, BF2, BF3)

Close

To make relevant plots, in the first place Views should be created (a set of settings of how to display a plot).
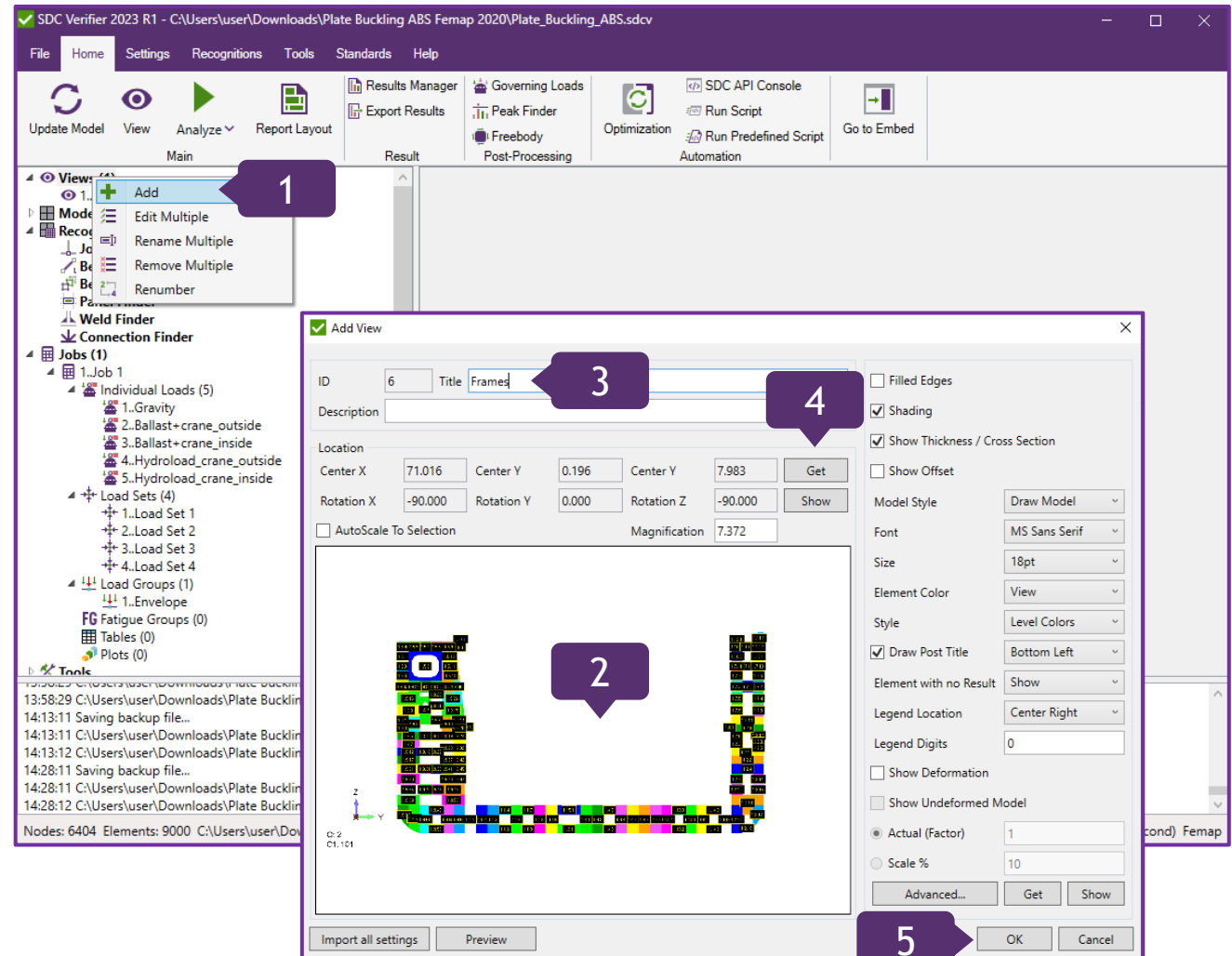
1 Execute Views => Add

2 In Femap, orient model as shown on picture (ZY plane)

3 Title: *Frames*

4 Press *Get*

5 Press *OK*

Repeat Steps 1-5 two times to create Views for Longitudinals (plane ZX) and Decks (plane XY)

1 Execute Views => Add

2 In Femap, orient model as shown on picture (ZY plane)

3 Title: *Stiffeners*

4 Press *Get*

5 Press *OK*

To make relevant plots, in the first place Views should be created (a set of settings of how to display a plot).
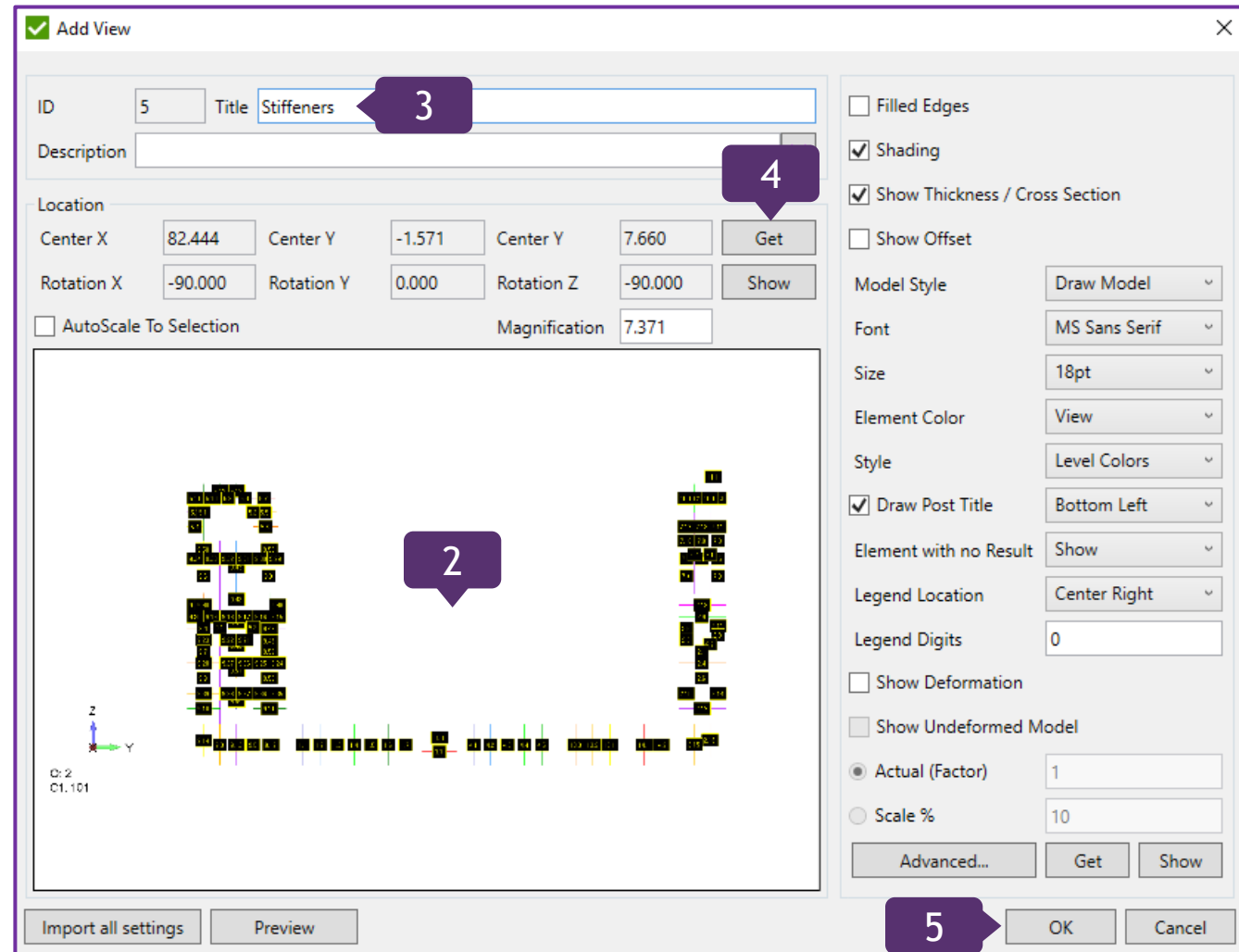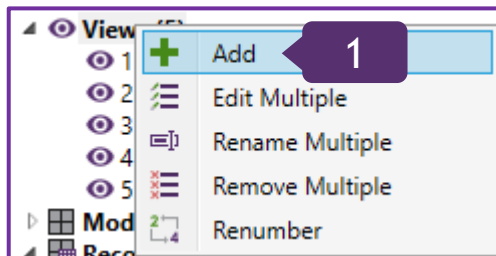
Plate Buckling Plot

