



Tutorial
Plate Buckling ABS 2014

ANSYS[®]

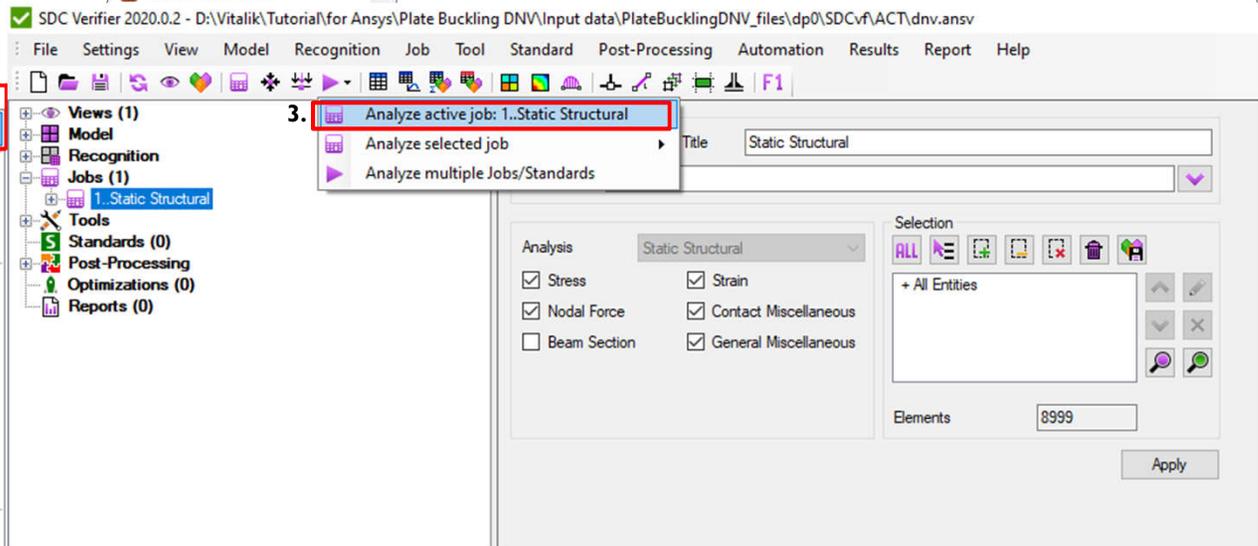
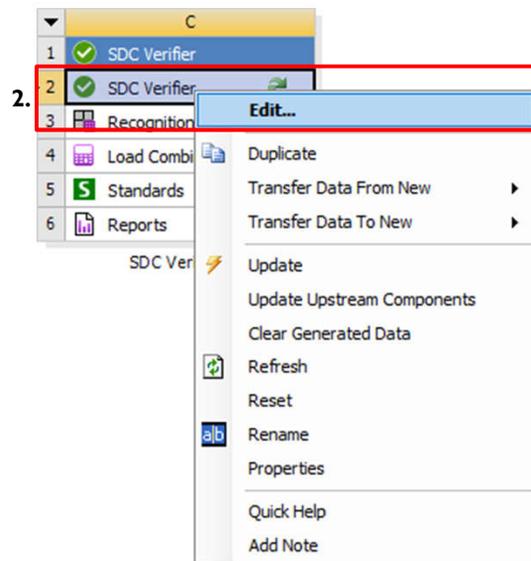
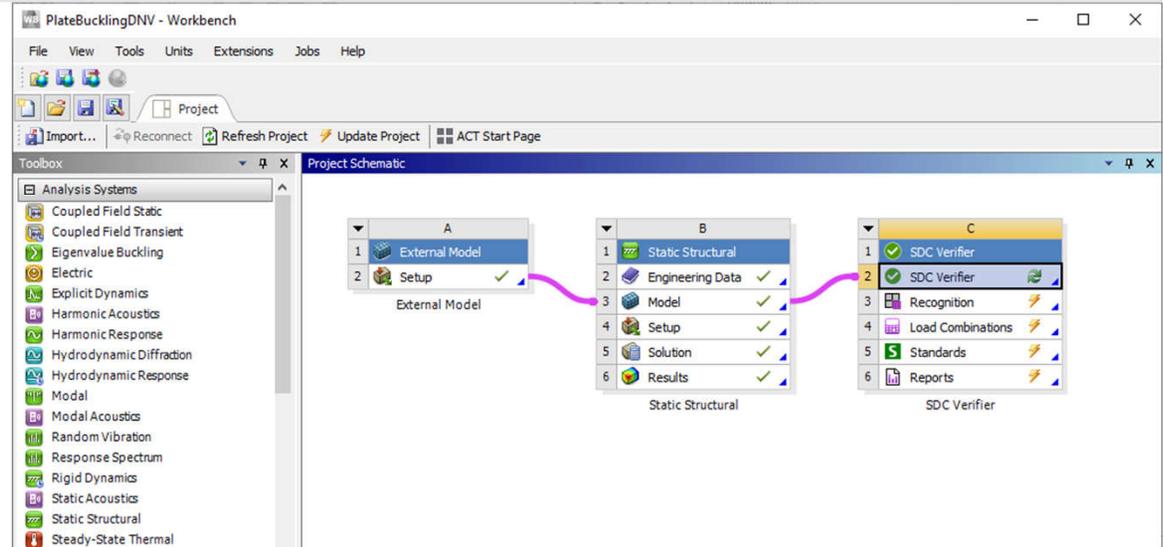
7 Dec 2020
version 2020.0.2

- ▶ In this tutorial an ABS 2014 Plate Buckling Check is reviewed in details.
- ▶ A part of a plate model of the ship has been used as a start FEM model.
- ▶ Load Sets and Load Group (Envelope) are created.
- ▶ Recognition of plates using Panel Finder.
- ▶ Plate Buckling tables and plots.
- ▶ Reporting: preparing and generating the final report.

Launch SDC Verifier



- 1 Open in **Ansys Workbench** **PlateBucklingDNV.wbpj**
- 2 Double Click on or execute *Edit* from context menu
- 3 Press on toolbar and “Analyze active job: 1.. Static Structural”



Load Sets

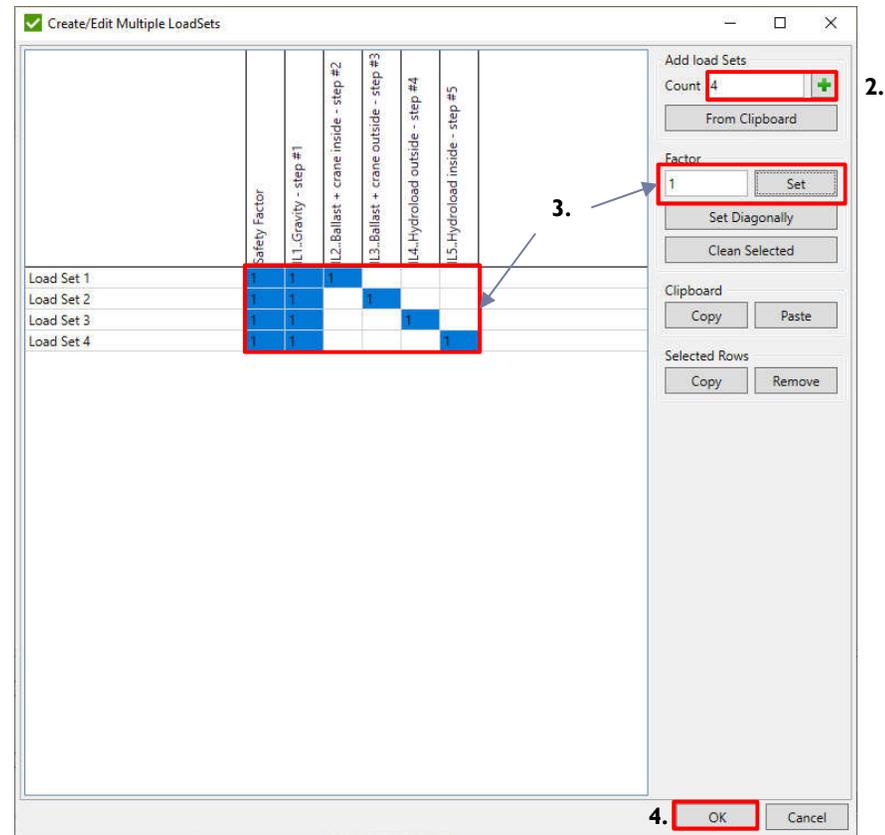
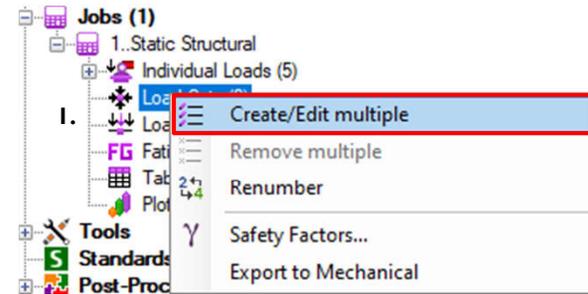
1 Right click on *Load Sets* =>
Create/Edit multiple.

2 Fill in "4" into *Count* and press  to add four Load Sets.

3 Select highlighted cells in the table like shown on the picture and press *Set* to define Factors of Load Sets. (By default LS Factor is 1)

4 Press *OK*

Load Sets are created with default titles "Load Set #". It is possible to rename them by double-click on the respective load set title. Alternatively, the titles and factors can be pasted from the Clipboard using *Paste* button.



