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FE Static Analysis Report -

Mini Vessel

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INDEX

1. Introduction

This Report consists of Results for FE Structural Analysis of the Mini Vessel for design verification under the pressure and thickness adequacy, joint strength with a pressure of 150psi.

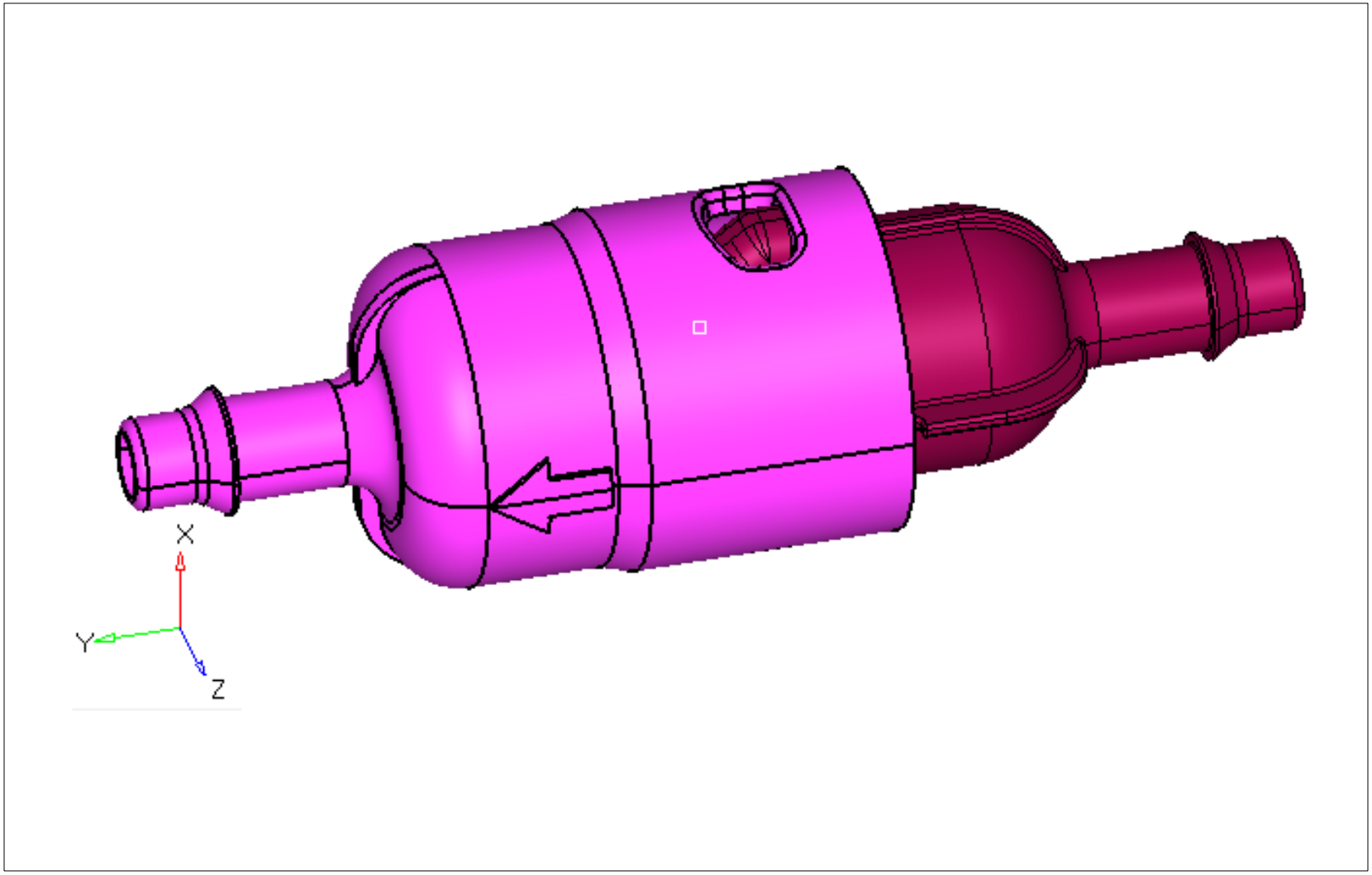
2. Objective

Objective of this FE Analysis is to evaluate deflection and stress on the Mini Vessel.

