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Pressure Vessel Engineering Ltd. provides: ASME Vessel Code Calculations - Finite Element Analysis (FEA) - Solid Modeling / Drafting - Canadian Registration Number (CRN) Assistance

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This article supplements the ABSA (Alberta Boilers Safety Association) requirements on writing FEA reports. These guidelines can be found at:

[http://www.absa.ca/Forms/AB-520%20Finite%20Element%20Analysis%20\(FEA\)%20Requirements.pdf](http://www.absa.ca/Forms/AB-520%20Finite%20Element%20Analysis%20(FEA)%20Requirements.pdf) .  
Refer to the section "Presentation of Results".

Pressure Vessel Engineering uses CosmosWorks for Finite Element Analysis. It is expected that these results would also be applicable to other FEA programs.

## Setting Up Presentation Screen Shots for FEA Reports

The ABSA FEA guideline has specific requirements for the Presentation of Results:

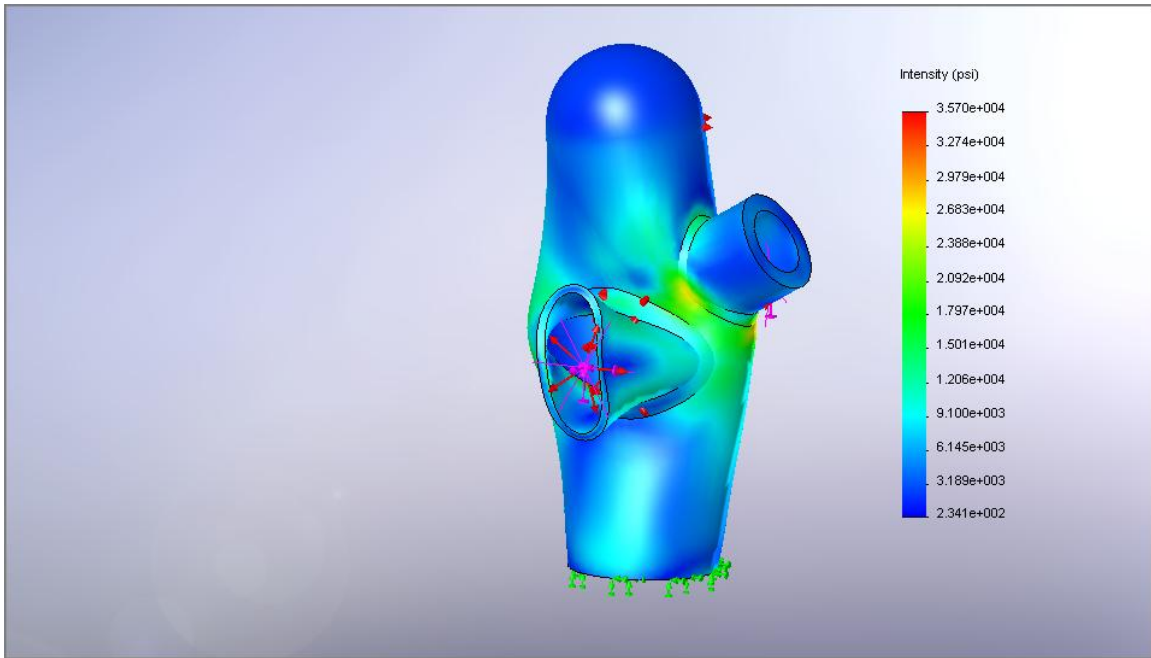
*The following figures must be presented (colored prints):*

- 1) *Displacements (plot);*
- 2) *Deformed shape with un-deformed shape superimposed;*
- 3) *Stress plot with mesh, that will :*
  - a. *Show discrete fringes → discrete color separation for stress ranges or plots*
  - b. *Allow comparison between the size of stress concentrations and the size of the mesh*
- 4) *Show plot with element stress and compare nodal (average) stress vs. element (non averaged) stress (if the [small] difference is less than 5%, the accuracy should be OK);*
- 5) *Compare reaction forces to applied loads;*

*When plots or figures have been presented, there must be [a]discussion relating to each and every figure to explain what is the purpose of the figure and why it is of importance.*

This report is based in part on these ABSA requirements and in part on our experience at Pressure Vessel Engineering Ltd.

