

Stress Analysis for 6mm Stiffener

1. The cavity is 3.5 mm thick.
2. The corner stiffeners are 5.85 mm thick.
3. The flat plate stiffeners are still 4 mm thick.
4. Cavity only, both beam pipe ends fixed to make it simple.
→ Still adequate to examine the stress on the stiffener area.
5. Niobium room temperature property, $E=1E+11$ Pa, $PR=0.4$
6. Conclusion

The area showing the equivalent stress over 50 MPa has membrane stress less than 50 MPa and total linearized stress less than 75 MPa.

6mm or ¼" thick sheet is good to use.

Boundary Conditions

A: 3.5mm with 5.85mm stiffener

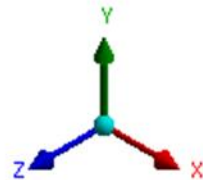
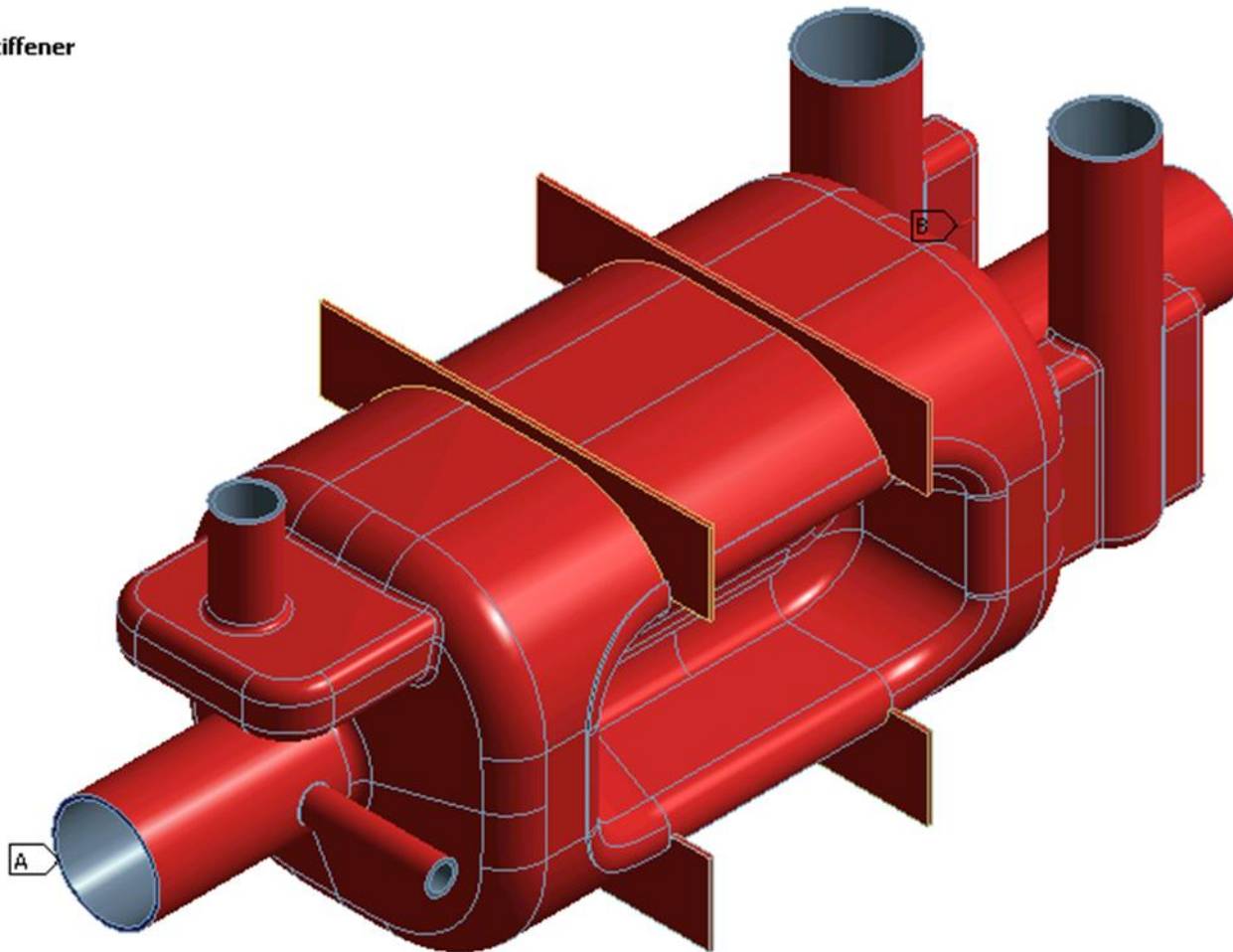
Static Structural