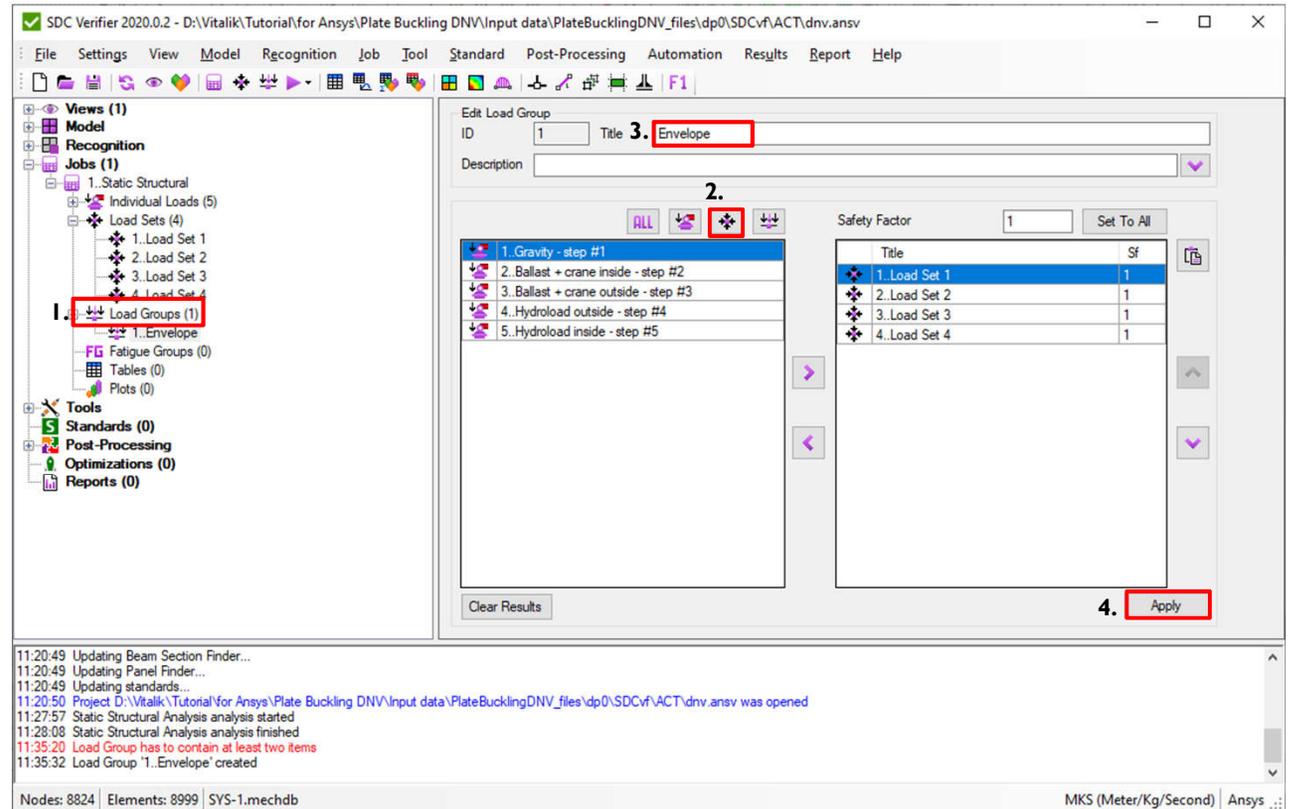
Load Groups

1 Click on *Load Groups*.

2 Press  to select all Load Sets.

3 *Title: Envelope*

4 Press *Create*



SDC Verifier 2020.0.2 - D:\Vitalik\Tutorial\for Ansys\Plate Buckling DNV\Input data\PlateBucklingDNV_files\dp0\SDCv\ACT\dnv.ansv

File Settings View Model Recognition Job Tool Standard Post-Processing Automation Results Report Help

Views (1)
Model
Recognition
Jobs (1)
1..Static Structural
Individual Loads (5)
Load Sets (4)
1..Load Set 1
2..Load Set 2
3..Load Set 3
4..Load Set 4
Load Groups (1)
1..Envelope
Fatigue Groups (0)
Tables (0)
Plots (0)
Tools
Standards (0)
Post-Processing
Optimizations (0)
Reports (0)

Edit Load Group
ID 1 Title 3. Envelope
Description

ALL   

Safety Factor 1 Set To All

Title	Sf
1..Load Set 1	1
2..Load Set 2	1
3..Load Set 3	1
4..Load Set 4	1

Clear Results **4.** Apply

11:20:49 Updating Beam Section Finder...
11:20:49 Updating Panel Finder...
11:20:49 Updating standards...
11:20:50 Project D:\Vitalik\Tutorial\for Ansys\Plate Buckling DNV\Input data\PlateBucklingDNV_files\dp0\SDCv\ACT\dnv.ansv was opened
11:27:57 Static Structural Analysis analysis started
11:28:08 Static Structural Analysis analysis finished
11:35:20 Load Group has to contain at least two items
11:35:32 Load Group '1..Envelope' created

Nodes: 8824 | Elements: 8999 | SYS-1.mechdb MKS (Meter/Kg/Second) Ansys ..

Load Sets and Load Groups are analyzed by SDC Verifier.

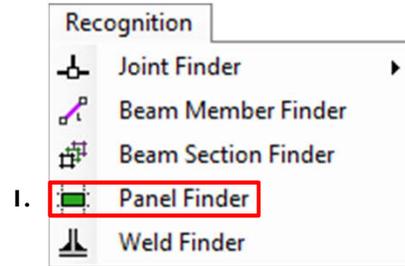
Panel Finder. Recognize Sections.

1

Execute *Recognition - Panel Finder* from main menu

2

Click on *Find*



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 = 11.8)	Z	11.8	2
Section Z 19 (Z = 13.3)	Z	13.3	3
Section Z 20 (Z = 14.8)	Z	14.8	7
Section Custom 21 (136...	Custom		4

Section Details

Panels Plates Stiffeners

Title	Plates Count	Stiffeners Count
Panel 1.1	10	7
Panel 1.2	18	15
Panel 1.3	1	1
Panel 1.4	7	5
Panel 1.5	12	21
Panel 1.6	1	0
Panel 1.7	12	7
Panel 1.8	1	0
Panel 1.9	55	35
Panel 1.10	5	3
Panel 1.11	1	1
Panel 1.12	1	0
Panel 1.13	5	3
Panel 1.14	4	2
Panel 1.15	1	1
Panel 1.16	1	0
Panel 1.17	1	0

2.

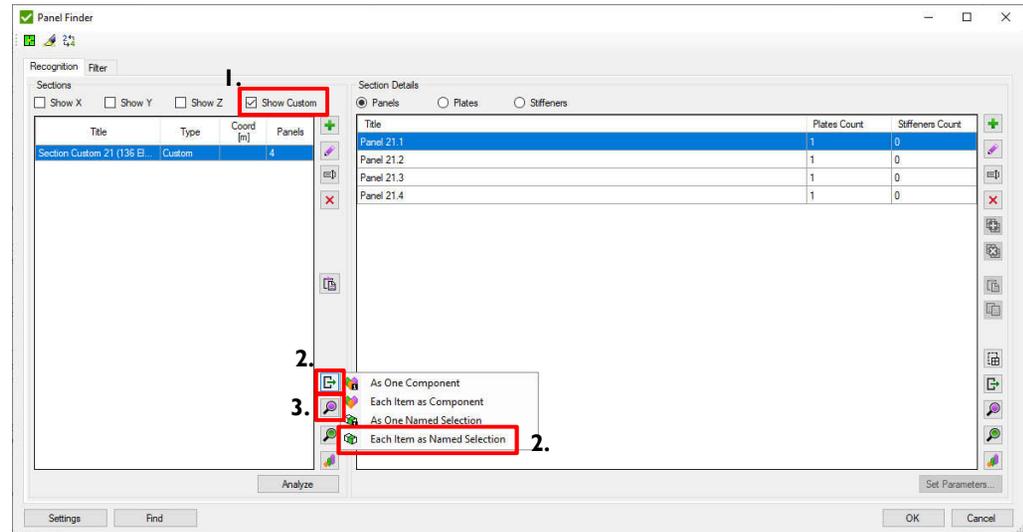
Analyze

Settings **Find** OK Cancel

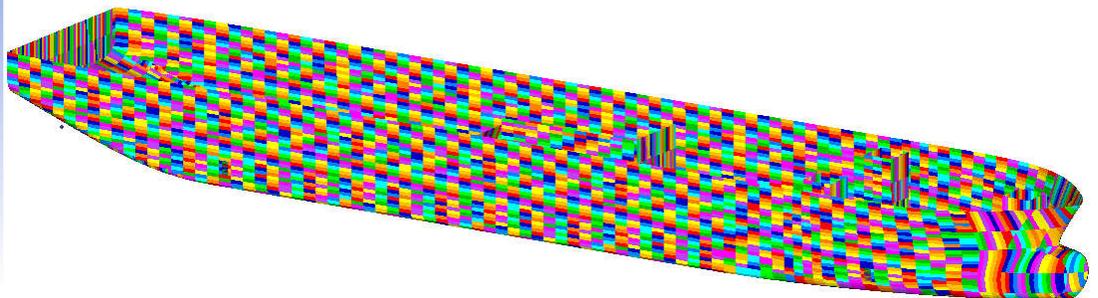
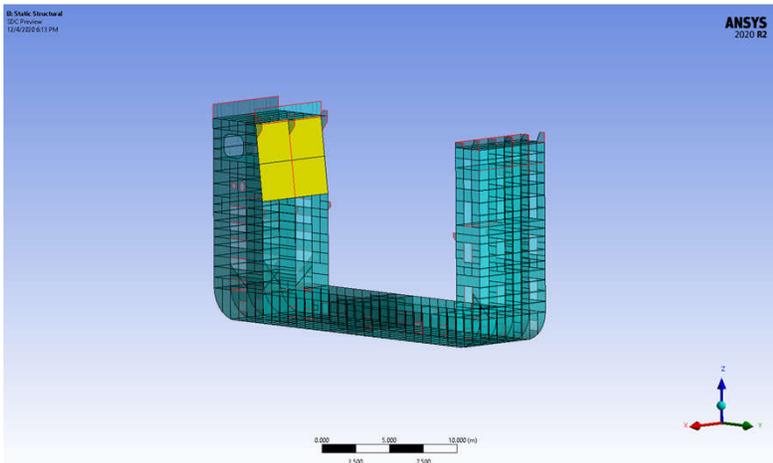
Panel Finder. Custom Section