1 Execute *Criteria Plot* from Plate Buckling DNV 2010 context menu

2 Load Group: *1..Envelope*

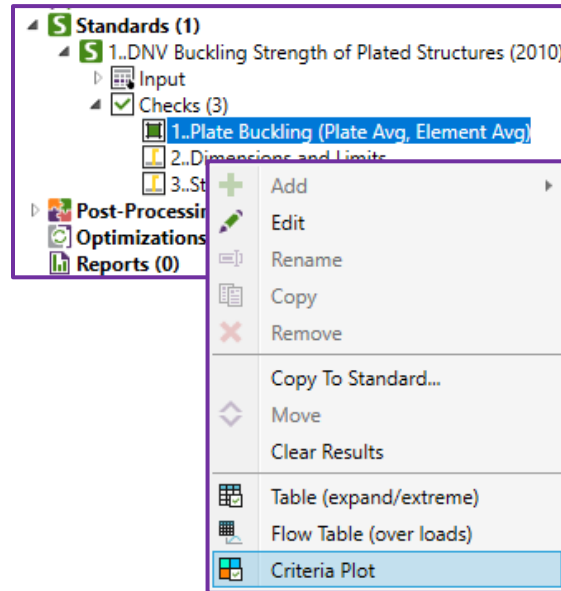**3** View: *2..Frames*

4 Press ✏ and select: *Section X3*

5 Press 🖵 *Preview*

Plate Buckling Table

SDC VERIFIER
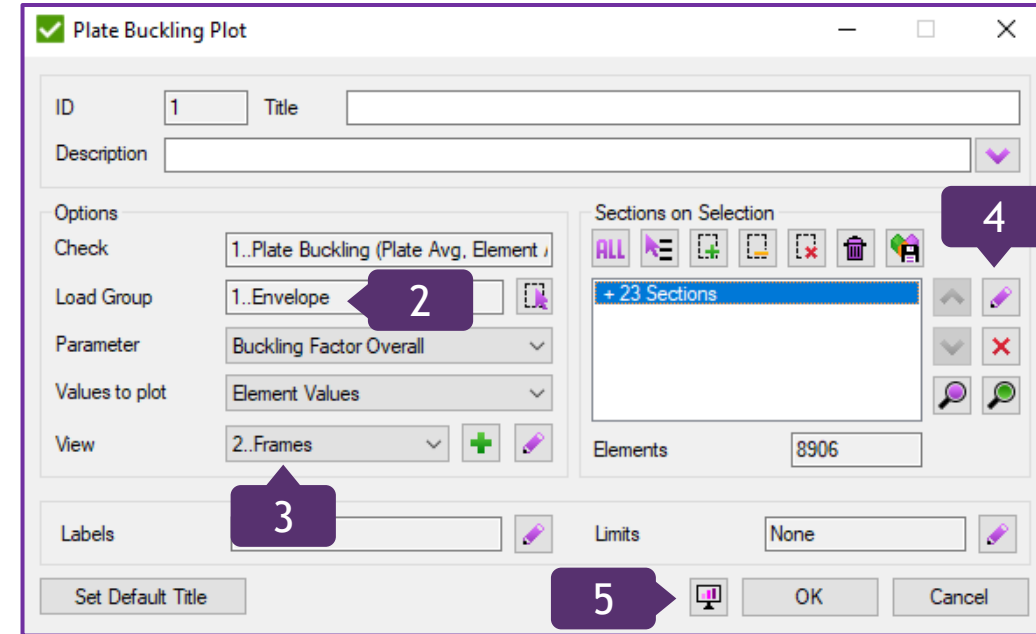
1. Execute *Table(expand/extreme)* from Plate Buckling DNV 2010 context menu