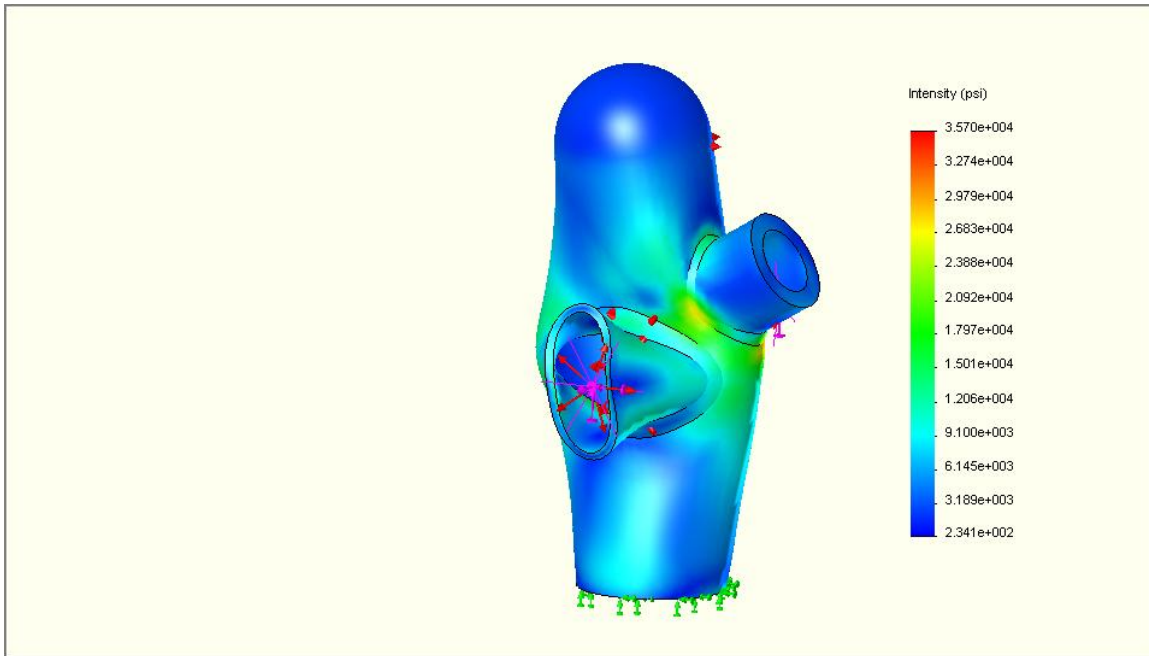
## Capture Size



The starting point – a FEA screen shot with most Cosmos Settings at default.

This image was captured using SnagIt at 952 x 540 pixels and shrunk by word to 60% of its original size to fit the page. The extra pixels provide good resolution for prints. Two images this size will fit on a page with space left over for captions. Have pity on the reader – do not try to fit more than 2 images on one page.

# Background Color and Light Scheme



The background color has been set

Here the background color has been set to **R-256, G-256, B-240**. This is a light straw yellow that stands out slightly from a white page. The background color is set at