- 1 Show Custom: **ON** (rest OFF)
- 2 Press and to export selected sections to named sel.
- 3 Press

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



Example: It is possible to create custom section based on hull selection:

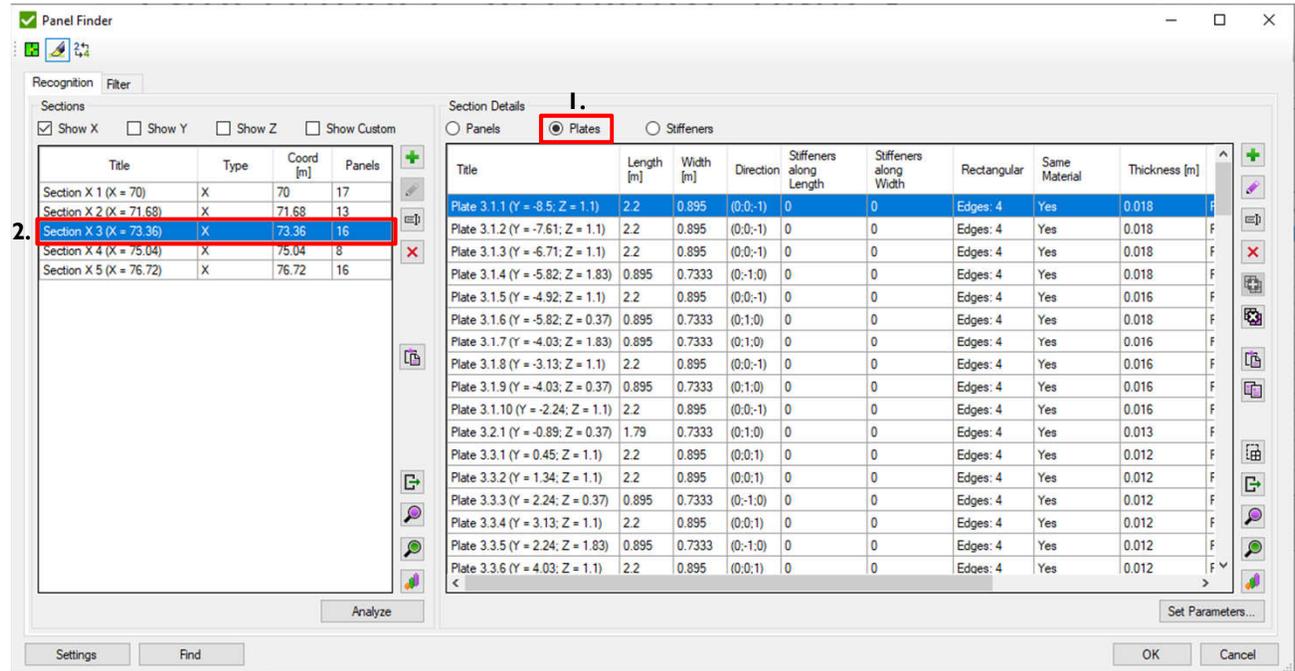


Panel Finder. Recognize plates

1 In Selection details Press **Plates**

2 Select **Section X3**.

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



Title	Length [m]	Width [m]	Direction	Stiffeners along Length	Stiffeners along Width	Rectangular	Same Material	Thickness [m]
Plate 3.5.15 (Y = 13.73; Z = 1...)	0.8333	0.75	(0;1;0)	0	0	Edges: 4	Yes	0.012
Plate 3.6.1 (Y = 12.9; Z = 2.39)	2.5	1.5333	(0;1;0)	0	0	Edges: 8	Yes	Min = 0.016

Section ID. Panel ID. Plate ID

Plate is rectangle with all corners = 90 degrees

Plate has elements more than from one property

Plate Dimensions and Thicknesses

Title	Length	Width	Direction	Rectangular	Yield Stress	Thickness
Plate 9 (Y = 12.07; Z = 11.34)	0.9167	0.8333	(0;0;1)	Yes	2.4E+08	0.012
Plate 10 (Y = 12.9; Z = 2.39)	2.5	1.5333	(0;1;0)	Edges: 8	2.4E+08	Min = 0.016

Plate ID

Plate is rectangle with all corners = 90 degrees

Plate has elements more than from one property

Dimensions: the results depend on plate dimensions and direction and it is important to understand how Panel Finder performs recognition. *Length* is considered the longest edge of plate and *Width* the longest perpendicular to the longest edge:

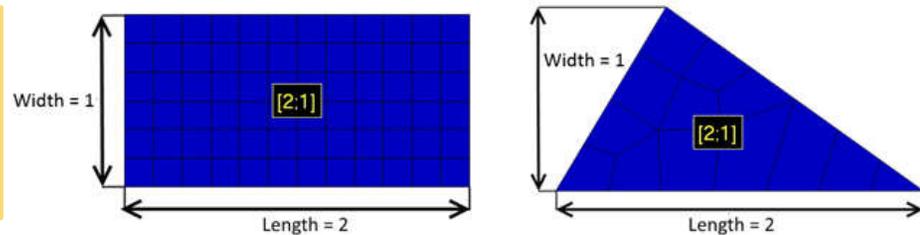


Plate Thickness: the calculations are performed on every element and thickness is taken directly from each element. It is possible to set thickness manually for a plate, in this case, the element thickness will be ignored and the user defined thickness will be used.
 Example: Plate with 2 properties 0.01 and 0.02 thicknesses. Left picture displays the property labels with property thicknesses and right presents the plate buckling plot of thickness parameter:

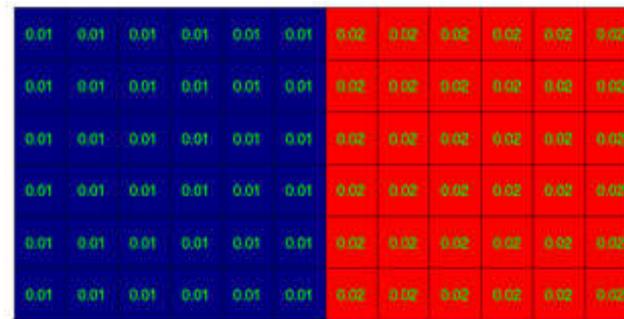
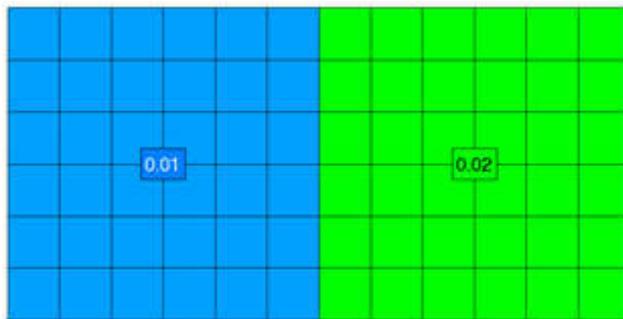
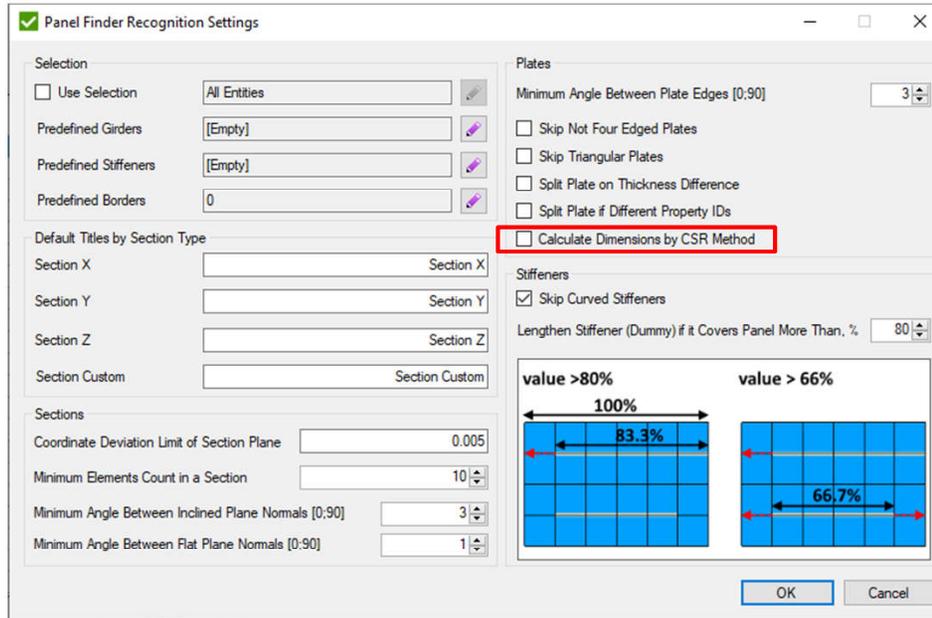


Plate Buckling Dimensions by CSR



2.3.2 Modelling of an unstiffened panel with irregular geometry

Unstiffened panels with irregular geometry are to be idealised to equivalent panels for plate buckling assessment according to the following procedure:

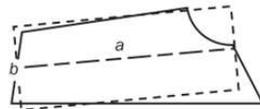
e) The length of shorter side, b in mm, is to be taken as:

$$b = A/a$$

where:

A : Area of the plate, in mm^2

a : length defined in (d), in mm

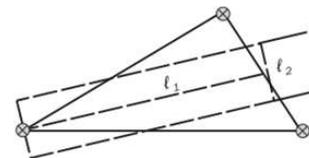


c) The width of the model, ℓ_2 , in mm, is to be taken as:

$$\ell_2 = A/\ell_1$$

where:

A : Area of the plate, in mm^2



Editing plates manually

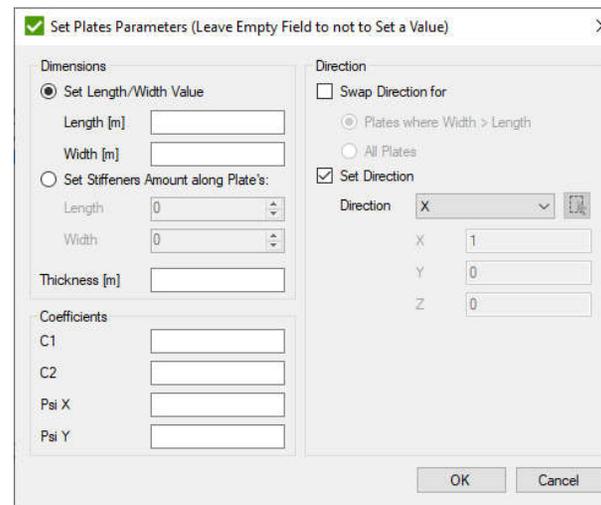
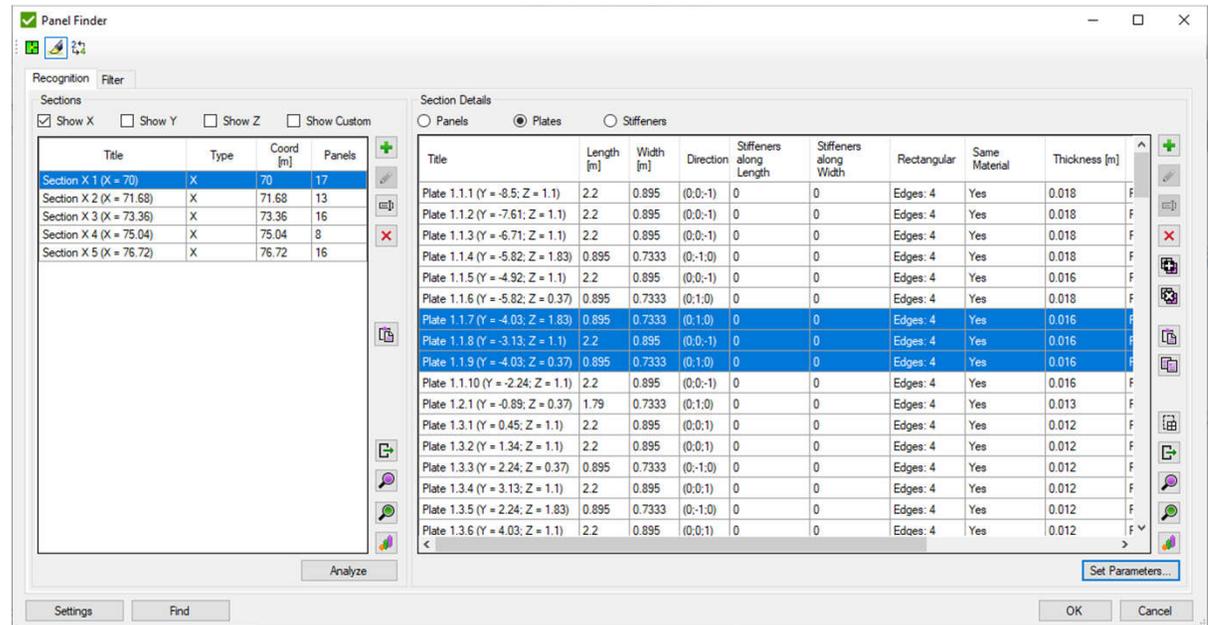
To modify plates select them from the list and press *Set Parameters*. It is possible to edit (Length / Width / Thickness / Coefficients / Direction).

It is possible to define parametric stiffeners along the Length and Width.

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

Thickness
0.016 (Original: 0.012)
0.016 (Original: 0.012)
0.016 (Original: 0.012)

Usually you should not modify plate directions. But in case it is required press *Set Direction*.



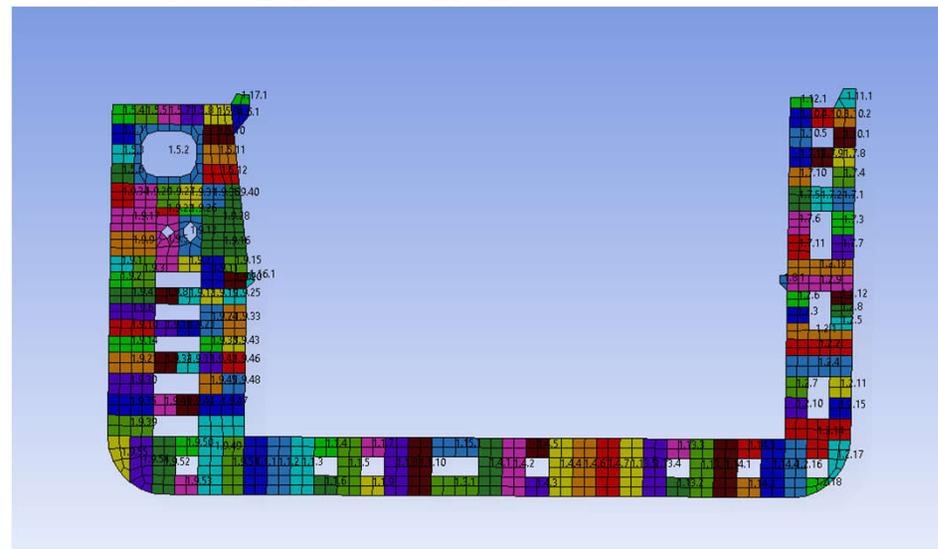
Panel Finder. Plates Plot

- 1 Select Section X1
- 2 Select All Plates (Ctrl+A)
- 3 Press
- 4 Click on Colors + Labels of Ids

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

Title	Length [m]	Width [m]	Direction	Stiffeners along Length	Stiffeners along Width	Rectangular	Same Material	Thickness [m]
Plate 3.1.1 (Y = -8.5; Z = 1.1)	2.2	0.895	(0;0;-1)	0	0	Edges: 4	Yes	0.01539855
Plate 3.1.2 (Y = -7.61; Z = 1.1)	2.2	0.895	(0;0;-1)	0	0	Edges: 4	Yes	0.01539855
Plate 3.1.3 (Y = -6.71; Z = 1.1)	2.2	0.895	(0;0;-1)	0	0	Edges: 4	Yes	0.01539855
Plate 3.1.4 (Y = -5.82; Z = 1.83)	0.895	0.7333	(0;-1;0)	0	0	Edges: 4	Yes	0.01539855
Plate 3.1.5 (Y = -4.92; Z = 1.1)	2.2	0.895	(0;0;-1)	0	0	Edges: 4	Yes	0.01539855
Plate 3.1.6 (Y = -5.82; Z = 0.37)	0.895	0.7333	(0;1;0)	0	0	Edges: 4	Yes	0.01539855
Plate 3.1.7 (Y = -4.03; Z = 1.83)	0.895	0.7333	(0;1;0)	0	0	Edges: 4	Yes	0.01539855
Plate 3.1.8 (Y = -3.13; Z = 1.1)	2.2	0.895	(0;0;-1)	0	0	Edges: 4	Yes	0.01539855
Plate 3.1.9 (Y = -4.03; Z = 0.37)	0.895	0.7333	(0;1;0)	0	0	Edges: 4	Yes	0.01539855
Plate 3.1.10 (Y = -2.24; Z = 1.1)	2.2	0.895	(0;0;-1)	0	0	Edges: 4	Yes	0.01539855
Plate 3.2.1 (Y = 12.75; Z = 6.26)	2.5	0.6083	(0;1;0)	0	0	Edges: 6	Yes	0.01539855
Plate 3.2.2 (Y = 12.9; Z = 5.7)	2.5	0.6083	(0;1;0)	0	0	Edges: 4	Yes	0.01539855
Plate 3.2.3 (Y = 12.07; Z = 6.92)	0.8333	0.6083	(0;-1;0)	0	0	Edges: 4	Yes	0.01539855
Plate 3.2.4 (Y = 12.9; Z = 5)	2.5	0.8	(0;1;0)	0	0	Edges: 4	Yes	0.01539855
Plate 3.2.5 (Y = 13.73; Z = 6.62)	0.8333	0.4867	(0;1;0)	0	0	Edges: 4	Yes	0.01539855
Plate 3.2.6 (Y = 12.07; Z = 7.53)	0.8333	0.6083	(0;-1;0)	0	0	Edges: 4	Yes	0.01539855
Plate 3.2.7 (Y = 12.07; Z = 4.2)	0.8333	0.8	(0;-1;0)	0	0	Edges: 4	Yes	0.01539855

- 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

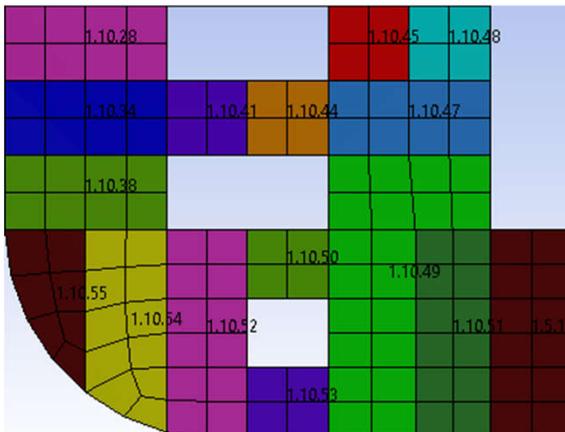


Panel Finder. Plot Options

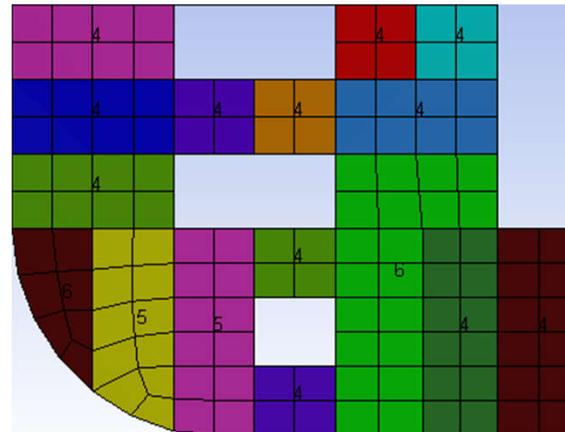
Note: Plate Plot can be displayed with different colors labels (labels of ids, labels of corners count or labels of dimensions). Also it is possible to show plates in length and width, coordinate systems etc.