2. Show plates results: *OFF*

3. Select [icon] Load =>Load Group: *1..Envelope*

4. Press *OK* and *Fill Table*

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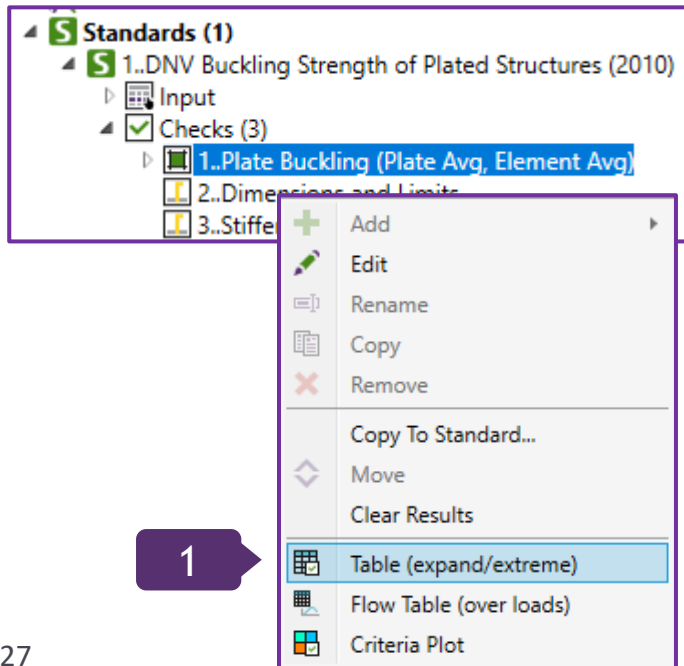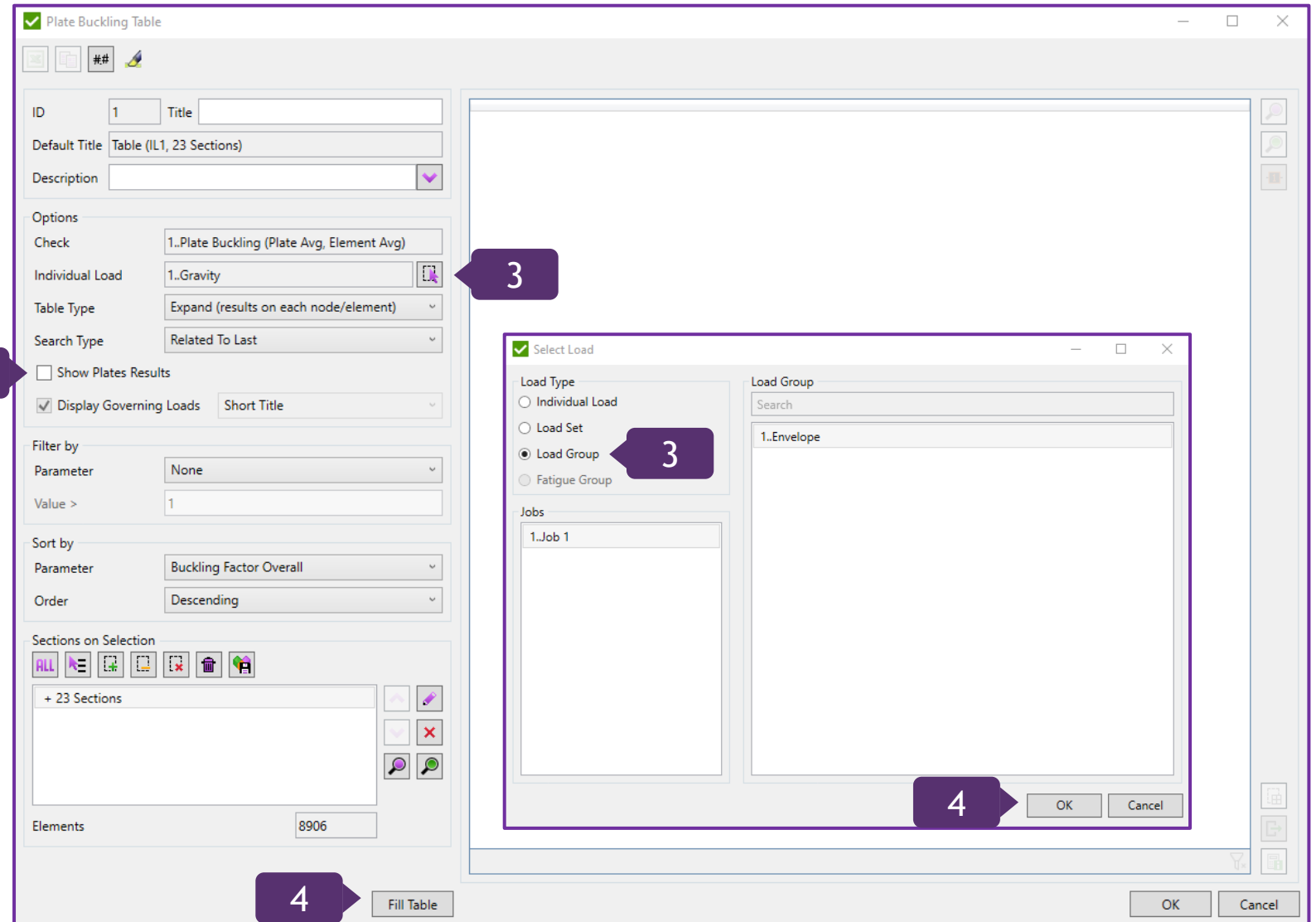
Plate Buckling Table (Continuation)

Section Title	Plate Length [m]	Plate Width [m]	Plate Thickness	Sx in plate direc	Sy in plate direc	Sxy in plate dire	Seqv [Pa]	Are Requiremer	Buckling Factor	Buckling Factor	Load
8..Section Y 8 (Y = -8.95)	9.05	3.36	0.01	-35426696.00	-1842345.25	1768854.25	34677996.00	1.00	0.54	0.74	LS4

All results (dimensions, stresses) are from the plate, which causes highest BF=0.74, because Search Type = Related to Last Parameter.

Plate Buckling Table

ID: 1 Title:
Default Title: Table (LG1, 23 Sections)
Description:

Options
Check: 1..Plate Buckling (Plate Avg, Element Avg)
Load Group: 1..Envelope
Table Type: Expand (results on each node/element)
Search Type: Related To Last
☐ Show Plates Results
☑ Display Governing Loads   Short Title

Filter by
Parameter: None
Value >: 1

Sort by
Parameter: Buckling Factor Overall
Order: Descending

Sections on Selection
+ 23 Sections
Elements: 8906

Table Info: Selection: 23 Sections, Load: LG1..Envelope, Search Type: Related To Last, Filter by: Parameter: None Value: 1, Table Type: Ex

Sectic	Plate	Plate	Plate	Sx in	Sy in	Sxy ir	Seqv	Are R	Buckl	Buckl	Load
8..Section	9.05	3.36	0.01	-3542669(	-1842345.	1768854.2	34677996.	1.00	0.54	0.74	LS4
15..Section	3.36	0.89	0.01	-6416806.	-5002351.	-1503733.	47173180	1.00	0.43	0.66	LS4
13..Section	2.20	1.68	0.01	-2771230(	-2488682.	7942283.5	37206920	1.00	0.32	0.57	LS3
14..Section	3.36	0.92	0.01	-5691683.	-3304535(	-7707855.	43482240	1.00	0.22	0.47	LS4
5..Section	0.83	0.75	0.01	-1657060(	-5226825:	-6306919(	14565179	1.00	0.22	0.47	LS1
16..Section	1.68	0.80	0.01	0.00	-3762691(	-3797884.	45583904	1.00	0.22	0.46	LS4
1..Section	0.83	0.75	0.01	-2145884(	-5509192(	-5361693(	13047609	1.00	0.18	0.42	LS1
3..Section	3.00	1.73	0.02	-4774826.	-2086080(	-2463746(	47230752	1.00	0.14	0.38	LS4
2..Section	3.00	2.60	0.02	-719801.4	-1905031(	-7225394.	22834550	1.00	0.09	0.30	LS4
4..Section	3.00	2.60	0.02	-733416.1	-1867930(	-7164324.	22450748	1.00	0.09	0.29	LS4
19..Section	3.36	2.50	0.01	-2079238.	-179163.6	11910052	21286758	1.00	0.07	0.26	LS3
11..Section	2.20	0.84	0.01	-1784343(	-355508.3	7760697.5	22236716	1.00	0.06	0.24	LS4
12..Section	2.20	1.68	0.01	-1090692.	-359209.5	-1419769:	24597612	1.00	0.03	0.19	LS1
21..Section	3.36	2.77	0.02	-520088.9	-1194041(	1339412.6	11917042	1.00	0.02	0.15	LS4
22..Section	2.72	1.68	0.01	-1223552:	-2736333.	3089973.5	12343374	1.00	0.02	0.12	LS1
9..Section	2.20	1.68	0.01	-1702782.	-232463.5	12916763	22486742	1.00	0.02	0.12	LS4
6..Section	3.36	0.92	0.02	-2730165.	-1167828:	6546880.(	26789118	1.00	0.01	0.10	LS3
17..Section	2.50	1.68	0.01	-1537421.	-2954400.	-3134238.	6001695.(	1.00	0.01	0.09	LS1
10..Section	2.20	1.68	0.01	-1484662.	-460297.7	7443296.(	12933136	1.00	0.01	0.07	LS1
20..Section	3.36	0.87	0.02	-4425791.	-7629121.	-6441163.	12980446	1.00	0.01	0.07	LS4
18..Section	4.87	3.36	0.01	-100041.5	0.00	2788725.5	4840818.(	1.00	0.00	0.06	LS1
23..Section	2.77	1.68	0.01	-276593.4	-1974606.	412053.84	6878272.5	1.00	0.00	0.04	LS4
7..Section	6.72	1.05	0.03	-83945.28	-83330.23	1.34	499296.75	1.00	0.00	0.00	LS1
Max ove	9.05	3.36	0.01	-3542669(	-1842345.	1768854.2	34677996.	1.00	0.54	0.74	LS4

Displaying 24 of 24 rows and 12 of 12 columns

Fill Table   OK   Cancel

Use Show plates results for detailed table with results for all plates. Otherwise only the worst results over Sections will be shown.