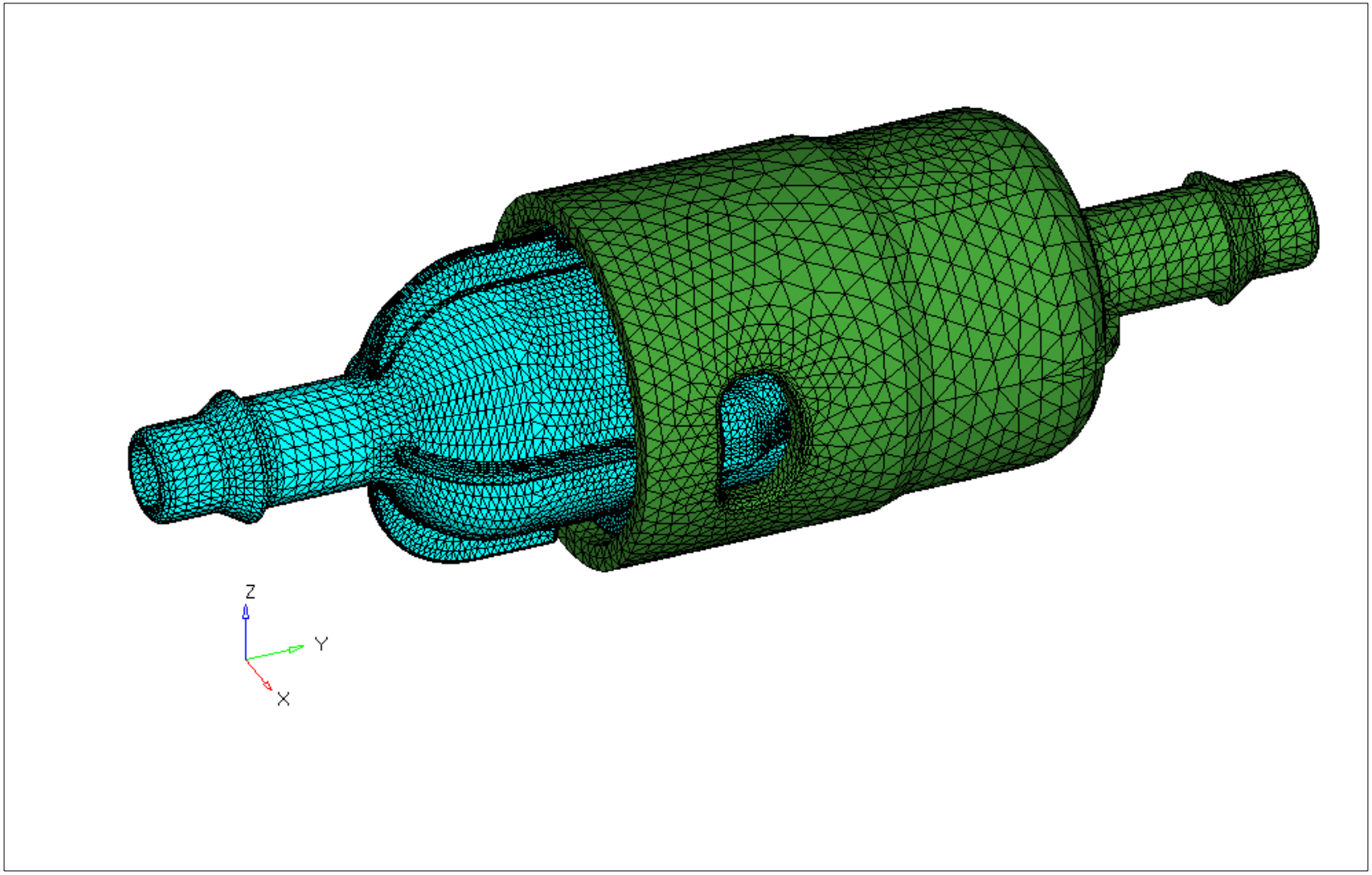
3. Assumptions

1. Non-Linear material properties have taken for analysis.

4. CAD Model :Model considered for FEA



5. Meshed Model :Model considered for FEA



6. FE Model Information :

The Mini Vessel Model has been meshed by 2nd order Tetra elements.

No. of Nodes in the Model = 141562
No. of Elements in the Model = 244292

The quality of elements is qualifying following criteria:-

From all the components in the FE Model Assembly, 99% of elements Qualify for :-

	Achieved
Warpage	< 5 (0% failed)
Aspect Ratio	< 7 (0% failed)
Jacobian	> 0.5 (0% failed)
Min. Angle Tria Faces	> 12 (0%failed)
Max. Angle Tria Faces	< 120 (0%failed)
Tet. Collapse	>0.1 (0% failed)