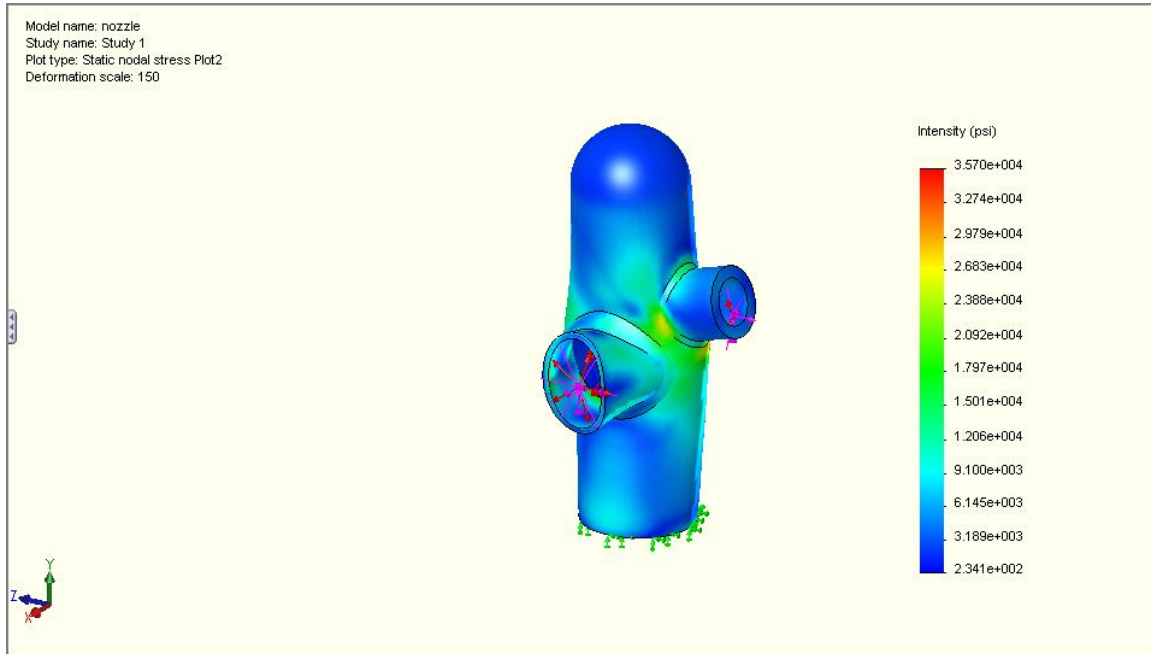
**Tools/Options/colors/Viewport background/Edit/custom colors**

Warm Kitchen
Plain White
Courtyard
Factory
Office Space
Rooftop
Reflective Floor Black
Reflective Floor Checkered
Factory Floor
Dusty Antique
Misty Blue Slate
Strip Lighting
Light Cards
Grill Lighting
Traffic Lights
<b>Ambient Occlusion</b>
Kitchen Background
Courtyard Background
Factory Background
Office Space Background
Wood Floor Room
Garage Room

Ambient Occlusion gives good readable lighting.