Time: 1. s

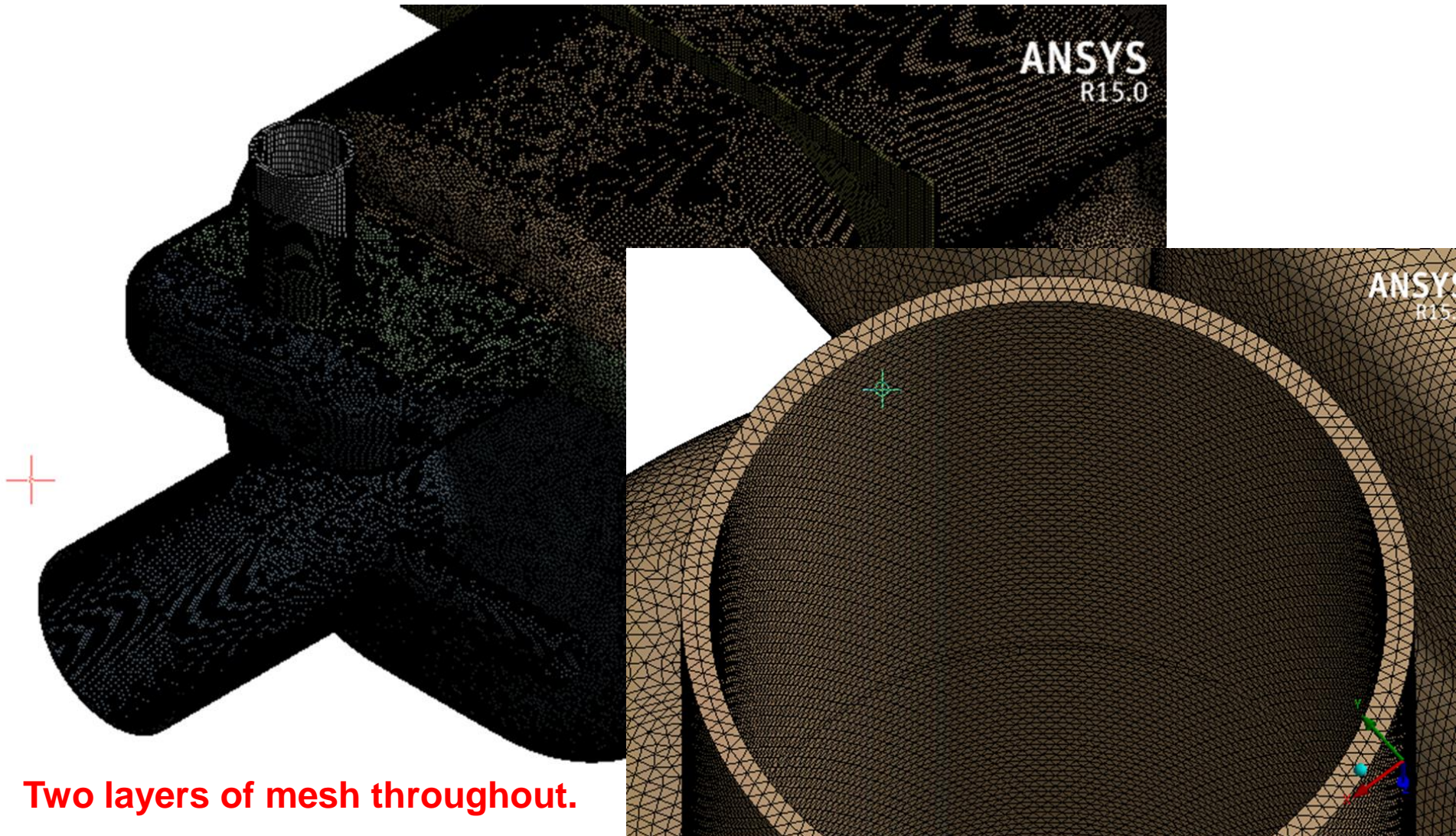
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A Fixed Support

B Pressure: 0.18 MPa



Mesh



Overall Equivalent Stress

Showing the max location.