Stiffener Buckling Plot

SDC VERIFIER

1 Execute *Criteria Plot* from Stiffener Buckling Results context menu
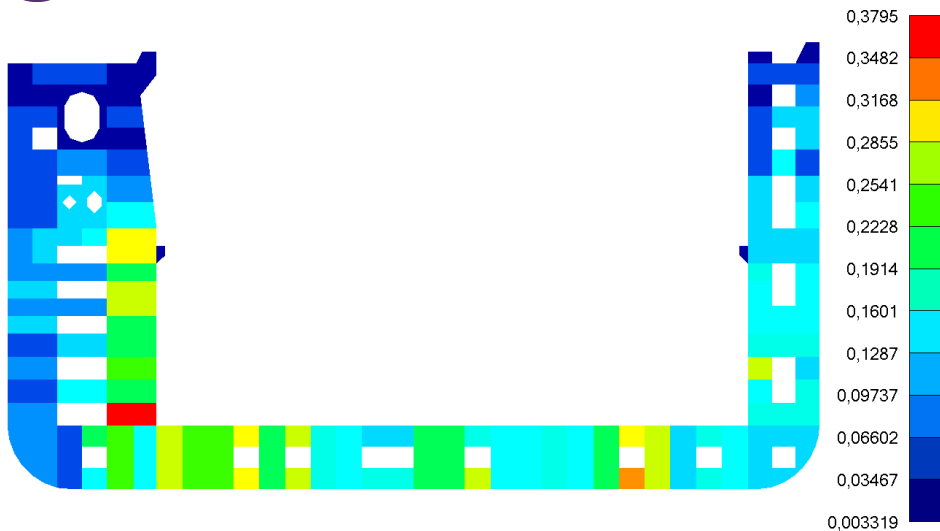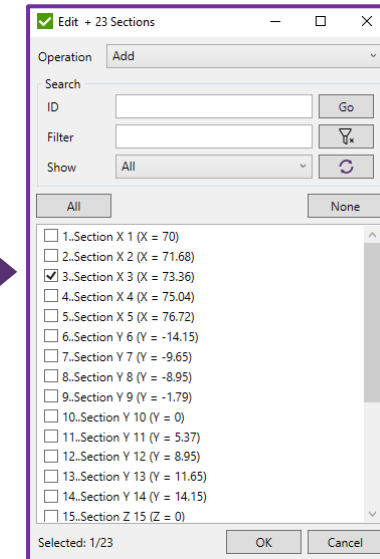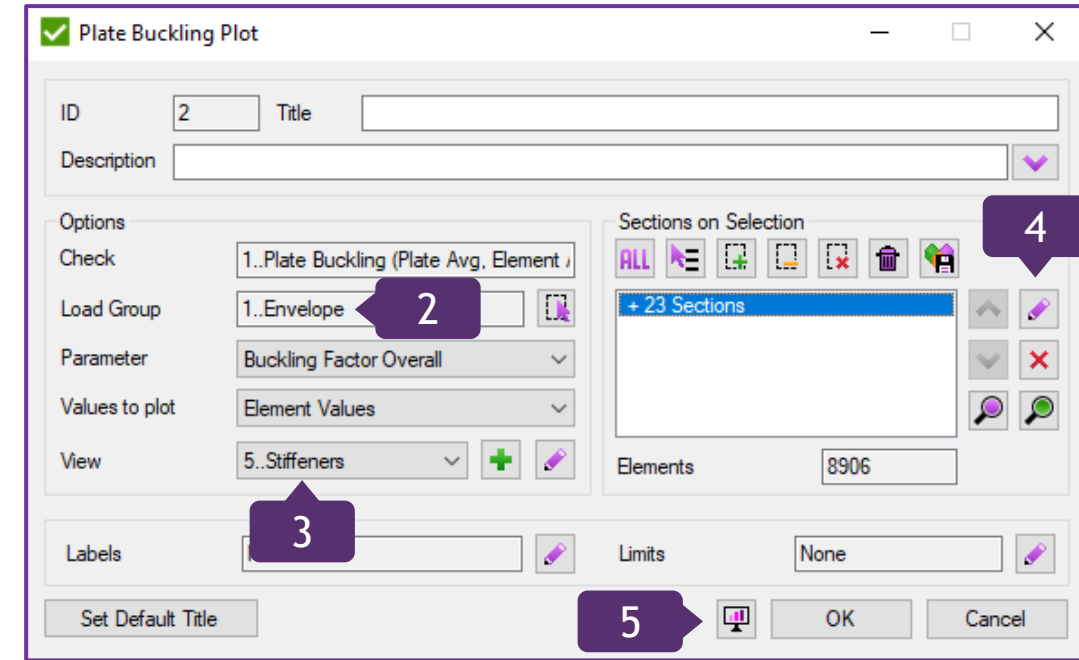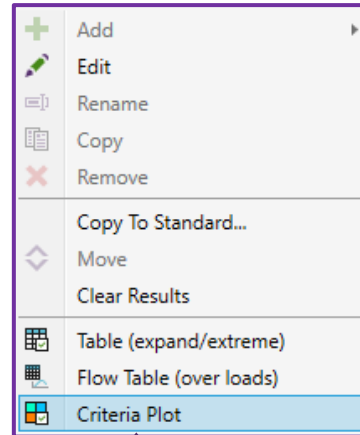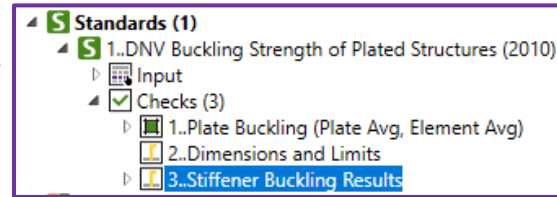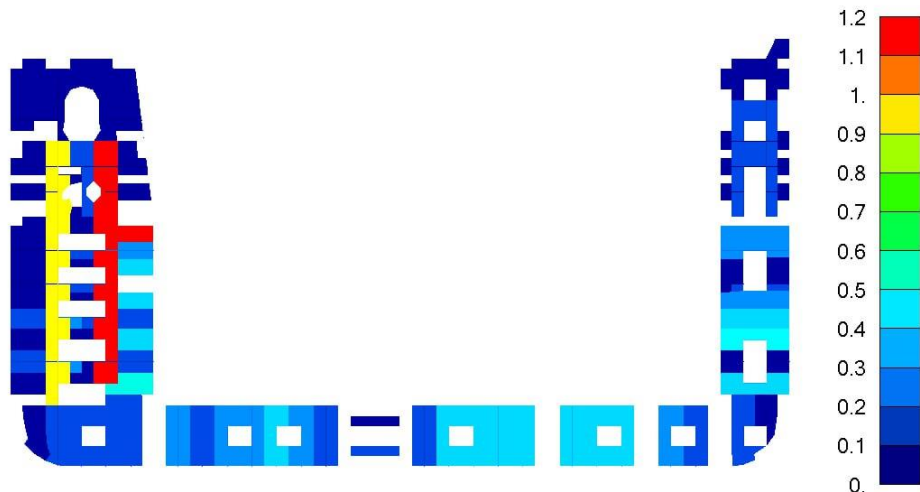
2 Load Group: *1..Envelope*