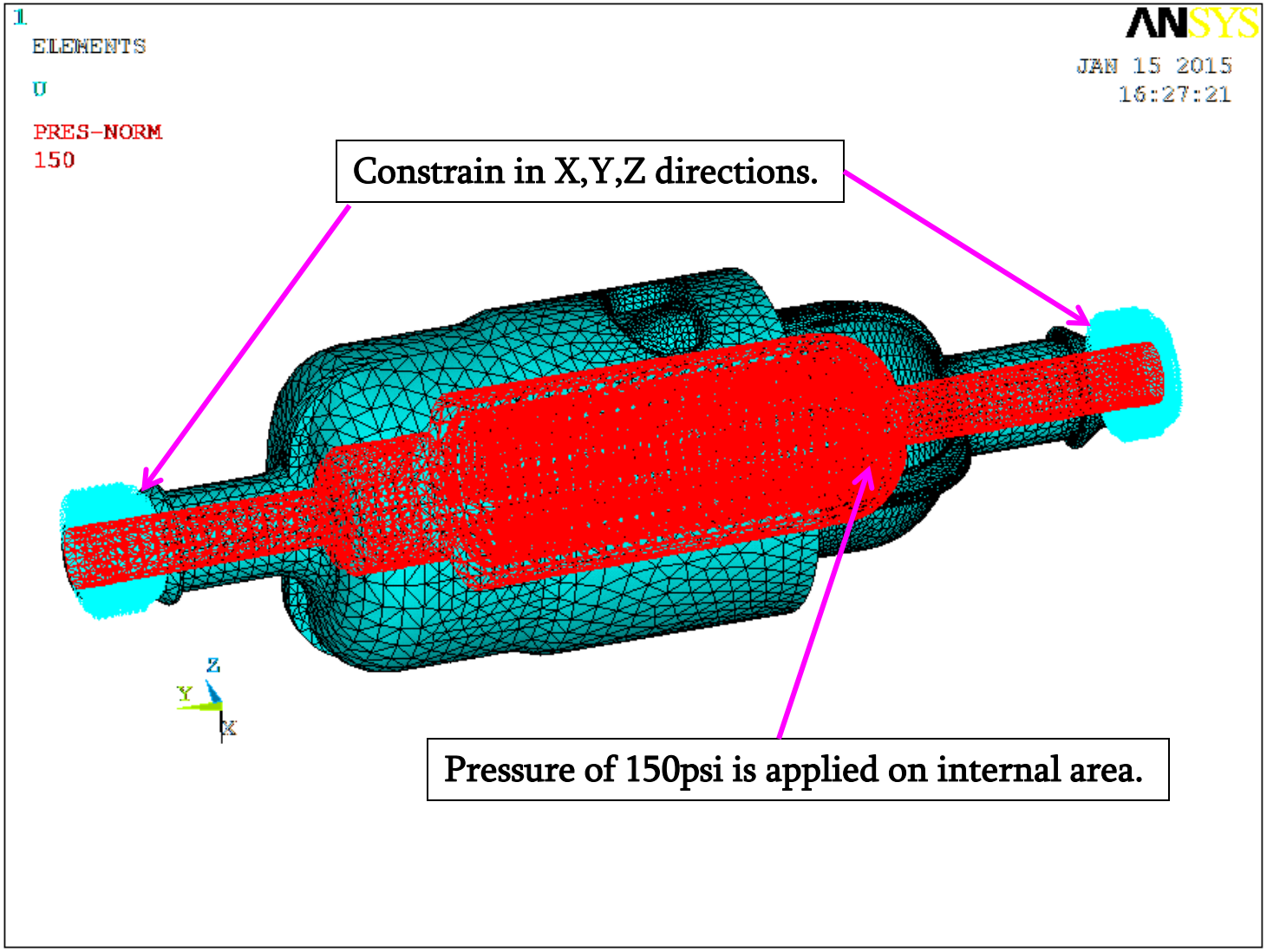
7. Material Properties:

Component	Material	Young's Modulus (psi)	Poisson's Ratio	Yield Strength (psi)
Filter, Housing 01 and Housing 02	Celanex 2002-2	377098.1	0.38	8702.264
O-Ring	Ethylene Propylene diene (EPDM)	174045.3	0.48	3625.943

Stress- Strain value of Celanex 2002-2 :

Strain	Stress (psi)
0.012884	4858.76
1.95E-2	7092.34
2.27E-2	7933.564
2.43E-2	8296.159
2.59E-2	8557.227
2.76E-2	8731.272
2.92E-2	8847.302
3.08E-2	8934.325
3.24E-2	8963.332
1.20E-1	8977.836