A: 3.5mm with 5.85mm stiffener

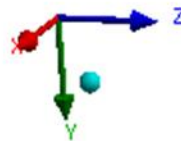
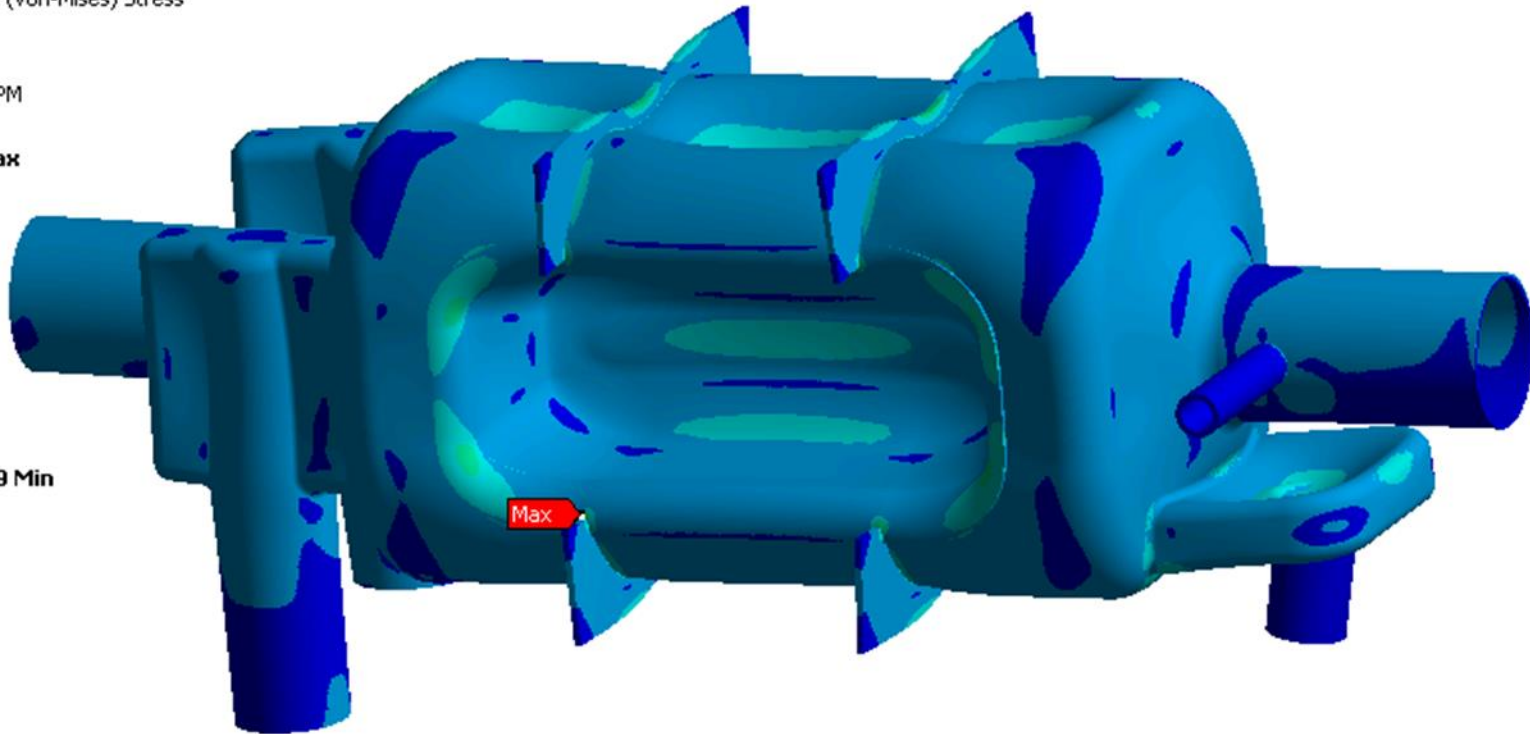
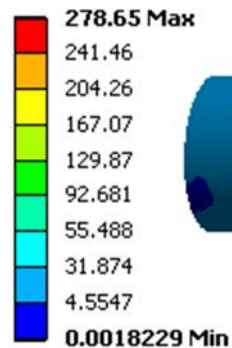
Equivalent Stress