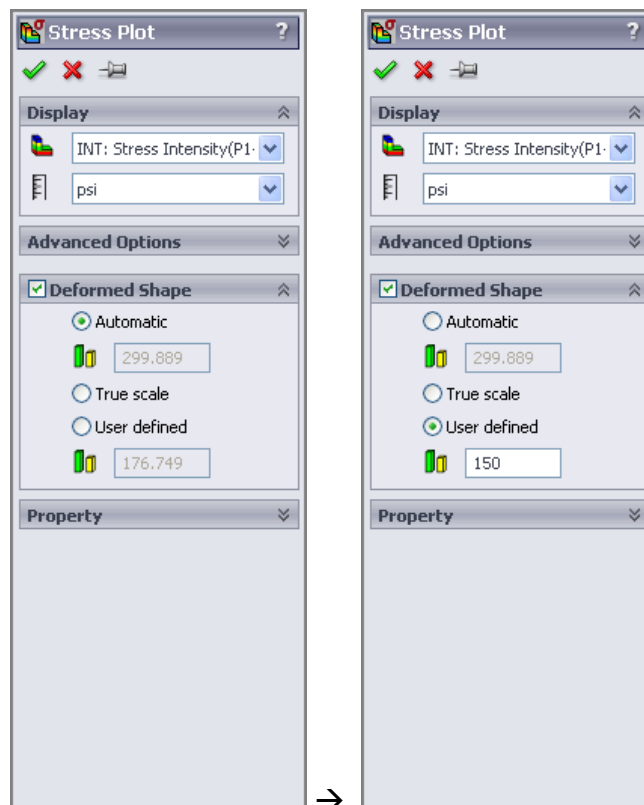
**Scene Selection pull down**

# Deformation Scale (Edit Definition Box)



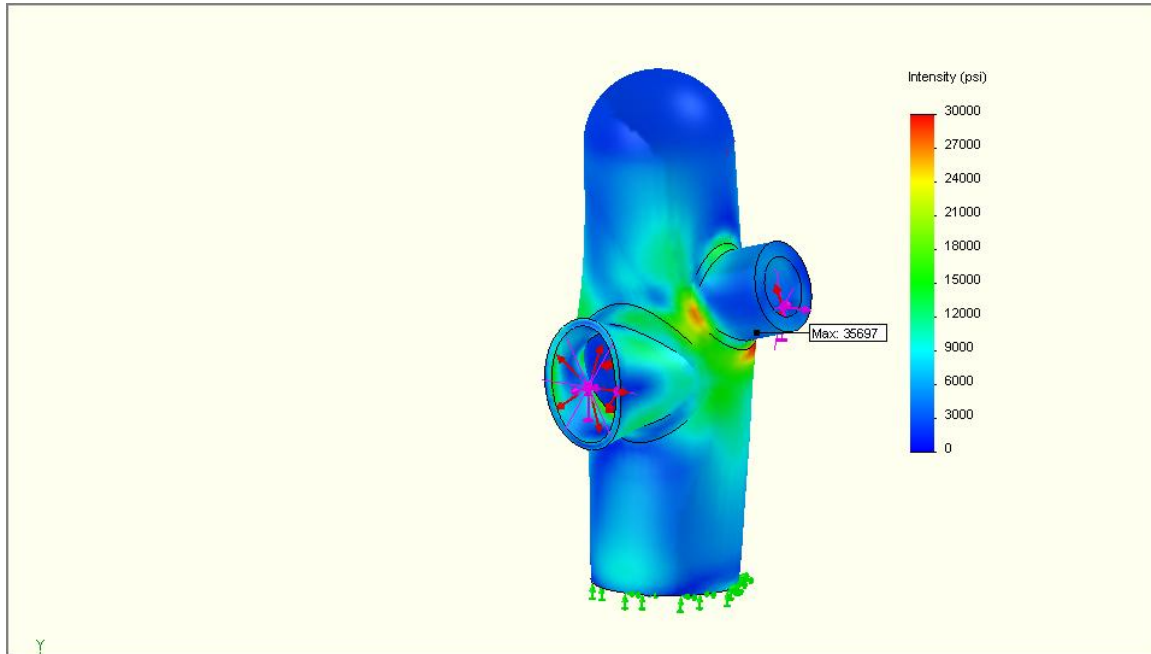
The deformation scale has been set to 150x - a rational number

A deformed model can make it easier to understand the stress results. However, it makes sense to choose a rational number. Here the scale has been set to 150x.



Edit Definitions - Before and After

## Stress / Deformation Display Scale (Chart Options)



The stress scale is now more readable

The **Show max** option allows the legend to be **rescaled to whole numbers** (here 30,000 psi instead of 35,700 psi). Rescale the graph from 0 (or negative numbers when justified). Change to **floating format**, only show decimal points for small numbers like displacement graphs – scientific format numbers are harder to understand. Choose a logical number of colors so that the legend shows whole numbers – here 10 colors are used.