3 View: 5..Stiffeners

4 Press ✏ and select: *Section X3*

5 Press 📊 *Preview*

Standards (1)
- 1..DNV Buckling Strength of Plated Structures (2010)
  - Input
  - Checks (3)
    - 1..Plate Buckling (Plate Avg, Element Avg)
    - 2..Dimensions and Limits
    - **3..Stiffener Buckling Results**

Context menu:
- Add
- Edit
- Rename
- Copy
- Remove
- Copy To Standard...
- Move
- Clear Results
- Table (expand/extreme)
- Flow Table (over loads)
- **Criteria Plot**

Plate Buckling Plot

ID: 2   Title:
Description:

Options

Check: 1..Plate Buckling (Plate Avg, Element ,
Load Group: 1..Envelope
Parameter: Buckling Factor Overall
Values to plot: Element Values
View: 5..Stiffeners

Labels:

Set Default Title

Sections on Selection
ALL
+ 23 Sections
Elements: 8906
Limits: None

OK   Cancel

Edit + 23 Sections

Operation: Add

Search
ID: [   ] Go
Filter: [   ]
Show: All

All   None

- 1..Section X 1 (X = 70)
- 2..Section X 2 (X = 71.68)
- ☑ 3..Section X 3 (X = 73.36)
- 4..Section X 4 (X = 75.04)
- 5..Section X 5 (X = 76.72)
- 6..Section Y 6 (Y = -14.15)
- 7..Section Y 7 (Y = -9.65)
- 8..Section Y 8 (Y = -8.95)
- 9..Section Y 9 (Y = -1.79)
- 10..Section Y 10 (Y = 0)
- 11..Section Y 11 (Y = 5.37)
- 12..Section Y 12 (Y = 8.95)
- 13..Section Y 13 (Y = 11.65)
- 14..Section Y 14 (Y = 14.15)
- 15..Section Z 15 (Z = 0)

Selected: 1/23   OK   Cancel

1.2
1.1
1.
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.

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1 Execute *Table(expand/extreme)* from Stiffener Buckling Results context menu

2 Show stiffeners results: *ON*

3 Select Load =>Load Group: *1..Envelope*

4 Press *OK* and *Fill Table*

Use **Show stiffener results** for detailed table with results for all stiffeners. Otherwise only the worst results over Sections will be shown.

SDC VERIFIER

1 Execute *Reports => Add => Designer - Results*

2 In 1..Report (Over Loads) on the Ribbon, go to Results and click on Check Tables

3 Select Standard '1..DNV Buckling Strength of Plated Structures (2010)' and activate [S1] 1..Plate Buckling
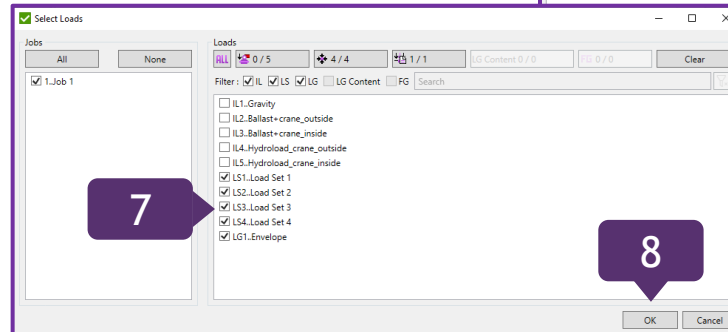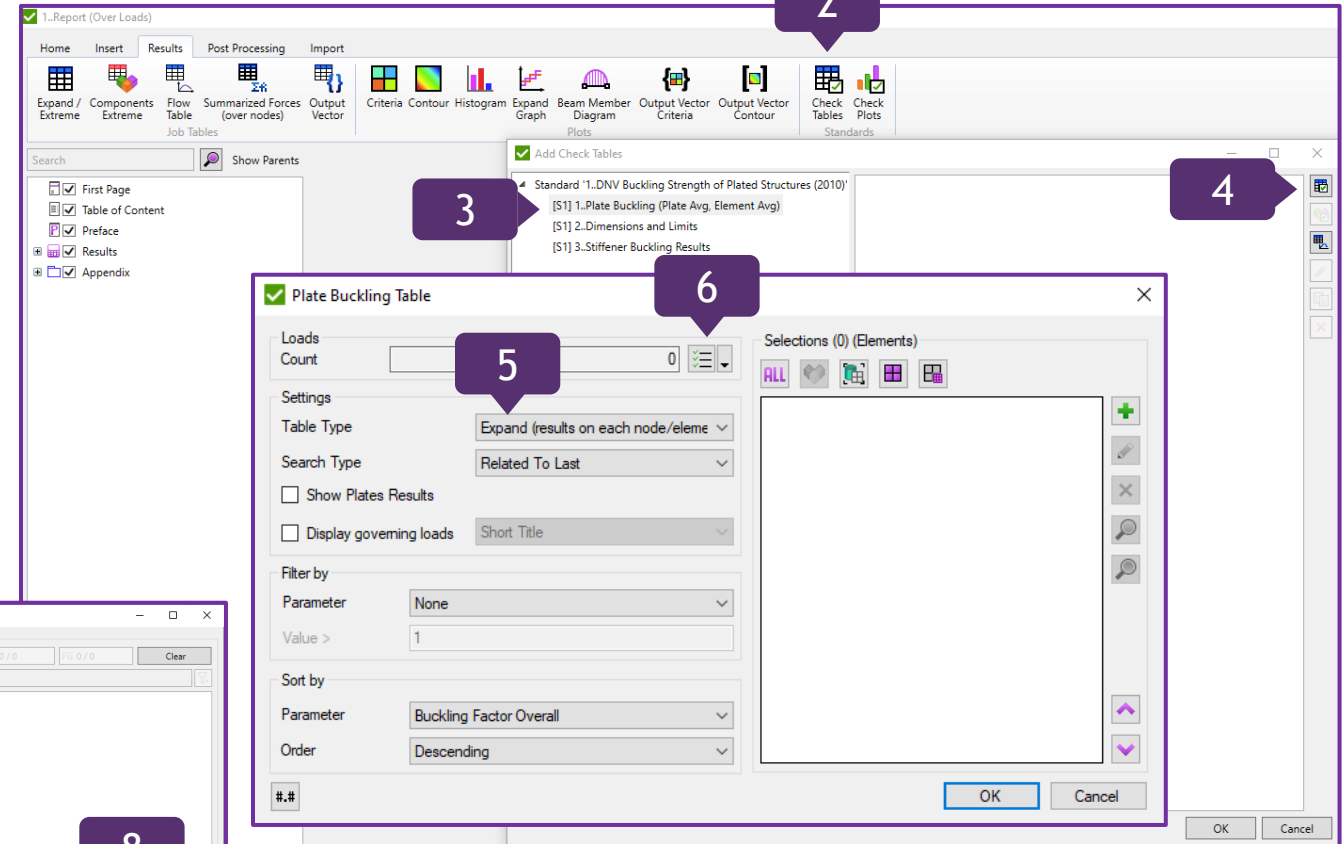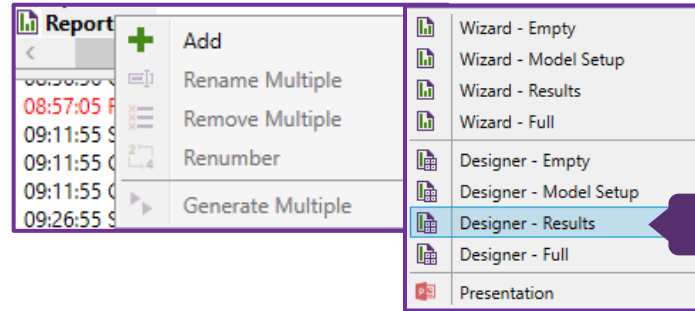
4 Press [icon] button