Type: Equivalent (von-Mises) Stress

Unit: MPa

Time: 1

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Deformation

A: 3.5mm with 5.85mm stiffener

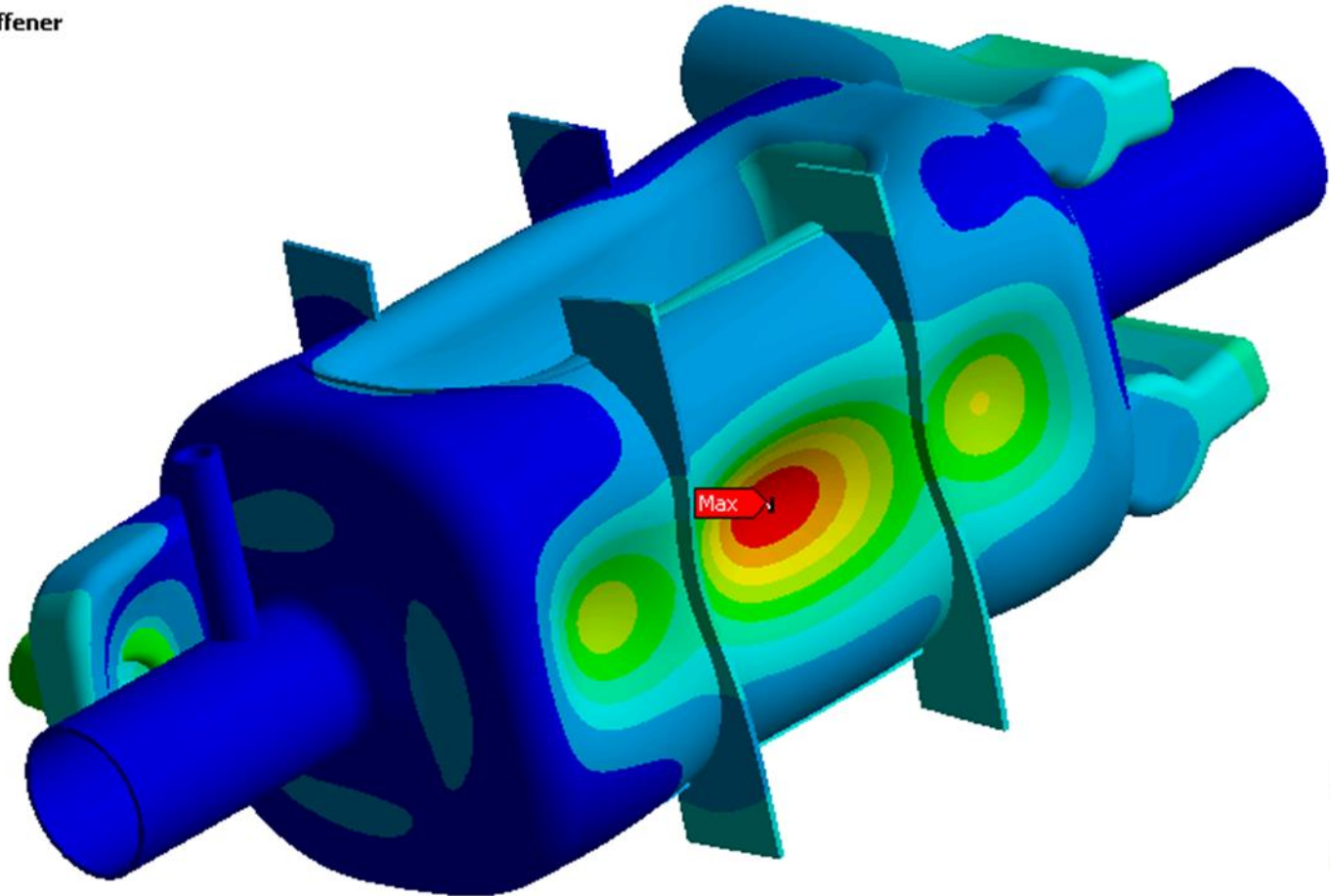
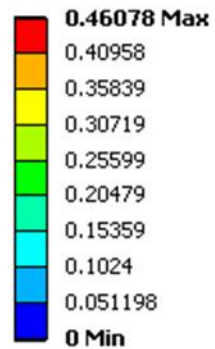
Total Deformation