8. Loads and Boundary Conditions:

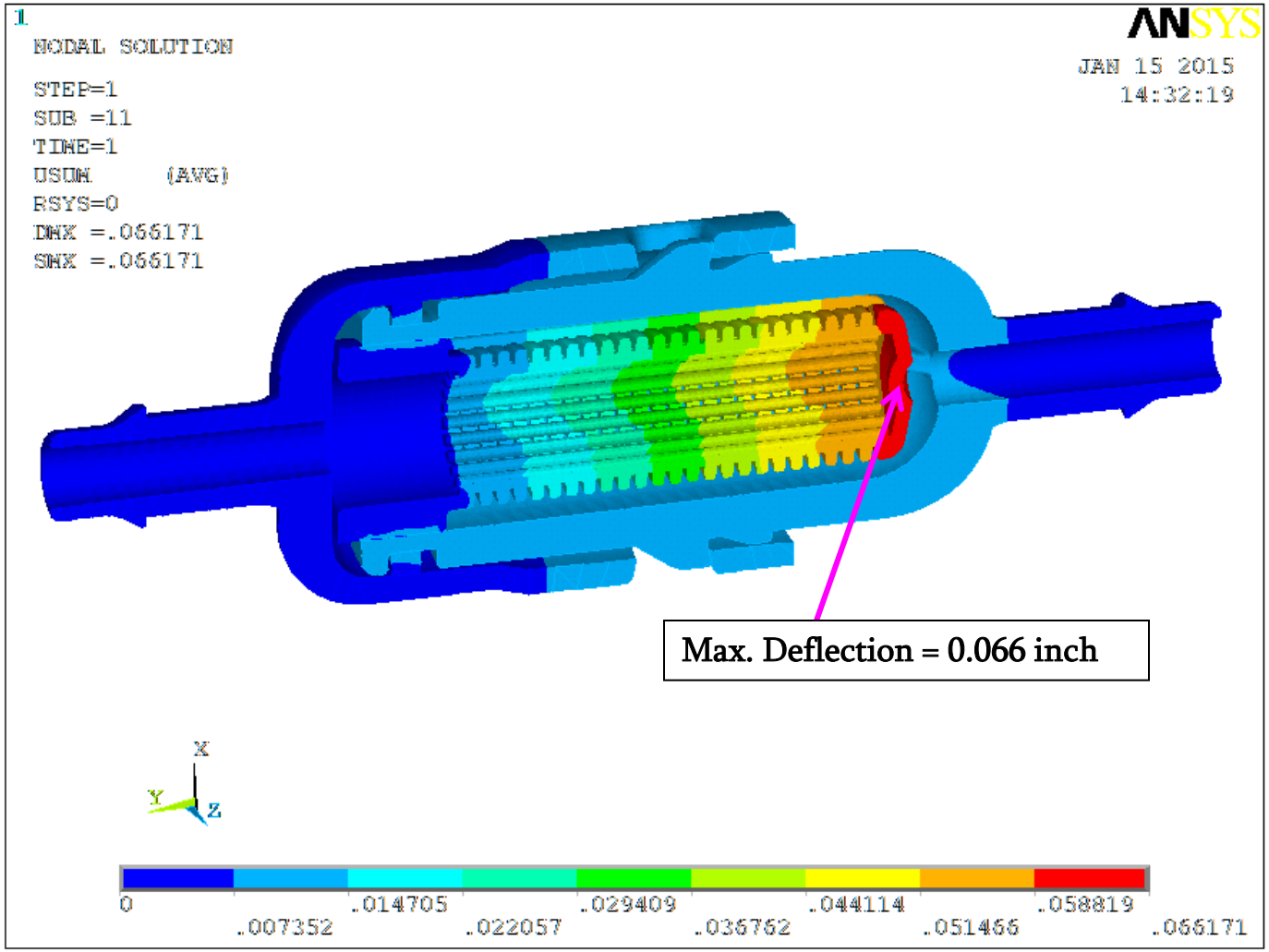


9. Procedure:

- The Models are imported into Hyper Mesh Software , 2nd Order Tetra Elements are generated.
- These elements were imported to ANSYS Software and assigned with the Material Properties to each component as per specified input.
- The Boundary Conditions are applied as per Section-8 in this report.
- Models are solved for given loads mentioned in the inputs and same is shown in the Introduction section in this report.

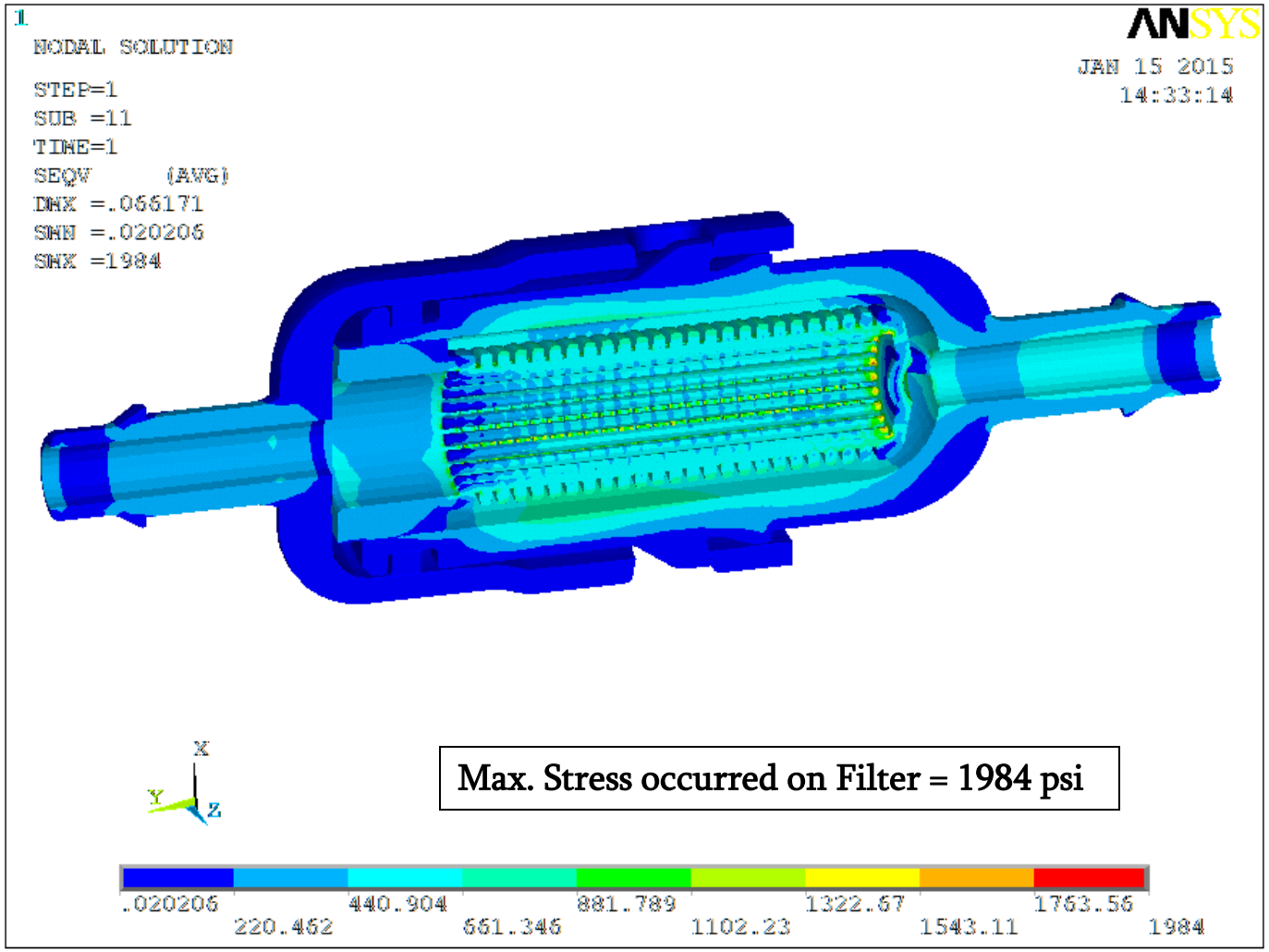
10.1 Stress Analysis Results :