-  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

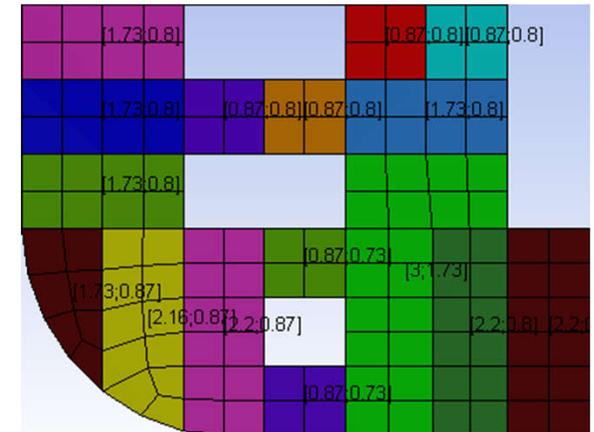
Labels of Ids



Labels of Corners Count

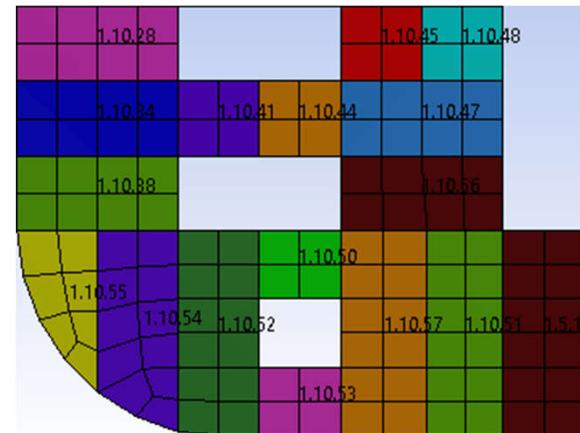
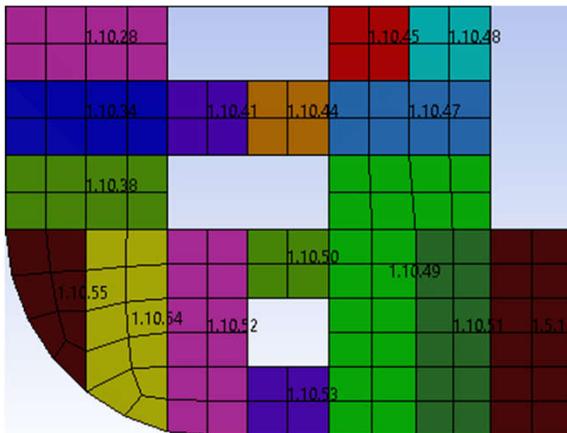


Labels of dimensions



Panel Finder. Update Plates

In some cases (e.g. stiffener is not modeled) plate is recognized not correctly, dimensions are bigger than in reality which leads to wrong results. Plate has to be updated manually. In Section X1 plate with Id = 1.10.49 should be split on 2 plates



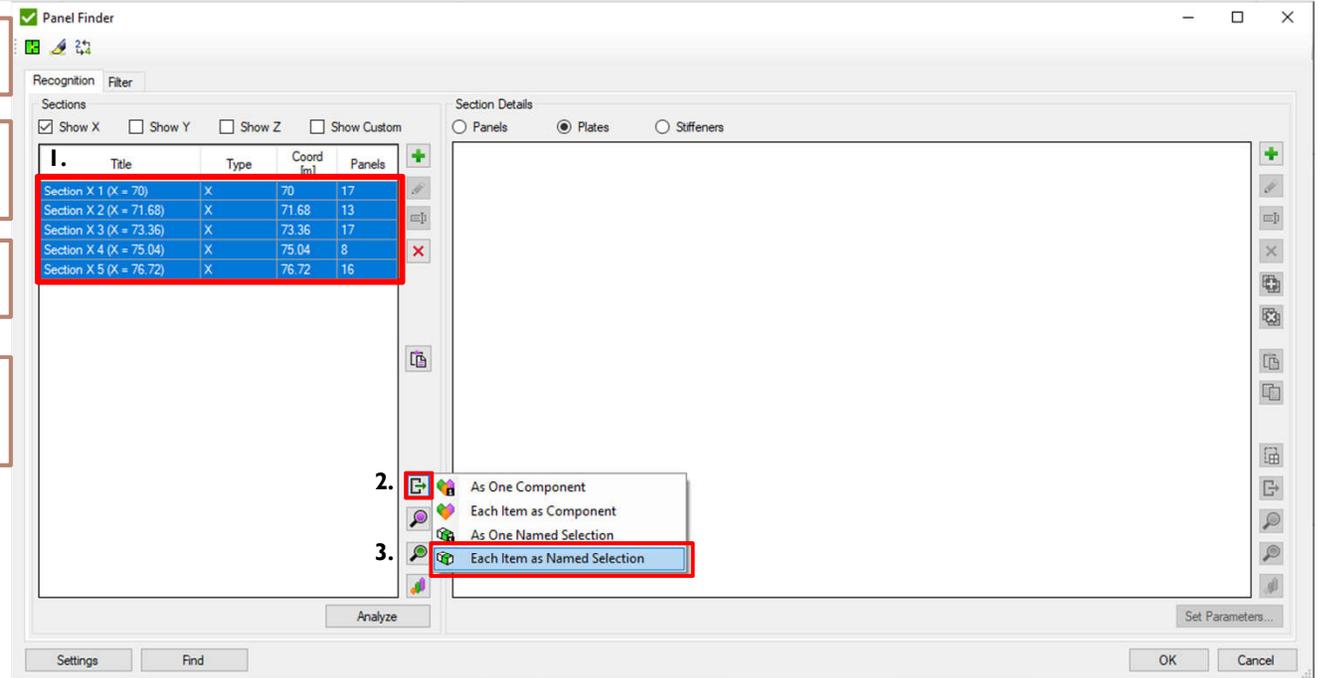
If plates were modified manually and later user decided to run recognition of plates, Panel Finder will ask what to do with the modified plates:

- Keep plates that was modified;
- Clear everything and recognize from scratch;

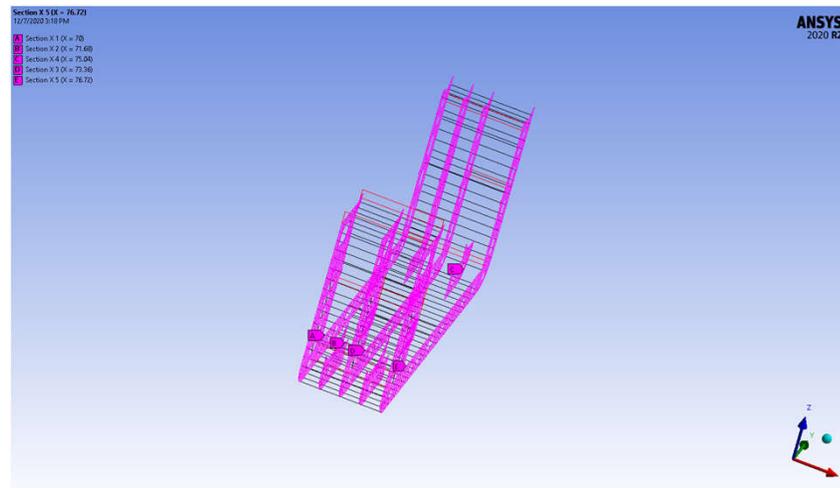
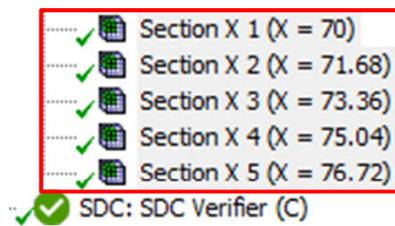


Panel Finder. Export Plates

- 1 Select *All X sections*.
- 2 Press  => Each Item as named Selection
- 3 Pick *Export by section*.
- 4 5 Named Selection will be created for 5 Sections .



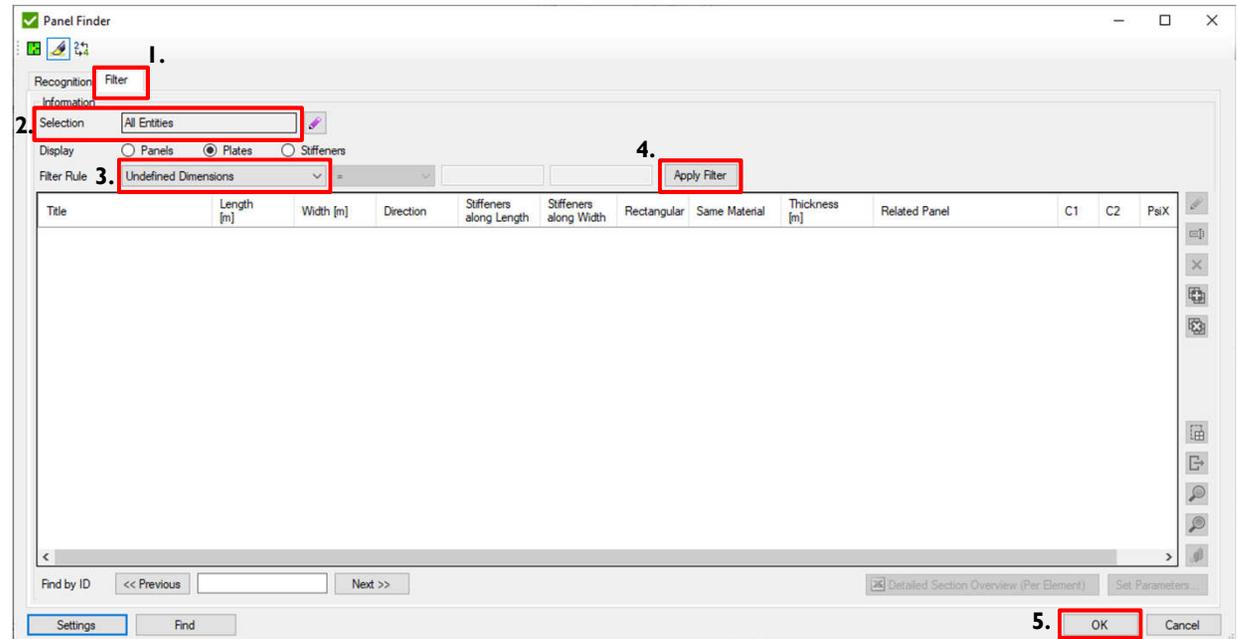
4.