Type: Total Deformation

Unit: mm

Time: 1

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High Stress Locations

Red is above 50 MPa.

A: 3.5mm with 5.85mm stiffener

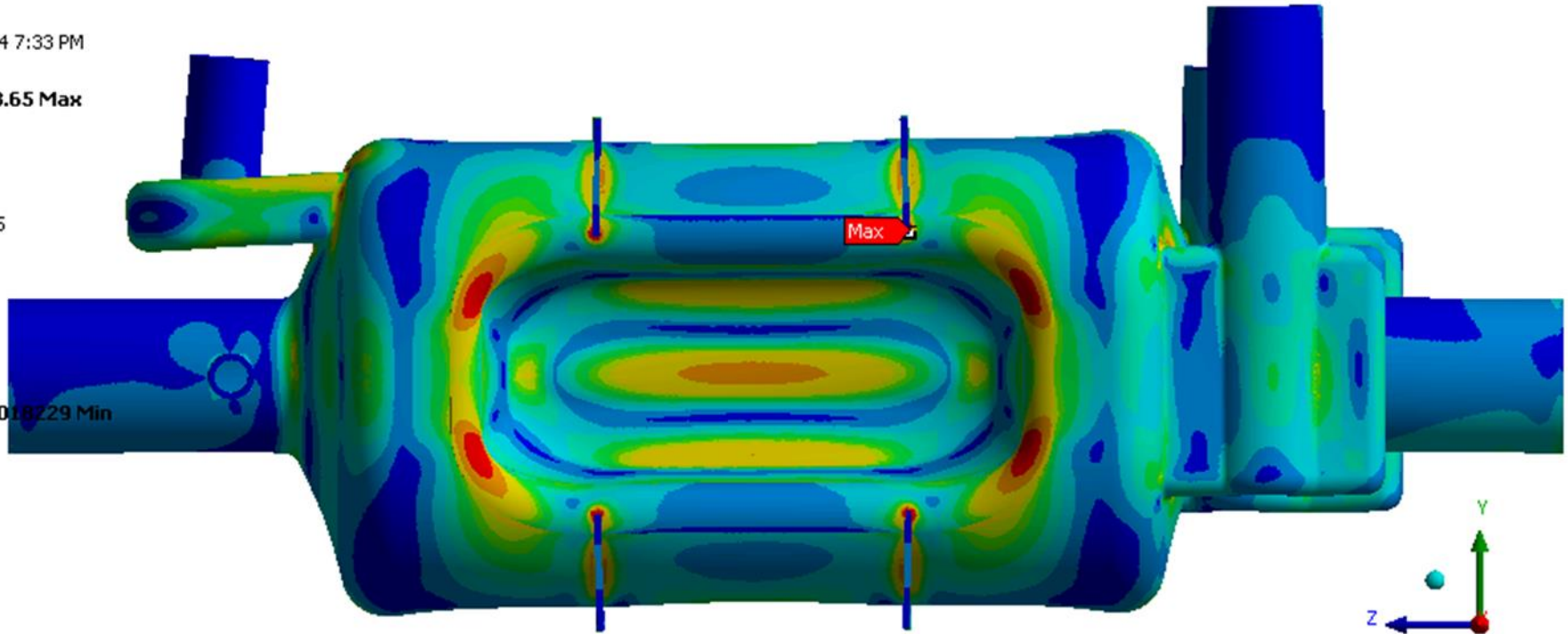
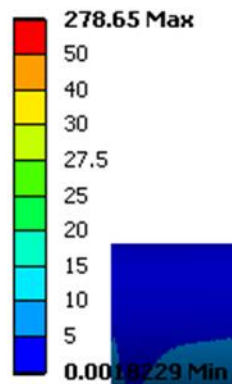
Equivalent Stress