Deflection Plot (inch):



10.2 Stress Analysis Results :Assembly

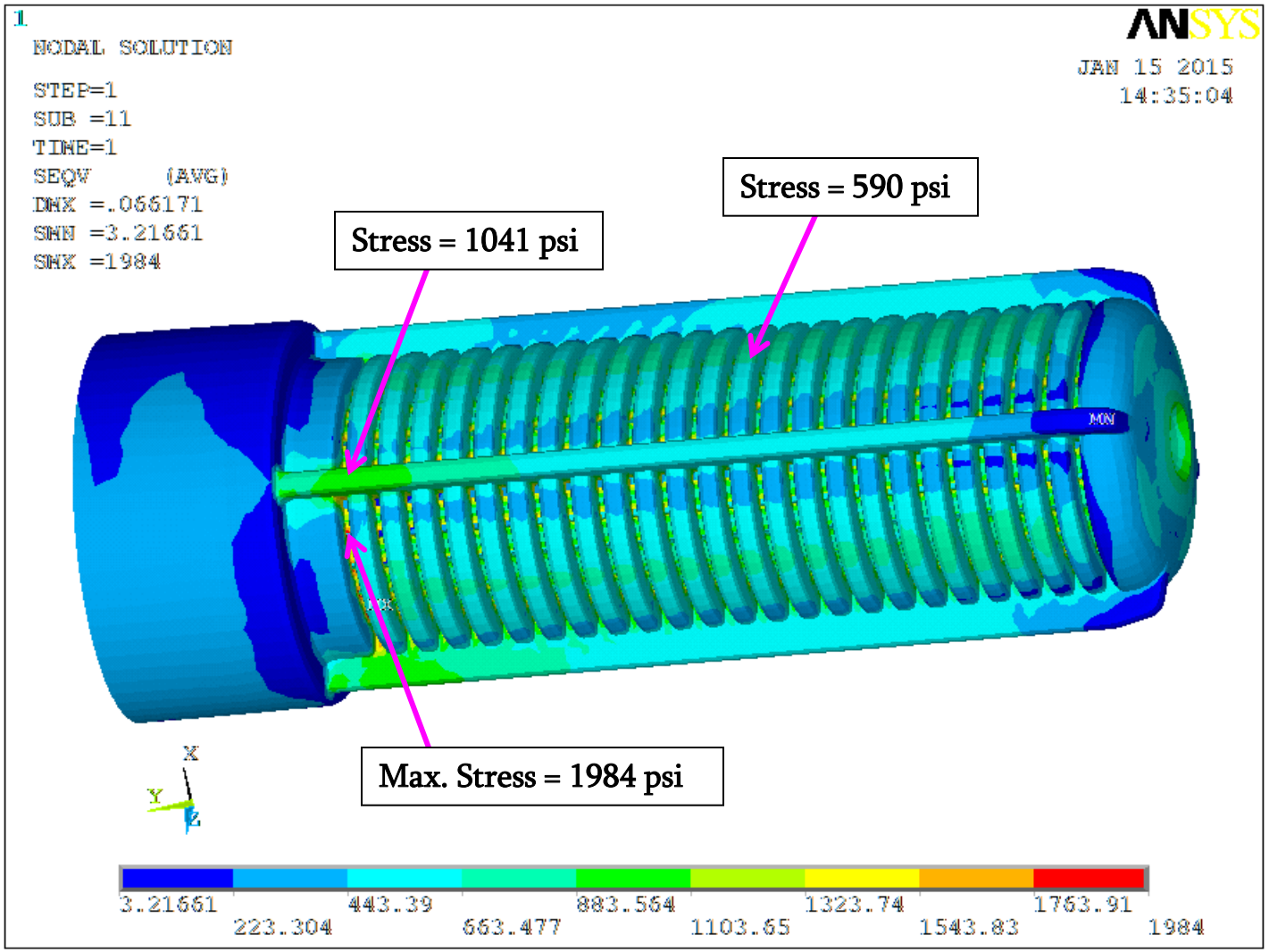
Von-Mises Stress Plot(psi) :