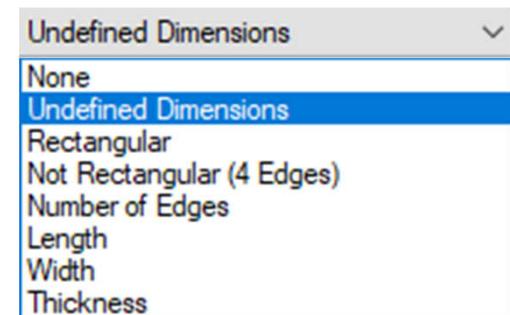
Panel Finder. Filter

Note: It is very important to check that all plates dimensions were recognized. If in the model, there are coincident nodes, coincident elements or free edges Panel Finder cannot recognize plate dimensions.

- 1 Click on *Filter tab*
- 2 Selection: **All Entities**
- 3 Filter: **Undefined dimensions**
- 4 Press *Apply Filter*
- 5 Table with plates is empty means that there is 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.



Add Plate Buckling ABS 2014

- 1 In Standards Context menu execute *Add* => *ABS* => *ABS Plate Buckling (2014)*
- 2 Utilization Factor (Eta) = **0.8**
- 3 Use Plate Average Stress: **On**
- 4 Press *OK*

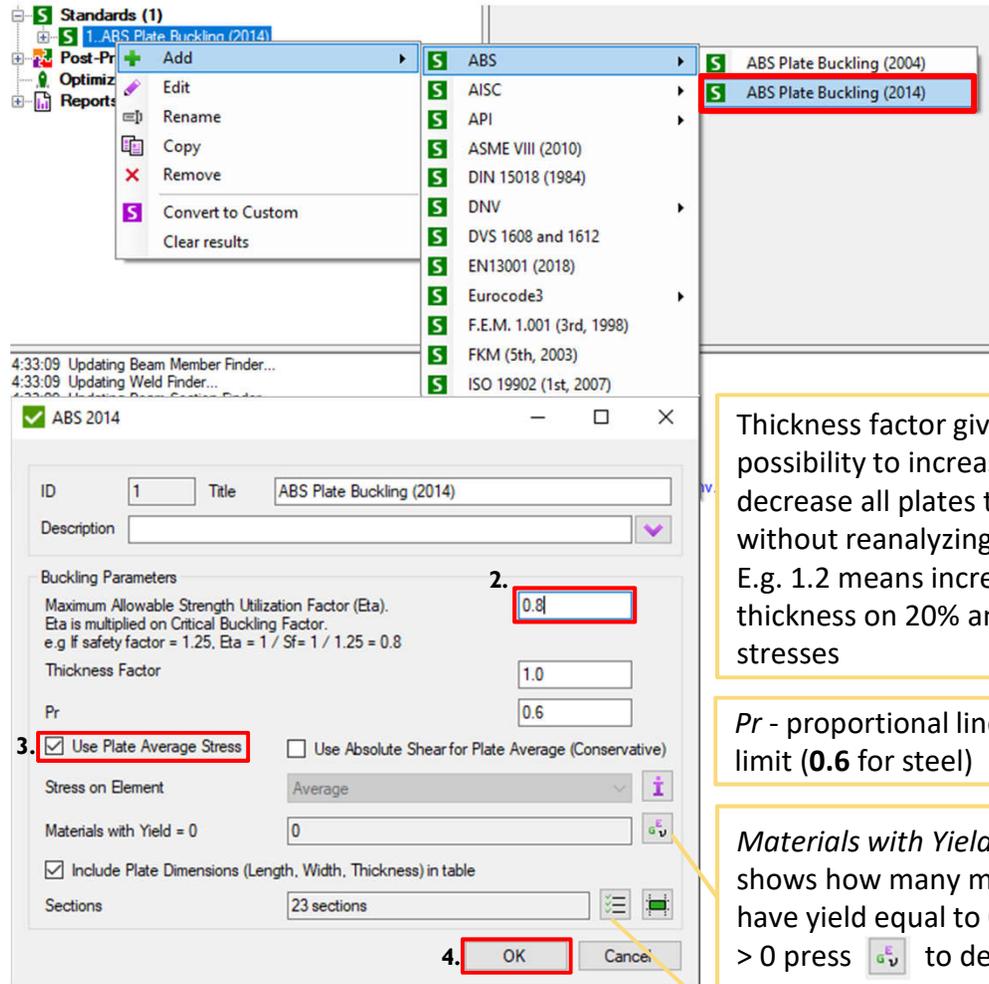


Plate Buckling transforms stresses automatically into plate direction. Options about element stresses and plate stresses are described on the next slide

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

P_r - proportional linear elastic limit (**0.6** for steel)

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.

Plate Buckling Stresses

Plate Buckling Stresses ✕

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

Minimum Element MidPlane:
 $Sel = \text{Min}((S1+S5) / 2, (S2+S6) / 2, (S3+S7) / 2, (S4+S8) / 2)$

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

Use Plate Average Stress

On Off

Sel1 (avg)	Sel2 (avg)	Sel3 (avg)
---------------	---------------	---------------

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

↓

One Buckling Factor for plate

Sel1	Sel2	Sel3
------	------	------

Sel1, Sel2, Sel3 - Average or min MidPlane

↓

Plate Buckling Factor = $\text{Max}(BF1, BF2, BF3)$

Views

1 Execute Views => **Add**

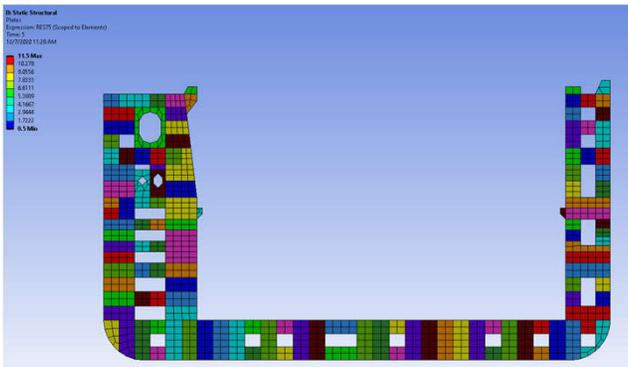
2 Title: **Frame**

3 Orient model in Ansys as shown on picture below (ZY plane)

4 Press **Get**

5 Press **OK**

To make nice plots first Views should be created (set of settings how to display plot).



SDC Verifier 2020.0.2 - D:\Vitalik\Tutorial\for Ansys

File Settings View Model Recognition

View Add Edit Multiple Rename Multiple Remove Multiple Renummer

Jobs (1)

1. Static Structural

Individual Loads (5)

Load Sets (4)

1. Load Set 1

2. Load Set 2

3. Load Set 3

4. Load Set 4

Load Groups (1)

1. Envelope

Fatigue Groups (0)

Tables (0)

Plots (0)

Tools

Standards (1)

1. DNV Buckling Strength of Plated Structures

Post-Processing

Optimizations (0)

Reports (0)

13:50:49 Saving backup file...

13:50:49 D:\Vitalik\Tutorial\for Ansys\Plate Buckling DNV\

13:50:50 D:\Vitalik\Tutorial\for Ansys\Plate Buckling DNV\

14:05:49 Saving backup file...

14:05:49 D:\Vitalik\Tutorial\for Ansys\Plate Buckling DNV\

14:05:50 D:\Vitalik\Tutorial\for Ansys\Plate Buckling DNV\

14:20:49 Saving backup file...

14:20:49 D:\Vitalik\Tutorial\for Ansys\Plate Buckling DNV\

14:20:50 D:\Vitalik\Tutorial\for Ansys\Plate Buckling DNV\

14:24:34 '2. View 2' created

Nodes: 8824 | Elements: 8999 | SYS-1.mechdb

MKS (Meter/Kg/Second) Ansys ...