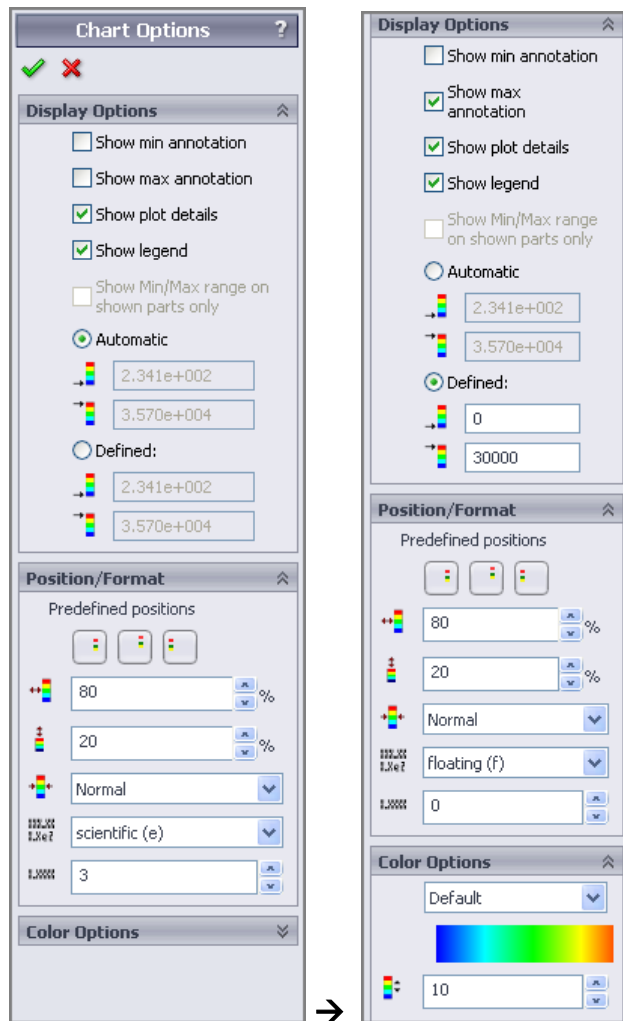
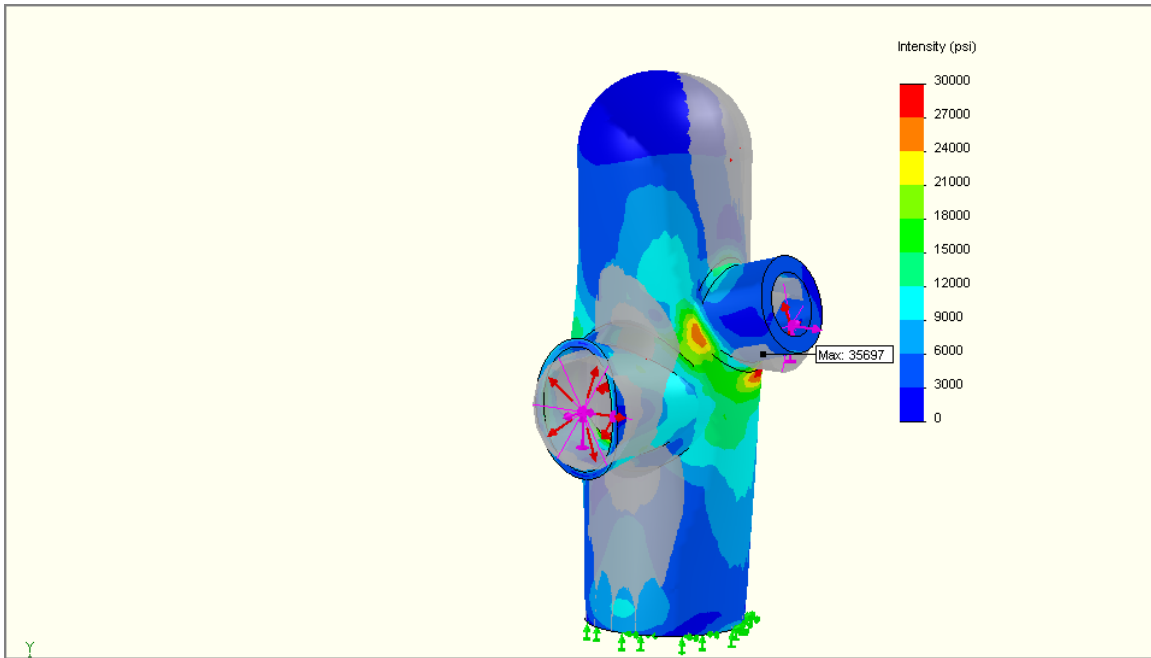