5 Table Type: *Expand*

6 Press [icon] to select loads

7 Select LS and LG1. Envelope

8 Press *OK*

Add
Rename Multiple
Remove Multiple
Renumber
Generate Multiple

Wizard - Empty
Wizard - Model Setup
Wizard - Results
Wizard - Full

Designer - Empty
Designer - Model Setup
Designer - Results
Designer - Full

Presentation

1..Report (Over Loads)

Home | Insert | **Results** | Post Processing | Import

Expand / Extreme | Components Extreme | Flow Table | Summarized Forces (over nodes) | Output Vector | Criteria | Contour | Histogram | Expand Graph | Beam Member Diagram | Output Vector Criteria | Output Vector Contour | Check Tables | Check Plots

Job Tables | Plots | Standards

Search | Show Parents

First Page
Table of Content
Preface
Results
Appendix

Add Check Tables

Standard '1..DNV Buckling Strength of Plated Structures (2010)'
 [S1] 1..Plate Buckling (Plate Avg, Element Avg)
 [S1] 2..Dimensions and Limits
 [S1] 3..Stiffener Buckling Results

Plate Buckling Table

Loads
Count: 0

Settings
Table Type: Expand (results on each node/eleme
Search Type: Related To Last
☐ Show Plates Results
☐ Display governing loads: Short Title

Filter by
Parameter: None
Value >: 1

Sort by
Parameter: Buckling Factor Overall
Order: Descending

Selections (0) (Elements)

OK | Cancel

Select Loads

Jobs
All | None
☑ 1..Job 1

Loads
ALL | 0 / 5 | 4 / 4 | 1 / 1 | LG Content 0 / 0 | 0 / 0 | Clear

Filter: ☑ IL ☑ LS ☑ LG ☐ LG Content ☐ FG | Search

☐ IL1..Gravity
☐ IL2..Ballast+crane_outside
☐ IL3..Ballast+crane_inside
☐ IL4..Hydroload_crane_outside
☐ IL5..Hydroload_crane_inside
☑ LS1..Load Set 1
☑ LS2..Load Set 2
☑ LS3..Load Set 3
☑ LS4..Load Set 4
☑ LG1..Envelope

OK | Cancel

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1 In Selection (0) (Elements), press ⊞ and select *From List*

2 Select Sections X 1-5 and press *OK*

3 Press *OK*

Select Items

Search
- ID [ ] Go
- Filter [ ]
- Show [All]

All | None

- ☑ Section '1..Section X 1 (X = 70)'
- ☑ Section '2..Section X 2 (X = 71.68)'
- ☑ Section '3..Section X 3 (X = 73.36)'
- ☑ Section '4..Section X 4 (X = 75.04)'
- ☑ Section '5..Section X 5 (X = 76.72)'
- ☐ Section '6..Section Y 6 (Y = -14.15)'
- ☐ Section '7..Section Y 7 (Y = -9.65)'
- ☐ Section '8..Section Y 8 (Y = -8.95)'
- ☐ Section '9..Section Y 9 (Y = -1.79)'
- ☐ Section '10..Section Y 10 (Y = 0)'
- ☐ Section '11..Section Y 11 (Y = 5.37)'
- ☐ Section '12..Section Y 12 (Y = 8.95)'
- ☐ Section '13..Section Y 13 (Y = 11.65)'
- ☐ Section '14..Section Y 14 (Y = 14.15)'
- ☐ Section '15..Section Z 15 (Z = 0)'
- ☐ Section '16..Section Z 16 (Z = 2.2)'

Selected: 5/23   OK   Cancel

Plate Buckling Table

Loads
Count [5]

Selections (0) (Elements)

Settings
- Table Type: Expand (re...
- Search Type: Related To
- ☐ Show Plates Results
- ☐ Display governing loads — Short Title

Filter by
- Parameter: None
- Value > 1

Sort by
- Parameter: Buckling State Limit
- Order: Descending

#.#   OK   Cancel

Selections (0) (Elements)
- Beam Members
- Beam Sections
- Panel Sections → From List
- Welds → On Components
- Connections → Select by Elements
- Group Elements between

Plate Buckling Table

Loads
Count [5]

Selections (5) (Elements)

Settings
- Table Type: Expand (results on each node/eleme...
- Search Type: Related To Last
- ☐ Show Plates Results
- ☐ Display governing loads — Short Title

- 1..Section X 1 (X = 70)
- 2..Section X 2 (X = 71.68)
- 3..Section X 3 (X = 73.36)
- 4..Section X 4 (X = 75.04)
- 5..Section X 5 (X = 76.72)

Filter by
- Parameter: None
- Value > 1

Sort by
- Parameter: Buckling State Limit
- Order: Descending

#.#   OK   Cancel

Add Check Tables

Standard '1..DNV Buckling Strength of Plated Structures (2010)'
- [S1] 1..Plate Buckling (Plate Avg, Element Avg)
- [S1] 2..Dimensions and Limits
- [S1] 3..Stiffener Buckling Results

- Table (LS1, 1..Section X 1 (X = 70))
- Table (LS1, 2..Section X 2 (X = 71.68))
- Table (LS1, 3..Section X 3 (X = 73.36))
- Table (LS1, 4..Section X 4 (X = 75.04))
- Table (LS1, 5..Section X 5 (X = 76.72))
- Table (LS2, 1..Section X 1 (X = 70))
- Table (LS2, 2..Section X 2 (X = 71.68))
- Table (LS2, 3..Section X 3 (X = 73.36))
- Table (LS2, 4..Section X 4 (X = 75.04))
- Table (LS2, 5..Section X 5 (X = 76.72))
- Table (LS3, 1..Section X 1 (X = 70))
- Table (LS3, 2..Section X 2 (X = 71.68))
- Table (LS3, 3..Section X 3 (X = 73.36))
- Table (LS3, 4..Section X 4 (X = 75.04))
- Table (LS3, 5..Section X 5 (X = 76.72))
- Table (LS4, 1..Section X 1 (X = 70))
- Table (LS4, 2..Section X 2 (X = 71.68))
- Table (LS4, 3..Section X 3 (X = 73.36))
- Table (LS4, 4..Section X 4 (X = 75.04))
- Table (LS4, 5..Section X 5 (X = 76.72))
- Table (LG1, 1..Section X 1 (X = 70))
- Table (LG1, 2..Section X 2 (X = 71.68))
- Table (LG1, 3..Section X 3 (X = 73.36))
- Table (LG1, 4..Section X 4 (X = 75.04))
- Table (LG1, 5..Section X 5 (X = 76.72))