Max. Stress occurred on Filter = 1984 psi

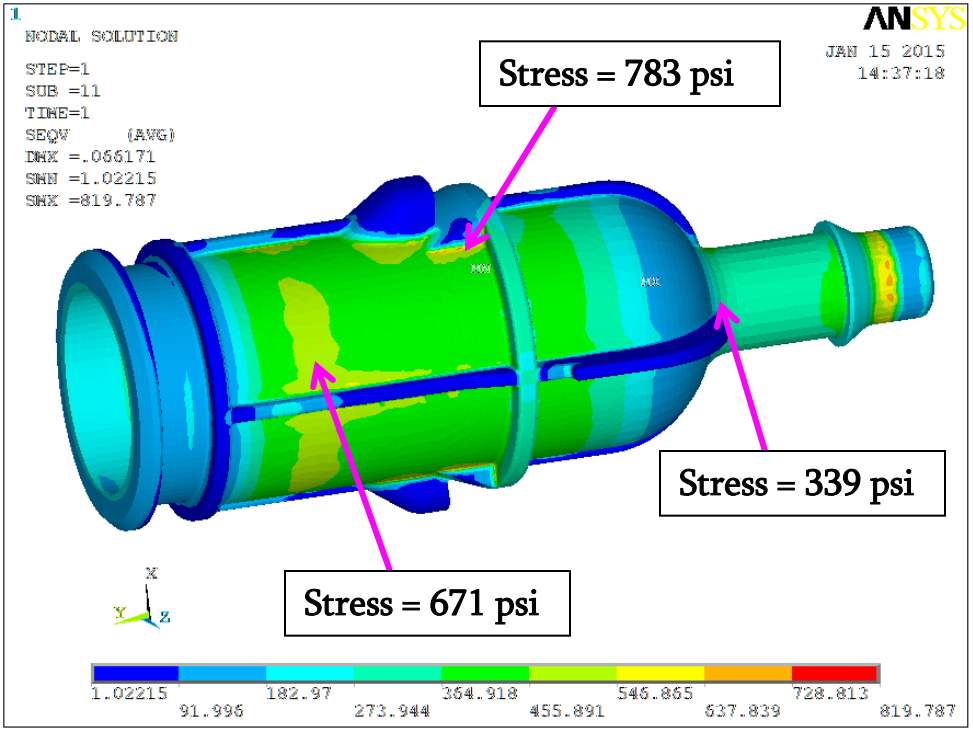
10.3 Stress Analysis Results :