Type: Equivalent (von-Mises) Stress

Unit: MPa

Time: 1

10/9/2014 7:33 PM



High Stress Locations – the other side

Red is above 50 MPa.

A: 3.5mm with 5.85mm stiffener

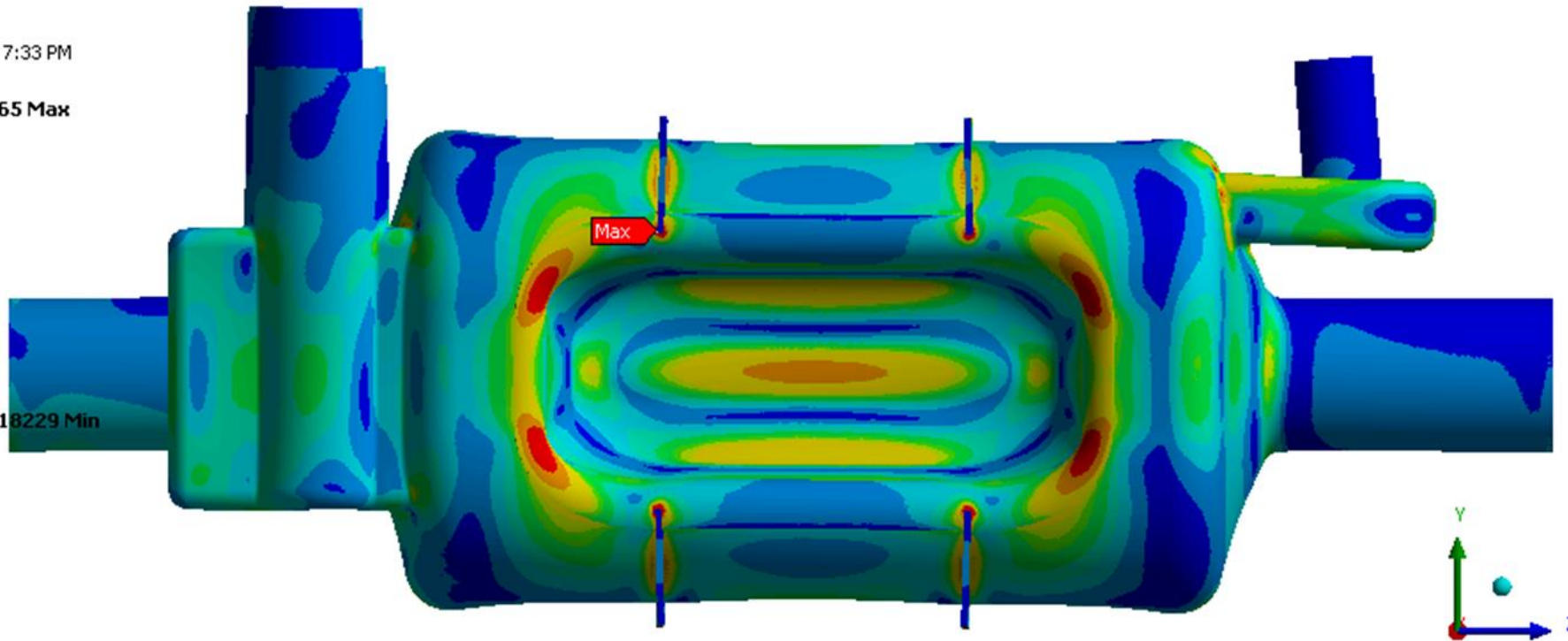
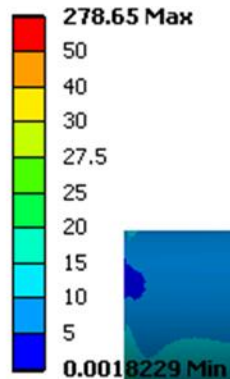
Equivalent Stress