OK   Cancel

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Report. Plots

1 In 1.. Report 1(Over Loads), go to Ribbon => Results => Check Plots

2 Activate *Standard '1..DNV Buckling Strength of Plated Structures (2010)* and activate [S1] 1..Plate Buckling
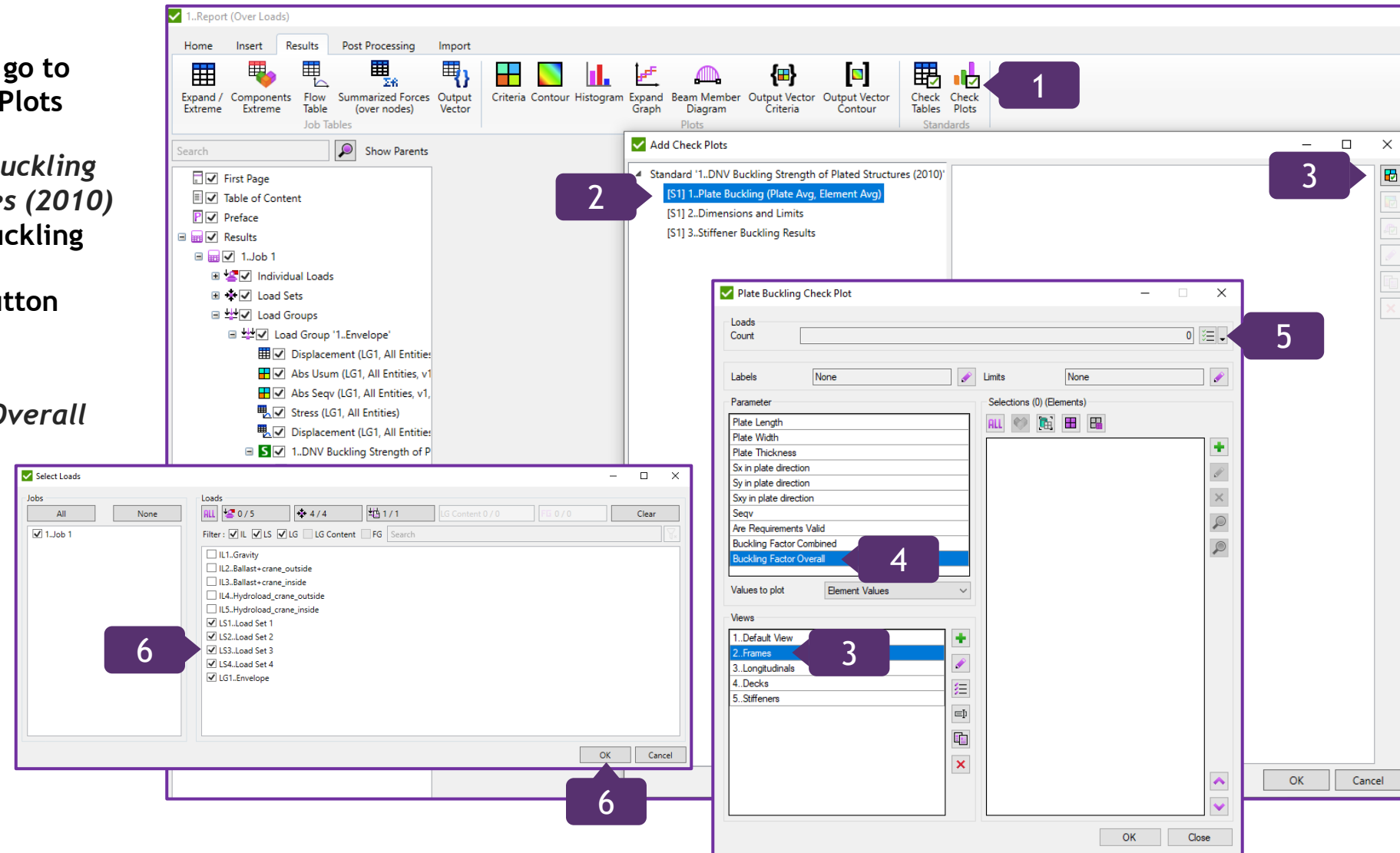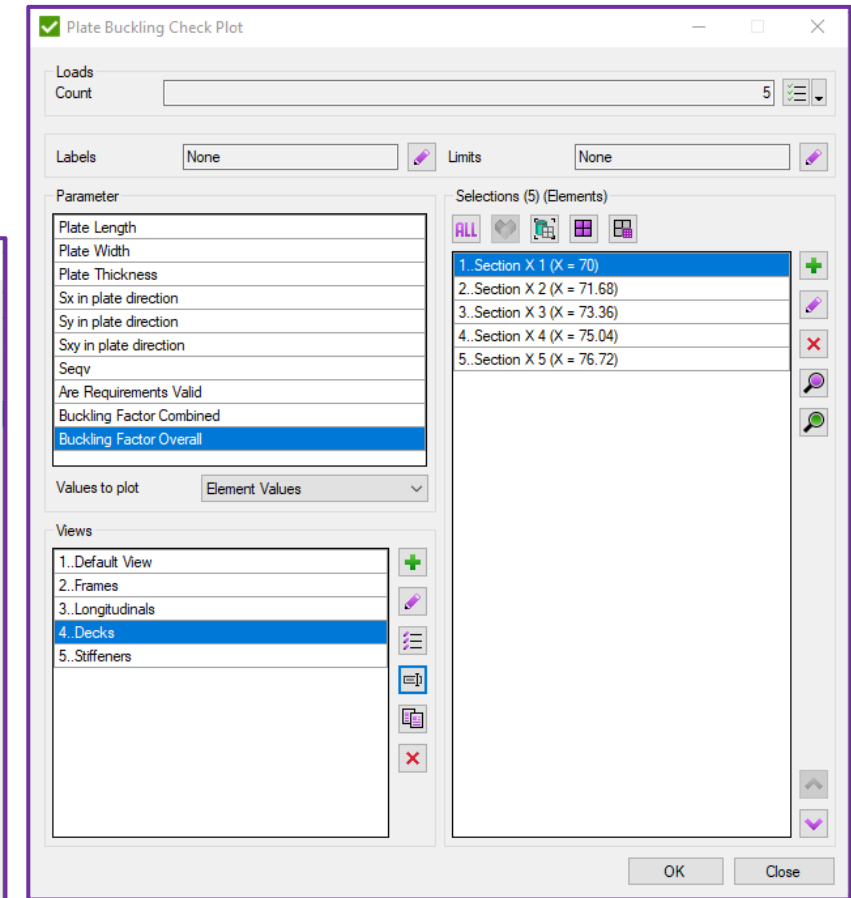
3 Press Add Criteria Plot button Views: *Frames*