Plate Buckling Plot

- 1 Execute *Criteria Plot* from Plate Buckling DNV 2010 context menu
- 2 Load Group: **1..Envelope**
- 3 View: **2..Frame**
- 4 Press and Select: **3..Section X3**
- 5 Press *OK*
- 6 Press *Preview*

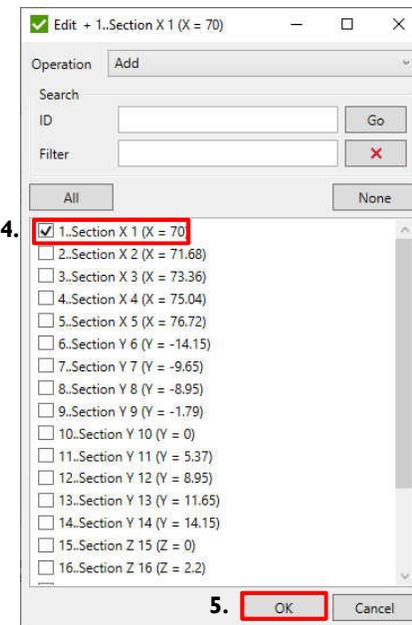
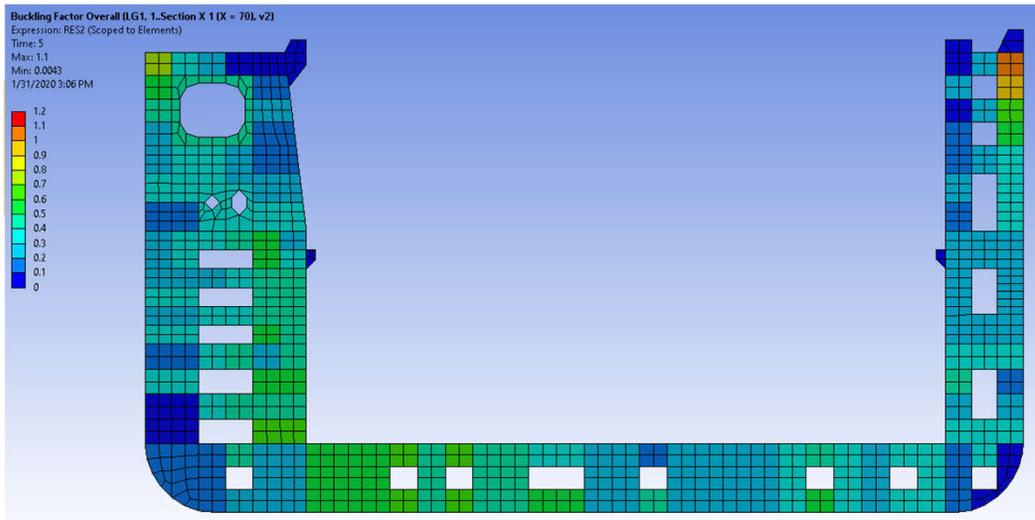
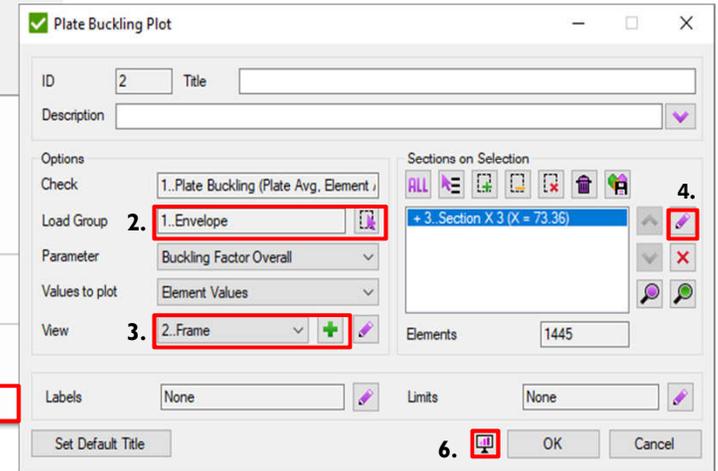
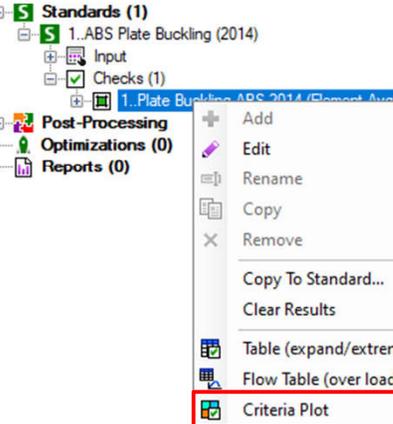
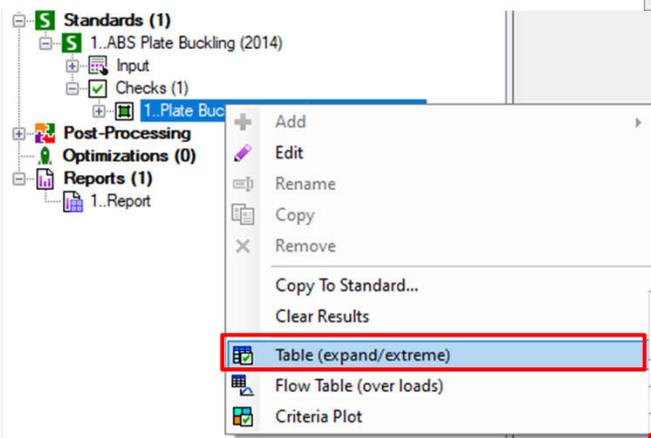
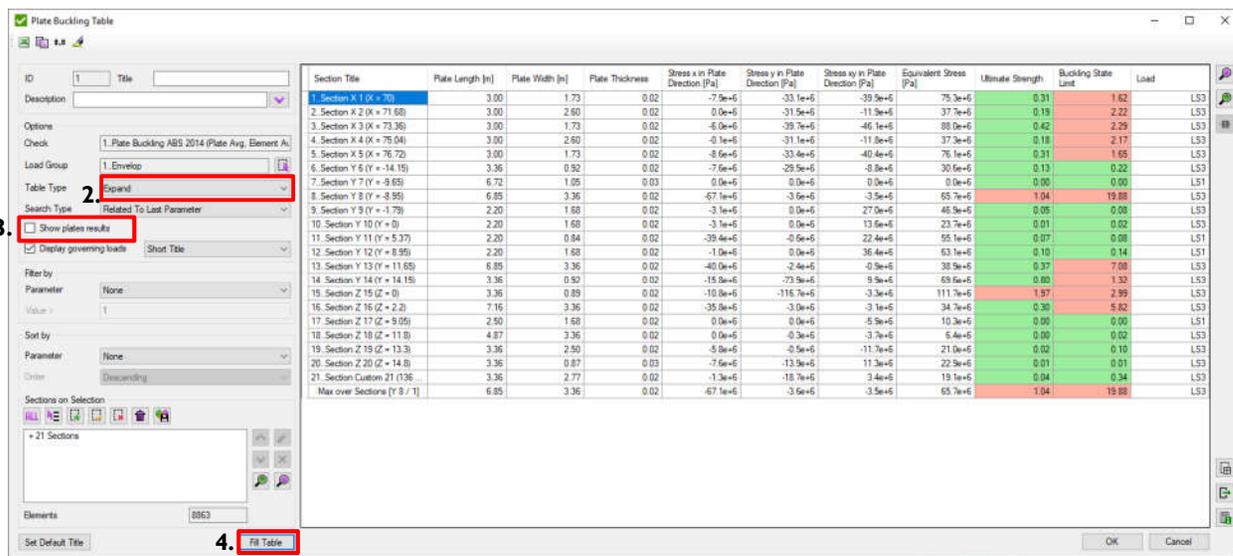


Plate Buckling Table

1. Execute *Table(expand/extreme)* from Plate Buckling DVN 2010 context menu
2. Load Group: **1..Envelop**
3. Show plates results: **OFF**
4. Press *Fill Table*



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

Plate with ID = 70 has the highest result in Section X 1

Section Title	Plate Length	Plate Width	Plate Thickness	Sx in plate direction	Sy in plate direction	Sxy in plate direction	Seqv	Buckling Factor Combined	Buckling Factor Overall
1..Section X 1 (X = 70000) [MaxID=70]	833.33	750.00	12.00	-0.02e+6	-0.06e+6	-0.05e+6	0.09e+6	0.22	0.47
2. Section X 2 (X = 71680) [MaxID=46]	3000.00	2600.00	16.00	0.00e+6	-0.02e+6	-0.01e+6	0.02e+6	0.12	0.35
3. Section X 3 (X = 73360) [MaxID=92]	895.00	733.33	14.00	-0.04e+6	-0.01e+6	-0.05e+6	0.10e+6	0.22	0.47
Max over Sections [3 / 92]	895.00	733.33	14.00	-0.04e+6	-0.01e+6	-0.05e+6	0.10e+6	0.22	0.47

Section ID = 3 / Plate ID = 92 worst result among sections

All results (dimensions, stresses) are from the plate which causes higher BF = 0.47 because Search Type = Related to Last Parameter

Report. Tables

- 1 Execute Reports => Add => **Designer - Results**
- 2 Results => Check Tables
- 3 Press => Check '1..Plate Buckling' =>
- 4 Type: **Expand**
- 5 Press and select **LS; LG** loads.
- 6 Press **OK**
- 7 Press and Execute **From List**
- 8 Select all **X Sections**
- 9 Press **OK**
- 9 Press **OK**

The screenshot illustrates the workflow for generating a report table in SDC Verifier. It shows the 'Reports' menu, the 'Report Designer' window, the 'Plate Buckling Table' dialog, and the 'Select Items' dialog.