Type: Equivalent (von-Mises) Stress

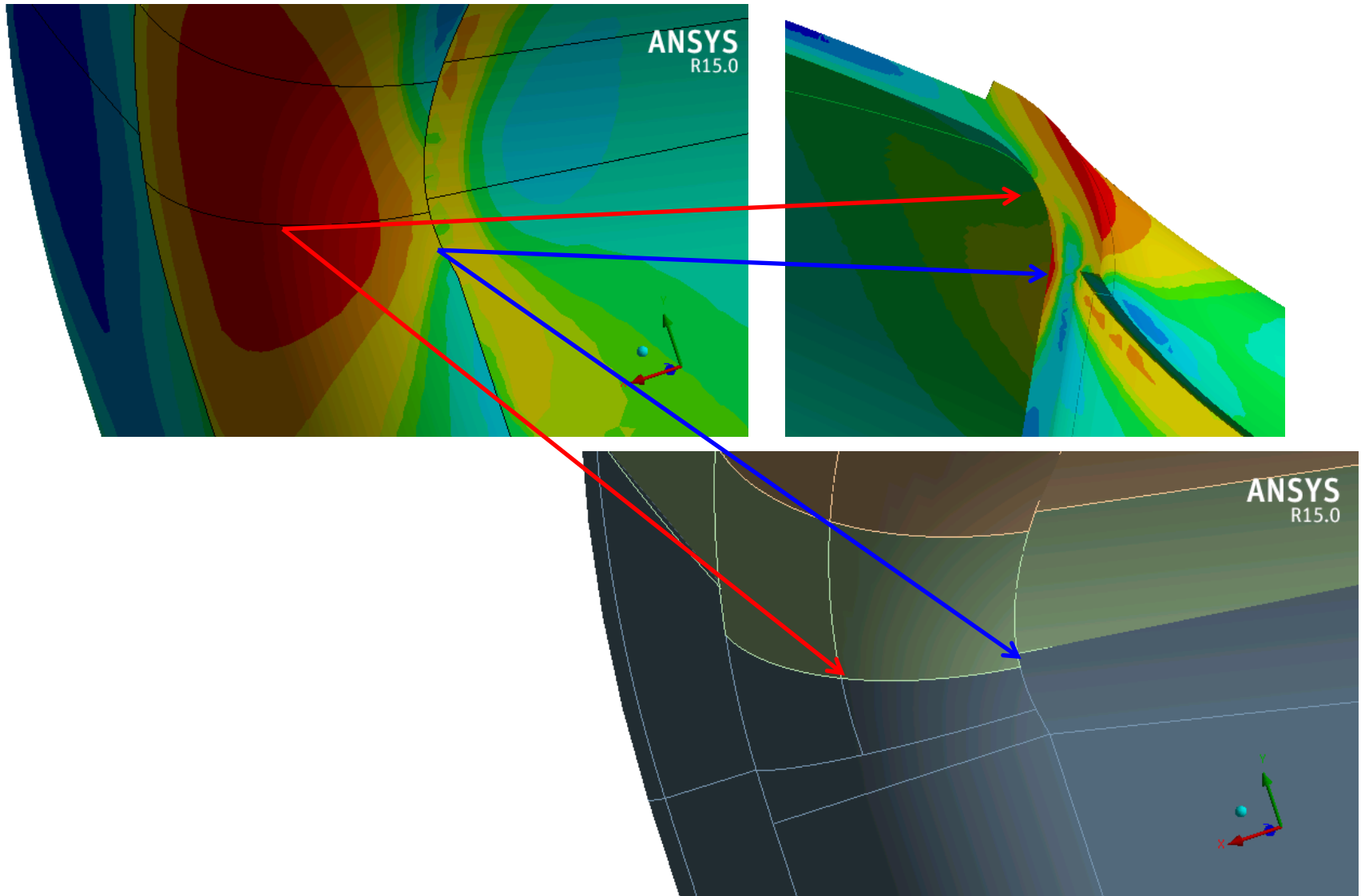
Unit: MPa

Time: 1

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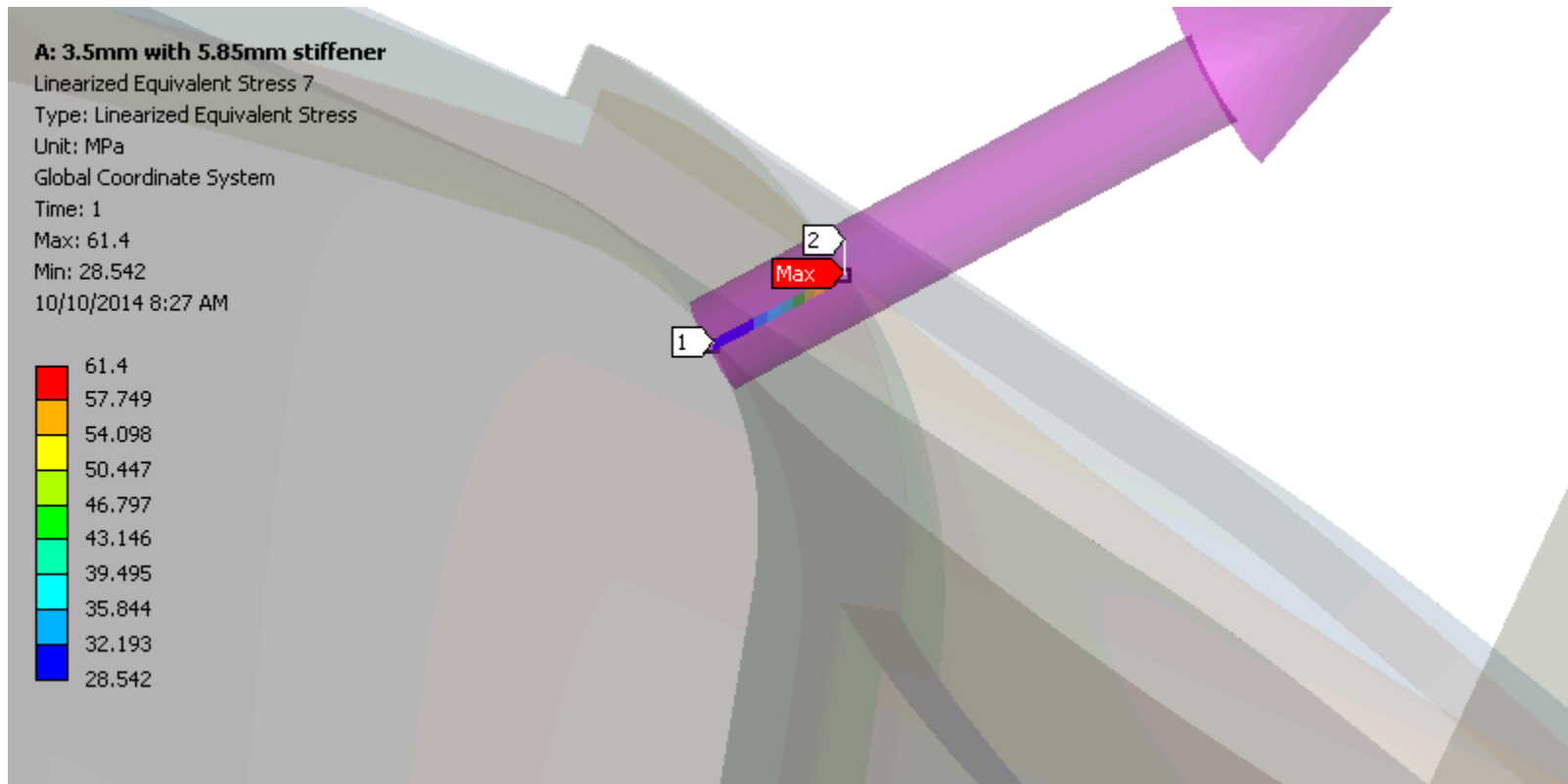