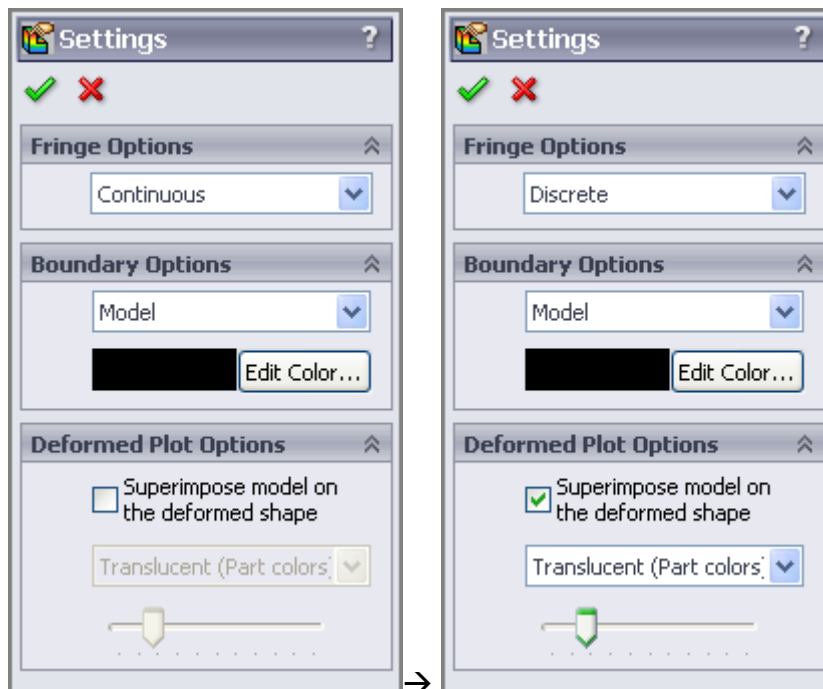
Chart Options - Before and After

# Displaced Model / Discrete Colors (Settings)



Here the superimposed un-deformed model has reduced the readability of the stress plot. The discrete color bands improve the readability – even on low quality printouts.

The superimposed plot makes more sense on a deformation plot than on a stress plot.