1. Reports Menu: The 'Add' option is selected, leading to the 'Designer - Results' sub-menu.

2. Report Designer: The 'Results' tab is active. The 'Check Tables' icon is highlighted.

3. Add Check Tables: The 'Standard '1..ABS Plate Buckling (2014)'' check table is selected.

4. Plate Buckling Table: The 'Table Type' is set to 'Expand'.

5. Plate Buckling Table: The 'Loads' count is set to 5.

6. Select Items: The 'From List' option is selected.

7. Select Items: The 'On Components' option is selected.

8. Select Items: All X Sections are selected.

9. OK: The 'OK' button is pressed to confirm the selection.

Report. Plots

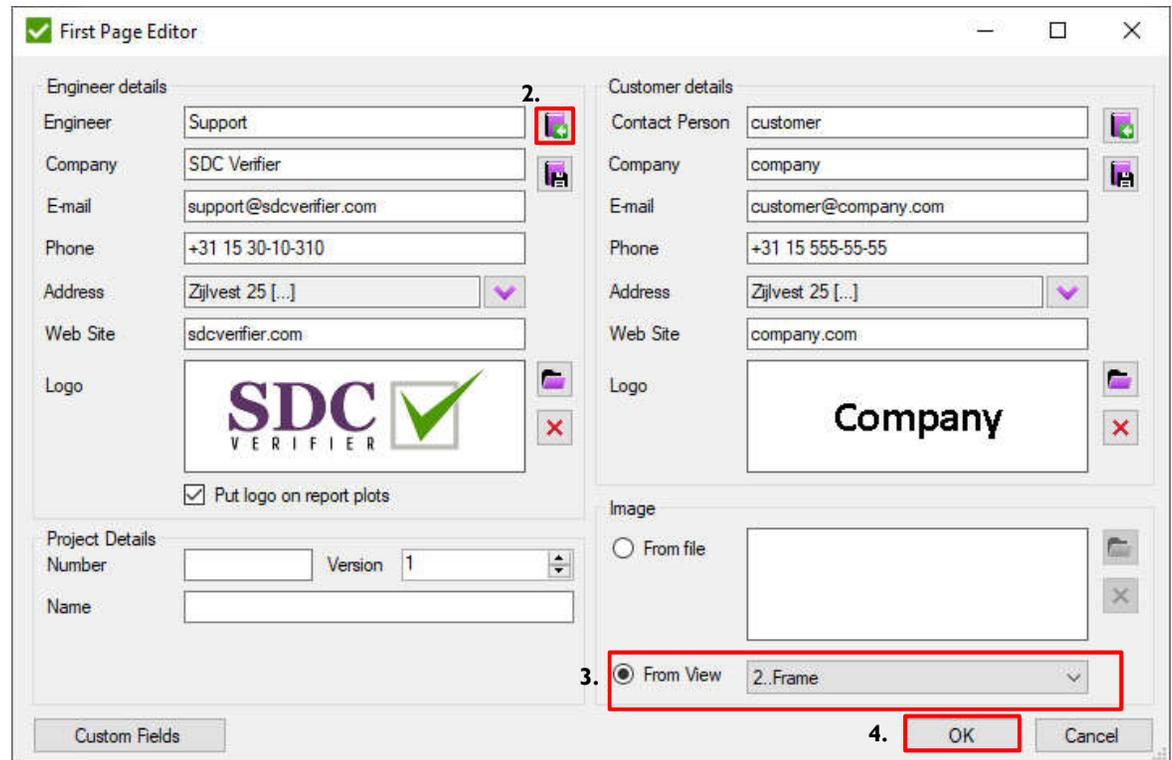
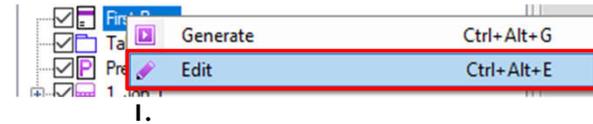
- 1 Results => Check Plots
- 2 Press => Check '1..Plate Buckling' =>
- 3 Parameter: **Buckling Factor Overall.**
- 4 Views: **Frame.**
- 5 Press , select **LS; LG** Loads and Press **OK.**
- 6 Press and Execute **From List**
- 7 Select all **X sections.**
- 8 Press **OK.**
- 9 Press **OK.**

The screenshot shows the SDC Verifier software interface with several windows open and specific elements highlighted with red boxes and numbered callouts (1-9) corresponding to the instructions on the left.

- 1:** The **Results** tab is selected in the top ribbon.
- 2:** The **Check Plots** icon in the Standards group is highlighted.
- 3:** In the **Add Check Plots** dialog, the check **'1..Plate Buckling ABS 2014 (Element Avg)'** is selected.
- 4:** In the **Plate Buckling Check Plot** dialog, the **From List** button is highlighted.
- 5:** In the **Select Loads** dialog, the **LG (1 / 1)** load set is selected.
- 6:** In the **Plate Buckling Check Plot** dialog, the **From List** button is highlighted.
- 7:** In the **Select Items** dialog, all **X sections** (1 through 5) are selected.
- 8:** The **OK** button in the **Select Items** dialog is highlighted.
- 9:** The **OK** button in the **Plate Buckling Check Plot** dialog is highlighted.

Report. First Page

- 1 Right click on *First Page* => **Edit**.
- 2 Press to select engineer and custom from library
- 3 Select Image *From View* and pick '*2..Frame*'.
- 4 Press **OK**.



Report

Press to generate complete report and press to convert report to word





Report

Prepared by: SDC Verifier
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sdcoverifier.com
Zijlvest 25
2011 VB Haarlem
The Netherlands

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

Engineer: Support
Customer: customer
Project Number:
Version: 1
Date: 03/02/2020

1..ABS Plate Buckling (2014)

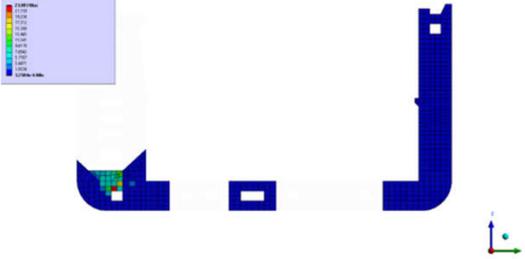
1..Table (LG1, 25 Sections)

Section Title	Plate Length [m]	Plate Width [m]	Plate Thickness	Stress x Direction [Pa]	Stress y Direction [Pa]	Stress z Direction [Pa]	Equivalent Stress [Pa]	Ultimate Strength [Pa]	Buckling State Limit	Load
16. Section Z 16 (Z = 2.2)	7.16	3.36	0.02	-148.2e+0	-22.5e+0	-13.9e+0	140.3e+0	5.07	108.70	LS3
8. Section Y 6 (Y = -8.95)	9.05	3.36	0.02	-141.0e+0	-18.8e+0	-8.1e+0	133.3e+0	4.55	99.41	LS3
3. Section X 3 (X = 73.36)	3.00	1.73	0.02	-157.1e+0	-138.0e+0	-127.8e+0	260.6e+0	5.70	33.95	LS3
5. Section X 5 (X = 76.72)	3.00	1.73	0.02	-177.1e+0	-124.6e+0	-118.0e+0	250.4e+0	5.44	31.23	LS3
13. Section Y 13 (Y = 11.65)	6.85	3.36	0.02	-78.5e+0	-13.5e+0	9.9e+0	71.7e+0	1.37	29.85	LS3
2. Section X 2 (X = 71.68)	3.00	2.60	0.02	-24.0e+0	-100.0e+0	-29.4e+0	103.8e+0	1.81	23.08	LS3
4. Section X 4 (X = 75.04)	3.00	2.60	0.02	-23.0e+0	-99.2e+0	-29.4e+0	103.1e+0	1.70	22.71	LS3
1. Section X 1 (X = 70)	2.00	2.25	0.02	-46.0e+0	-68.9e+0	25.3e+0	75.0e+0	0.90	7.88	LS3
15. Section Z 15 (Z = 0)	3.36	0.89	0.02	-10.0e+0	-122.9e+0	-4.4e+0	118.2e+0	2.07	3.32	LS3
14. Section Y 14 (Y = 14.15)	3.36	0.78	0.03	66.6e+0	237.1e+0	123.0e+0	266.6e+0	2.36	2.63	LS3
6. Section Y 6 (Y = -14.15)	3.36	0.75	0.03	-35.7e+0	-228.1e+0	-59.4e+0	234.4e+0	1.52	1.55	LS3
19. Section Z 19 (Z = 13.3)	3.36	2.60	0.02	-5.8e+0	-15.7e+0	-11.3e+0	23.9e+0	0.07	0.83	LS3
18. Section Z 18 (Z = 11.8)	4.87	3.36	0.02	-3.5e+0	-7.9e+0	1.1e+0	7.1e+0	0.02	0.81	LS3
20. Section Z 20 (Z = 14.8)	3.36	0.87	0.03	-47.5e+0	-130.3e+0	60.1e+0	154.6e+0	0.72	0.76	LS3
21. Section Custom 21 (136 Elements)	3.36	2.77	0.02	0.0e+0	-23.4e+0	0.4e+0	23.4e+0	0.08	0.53	LS3
12. Section Y 12 (Y = 8.95)	2.20	1.68	0.02	0.0e+0	0.0e+0	42.7e+0	73.9e+0	0.13	0.18	LS1
11. Section Y 11 (Y = 5.37)	2.20	0.84	0.02	-68.5e+0	-1.1e+0	21.9e+0	70.0e+0	0.13	0.15	LS1
9. Section Y 9 (Y = -1.79)	2.20	1.68	0.02	-10.4e+0	-2.7e+0	31.4e+0	55.2e+0	0.08	0.13	LS3
10. Section Y 10 (Y = 0)	2.20	1.68	0.02	-7.9e+0	-7.9e+0	14.4e+0	26.1e+0	0.02	0.07	LS3
17. Section Z 17 (Z = 9.05)	3.36	2.60	0.02	0.0e+0	0.0e+0	-8.2e+0	14.2e+0	0.01	0.03	LS3
24. Section Custom 24 (16 Elements)	1.88	0.43	0.02	-0.4e+0	0.0e+0	-11.9e+0	20.6e+0	0.01	0.01	LS3
22. Section Custom 22 (16 Elements)	1.88	0.42	0.02	0.0e+0	-8.3e+0	9.0e+0	17.6e+0	0.01	0.01	LS3
25. Section Custom 25 (16)	1.88	0.49	0.02	-2.9e+0	0.0e+0	-10.3e+0	18.0e+0	0.01	0.01	LS3

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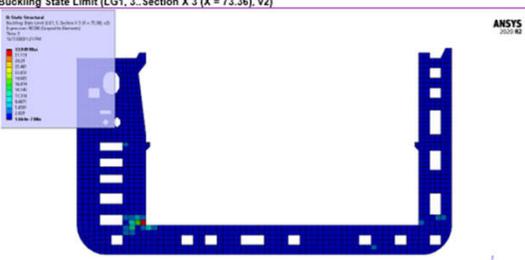


Buckling State Limit (LG1, 2. Section X 2 (X = 71.68), v2)



Check [S1] 1. Plate Buckling ABS 2014 (Element Avg) **Load Group** LG1. Envelope
Parameter View Buckling State Limit **Selection** 2. Section X 2 (X = 71.68)

Buckling State Limit (LG1, 3. Section X 3 (X = 73.36), v2)



Check [S1] 1. Plate Buckling ABS 2014 (Element Avg) **Load Group** LG1. Envelope
Parameter View Buckling State Limit **Selection** 3. Section X 3 (X = 73.36)

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