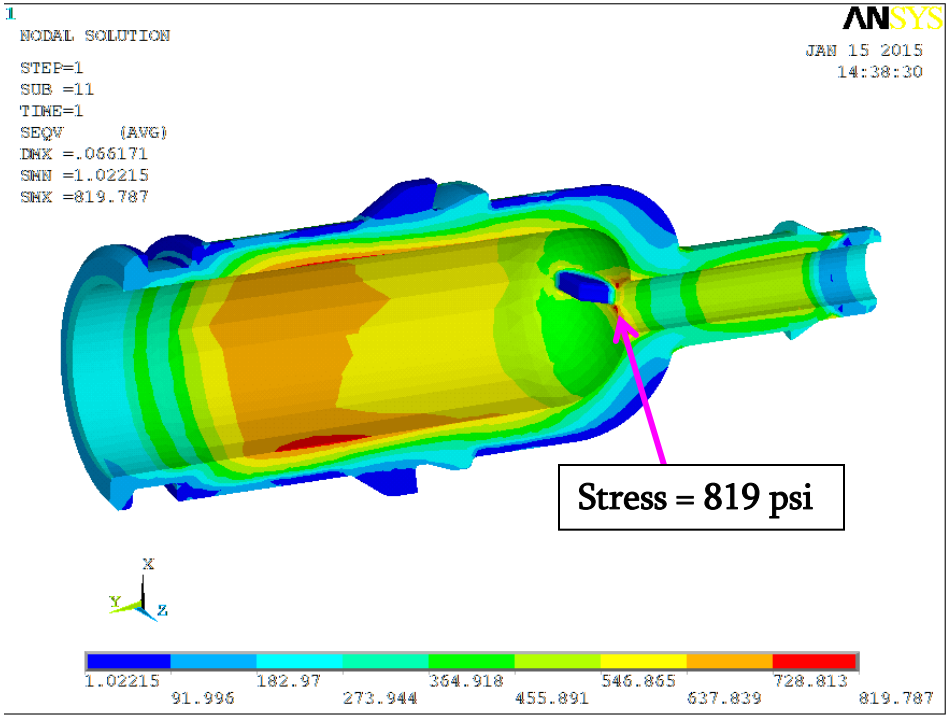
Von-Mises Stress Plot(psi) : Filter



10.4 Stress Analysis Results :

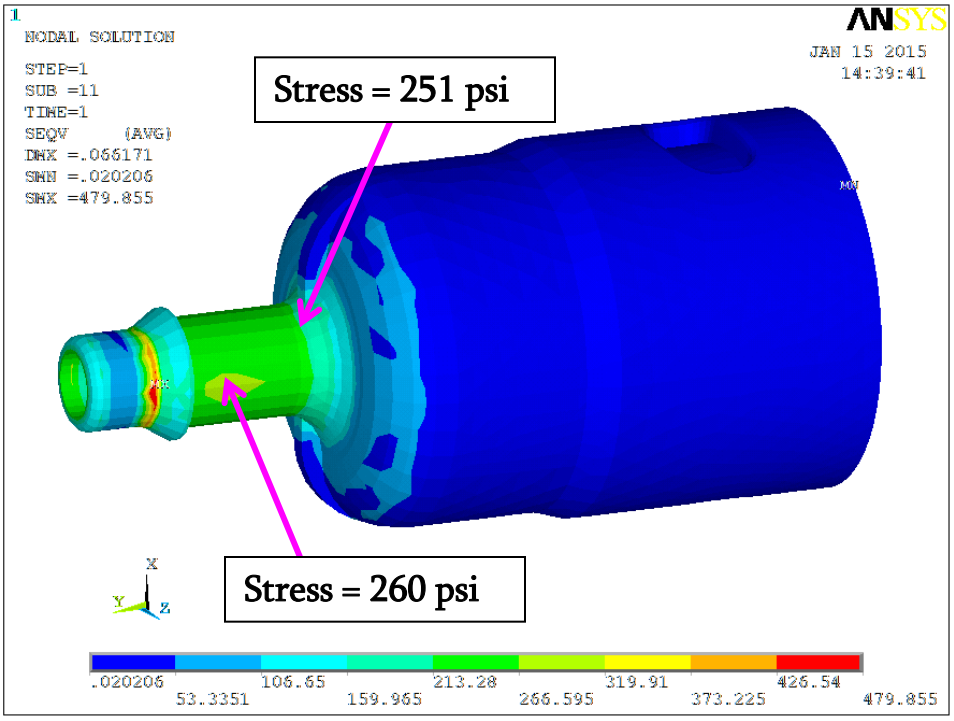
Von-Mises Stress Plot(psi) : Housing 01

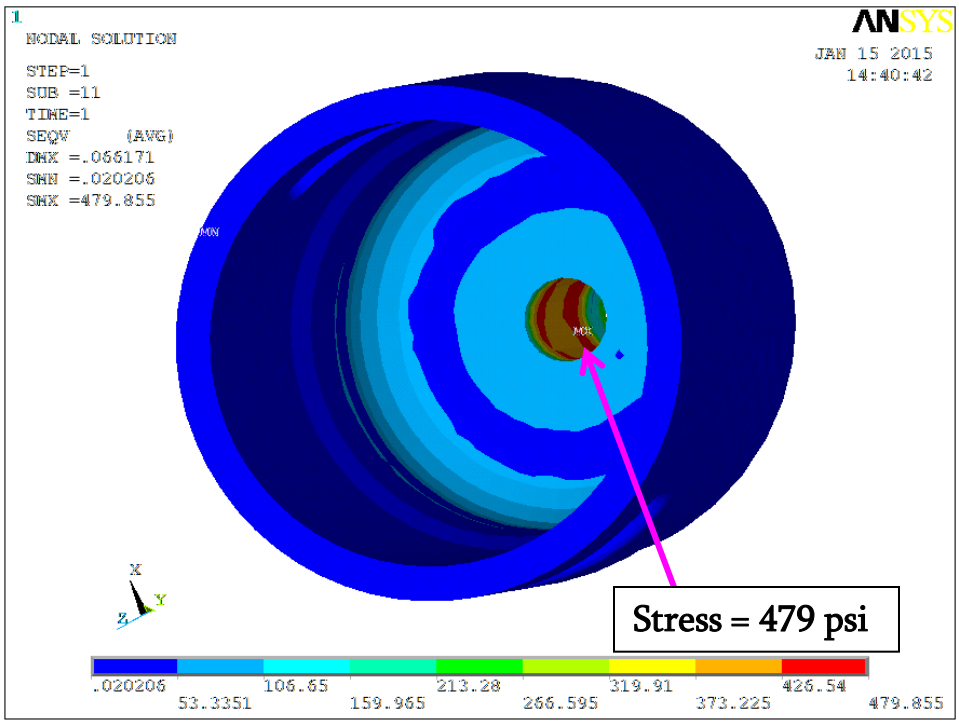




10.5 Stress Analysis Results :

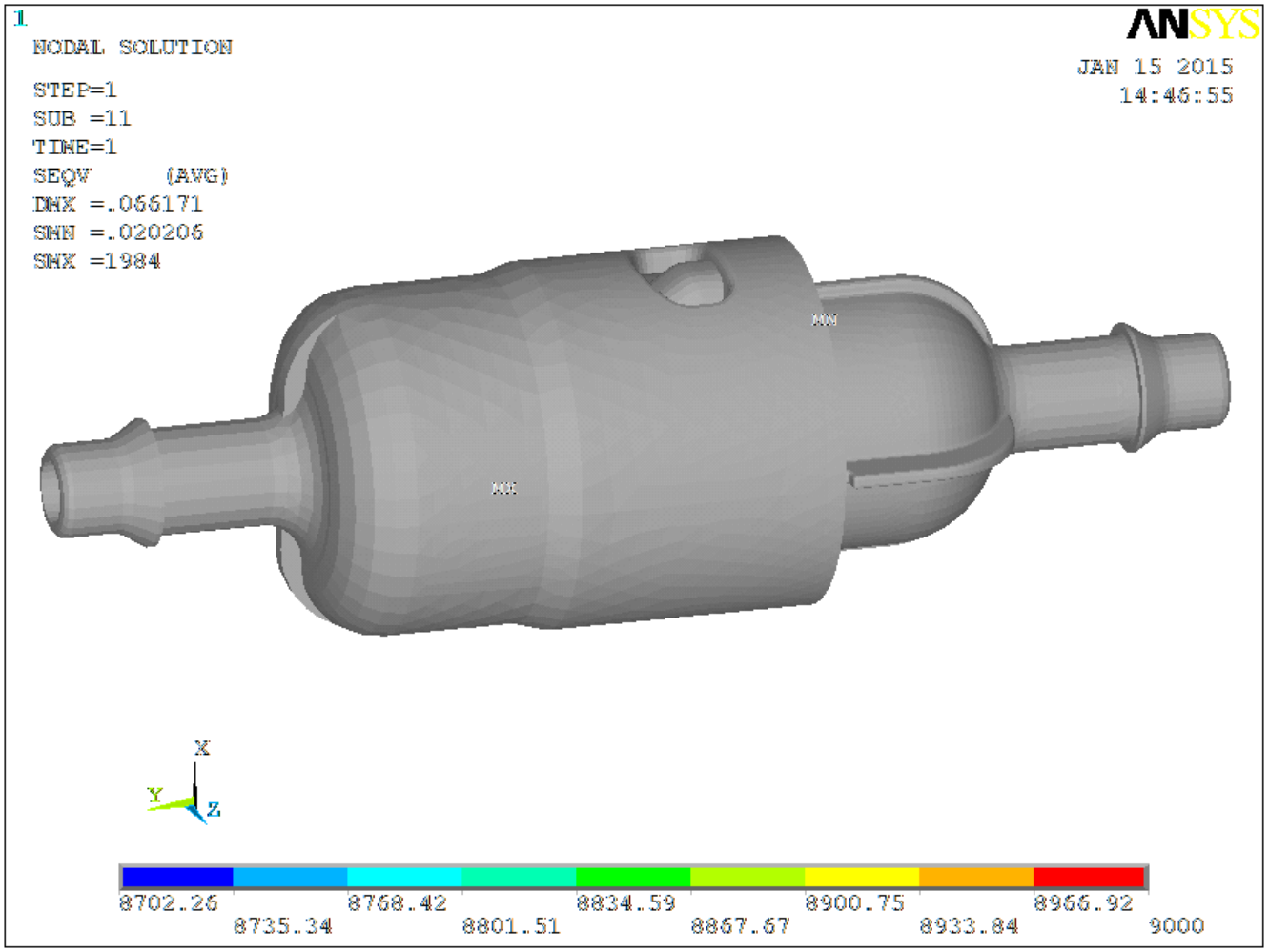
Von-Mises Stress Plot(psi) : Housing 02





10.6 Stress Analysis Results : Assembly

Von-Mises Stress Plot: Stresses <8702.26 psi



Overall Stresses on Assembly are well below the Yield Strength of Material

11. Result Summary :

- From FE Analysis of the Mini Vessel, it is observed that :

- Max. Deflection is 0.066 inches and Max. Stress is 1984 psi which occurred on filter.

- Stress on Housing-01 is 819 psi and Housing-02 is 479 psi which are well below the Yield Strength of Material.

- As overall Stresses on Mini Vessel Assembly are well below the Yield Strength of Material so design is adequate to withstand at the pressure of 150 psi.

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