Cross section of high stress area



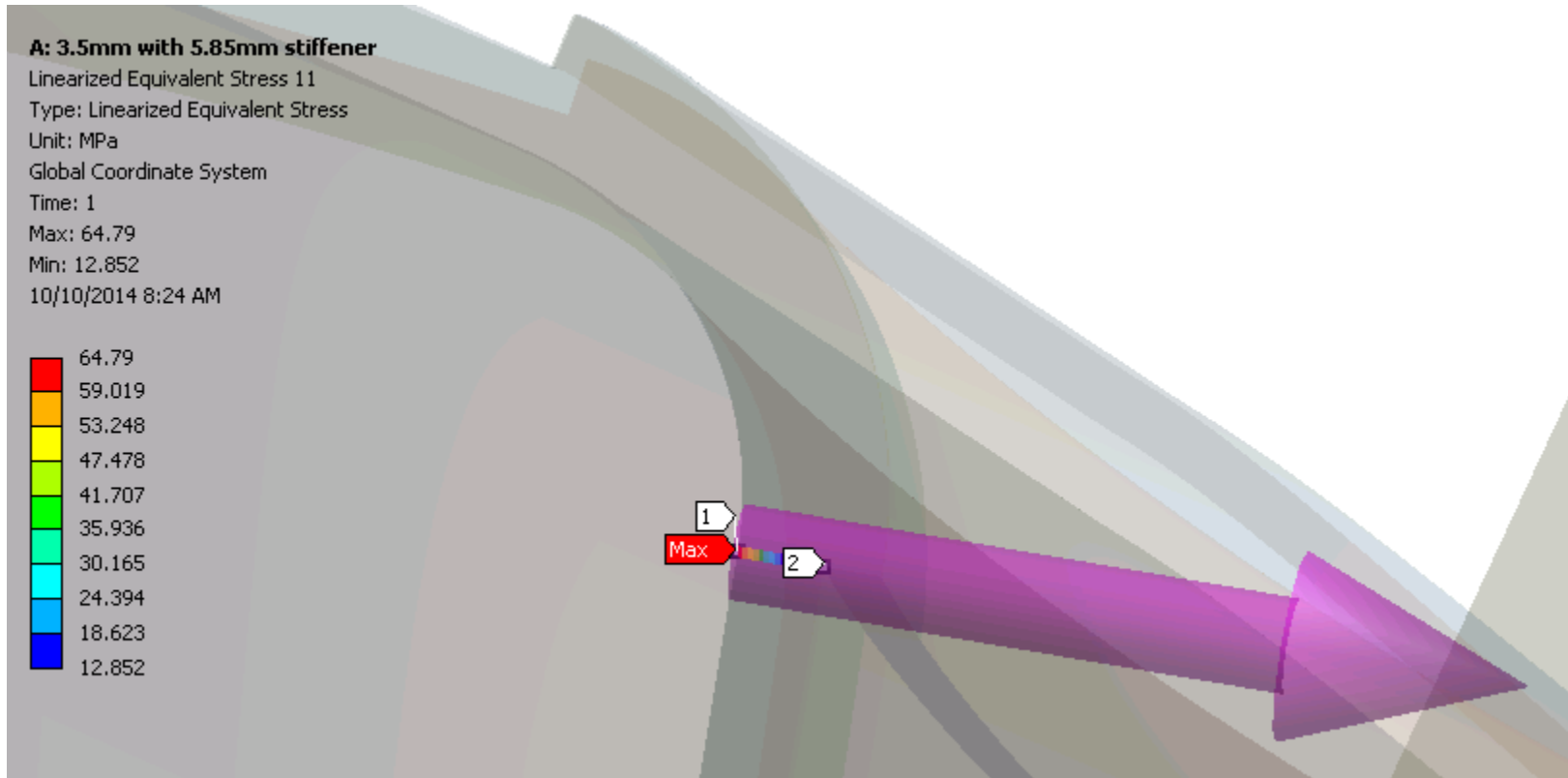
Linearized Stress

**Highest equivalent stress area
Through 5.85 mm thickness
Membrane stress 38.048 MPa**



Linearized Stress

**At the connection between 3.5 mm and 5.85 mm
Membrane stress 23.182 MPa**



Linearized Stress – other area

A: 3.5mm with 5.85mm stiffener

Linearized Equivalent Stress

Type: Linearized Equivalent Stress

Unit: MPa

Global Coordinate System

Time: 1

Max: 58.018

Min: 25.138

10/10/2014 8:38 AM



A: 3.5mm with 5.85mm stiffener

Linearized Equivalent Stress 2

Type: Linearized Equivalent Stress

Unit: MPa

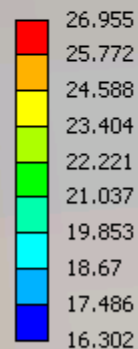
Global Coordinate System

Time: 1

Max: 26.955

Min: 16.302

10/10/2014 8:37 AM



Linearized Stress – other area

A: 3.5mm with 5.85mm stiffener

Linearized Equivalent Stress 3

Type: Linearized Equivalent Stress

Unit: MPa

Global Coordinate System

Time: 1

Max: 36.401

Min: 16.867

10/10/2014 8:40 AM



A: 3.5mm with 5.85mm stiffener

Linearized Equivalent Stress 10

Type: Linearized Equivalent Stress

Unit: MPa

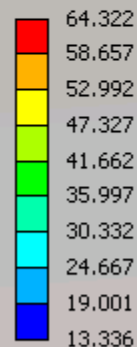
Global Coordinate System

Time: 1

Max: 64.322

Min: 13.336

10/10/2014 8:42 AM



Membrane stress 21.739 MPa