4 Parameter: *Buckling Factor Overall*

5 Press in Loads Count
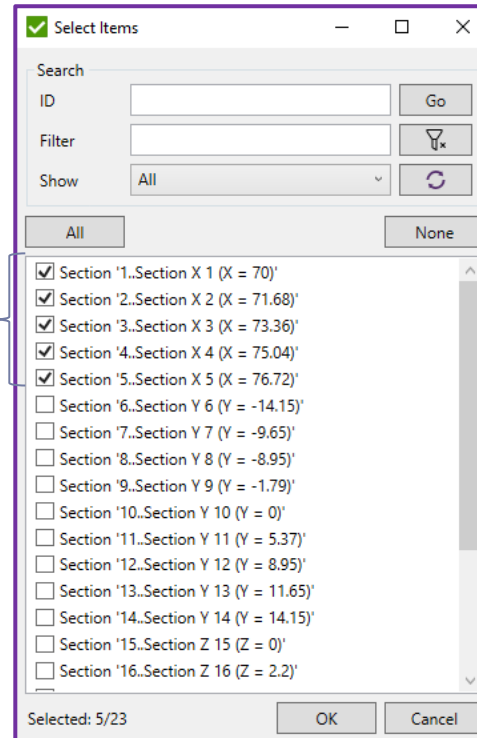
6 Select LS and LG1. Envelope and press *OK*

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1 In Selection (1) (Elements), press ⊞ and select *From List*

2 Select Sections X 1-5 and press *OK*

3 Press *OK*
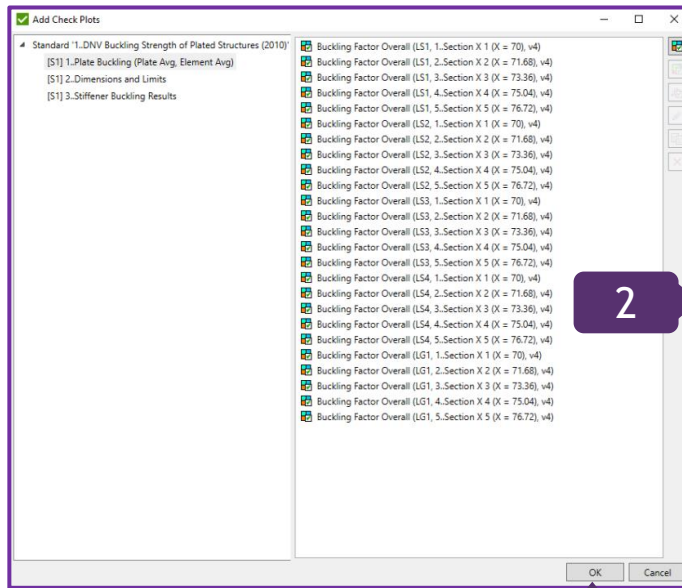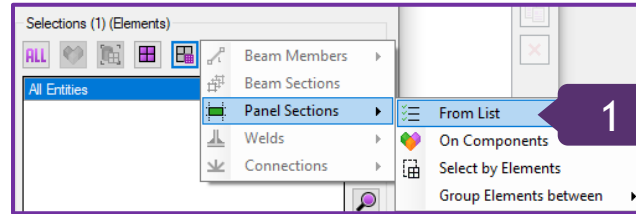
Repeat steps 1-6 (previous slide) and 1-3 (this slide) for **Stiffener Buckling Check** with Stiffeners View

Repeat steps 1-5 for Sections Y with Longitudinals View and Sections Z with Decks View

Report. First Page

1   Right click on *First Page => Edit*

2   Press 🔳 to select Engineer and Customer details from the library

3   Press *OK*
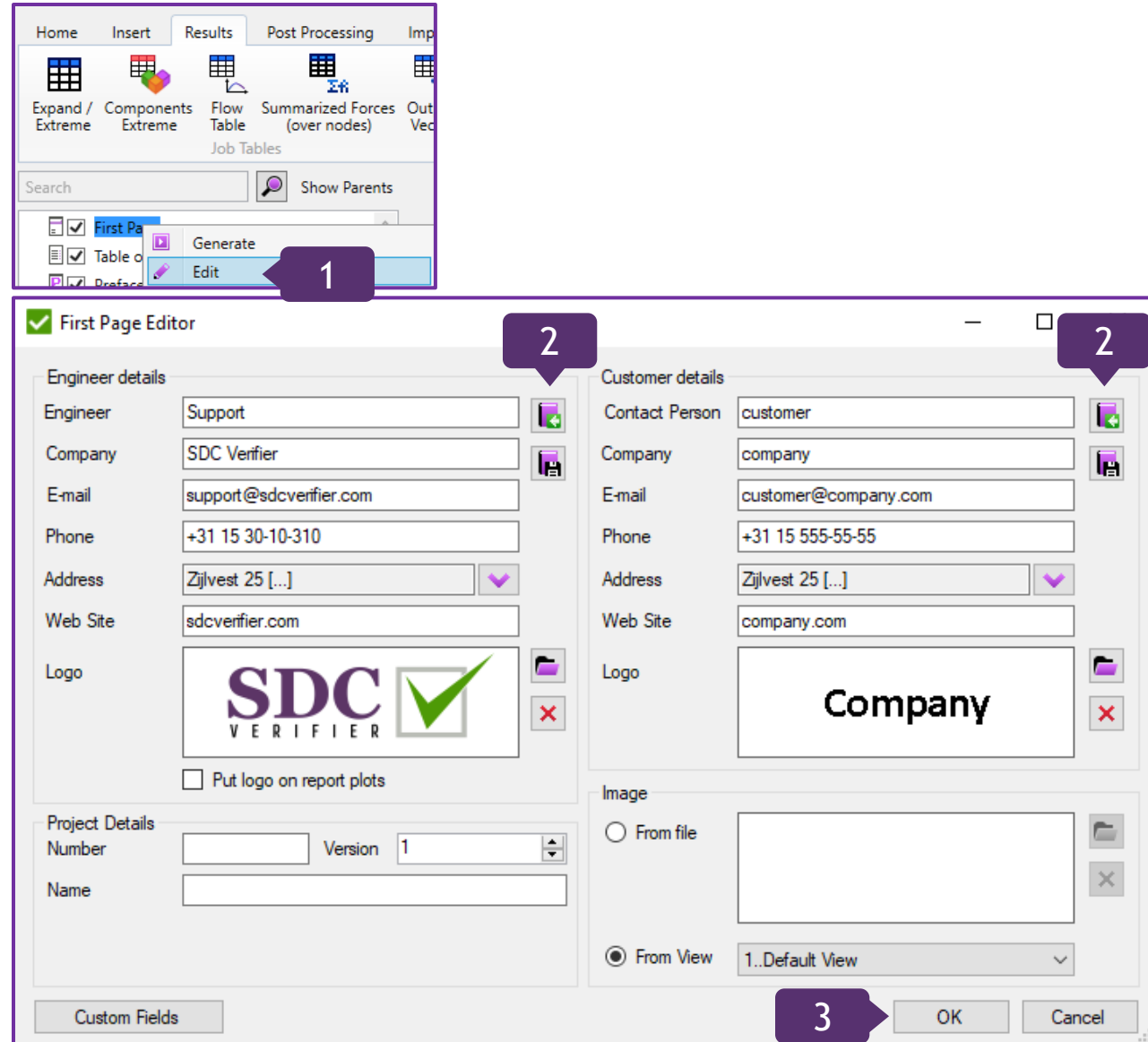
Report

1 In Home section of the Ribbon, press ▶ to generate a report