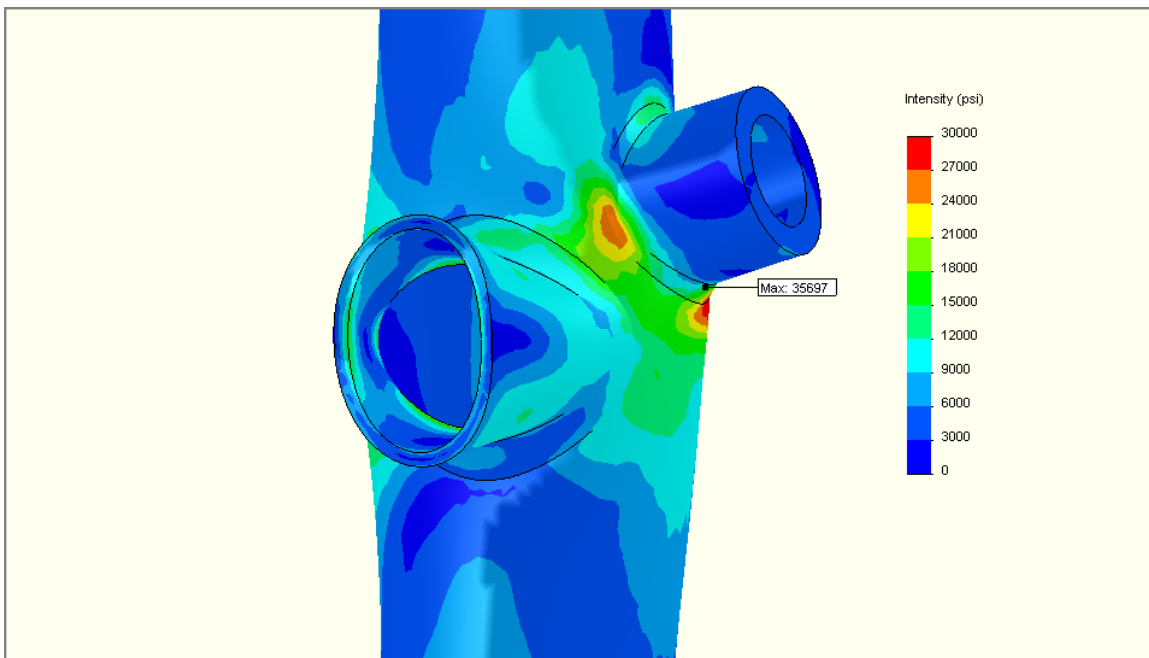
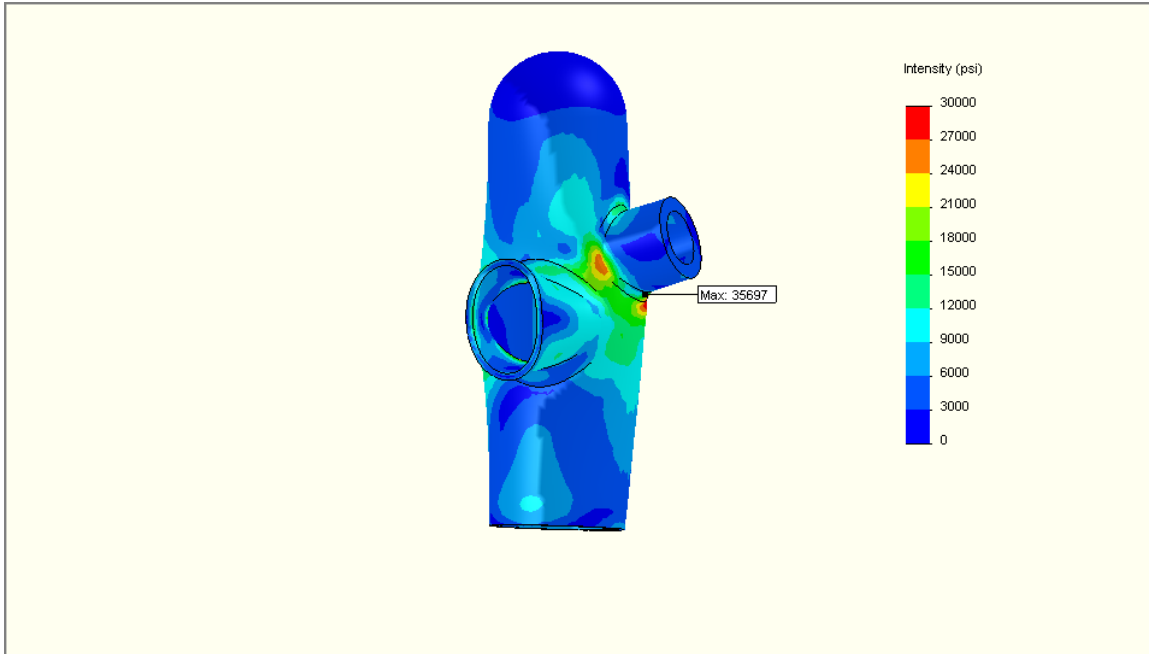


Settings - Before and After

# Miscellaneous

**Turn off** unnecessary items like loads/restraints that have already been discussed.

Show at least **one overall view** and **close-ups** as required. Have pity on the reader who can not enlarge or spin your model on the printed page!



Laurence Brundrett  
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Oct 20 2008