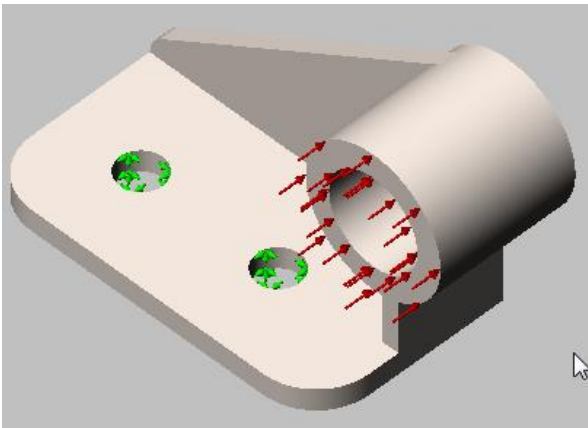
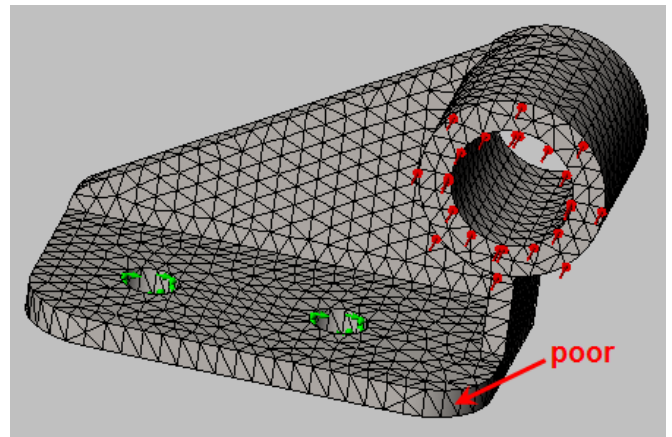


Improving the Engineering Value of Simulation Outputs

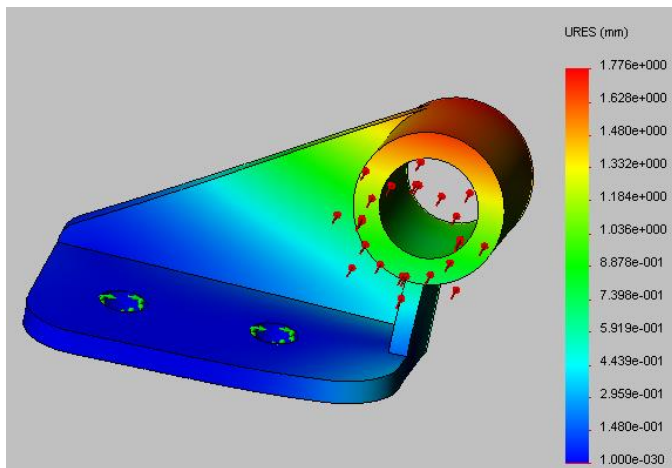
These figures use the first tutorial model. The boundary conditions (Fixtures) here are unreasonable. The purpose here is not to justify the model, but to show how various default plots can be enhanced to improve the engineering information in a report. Begin with the default presentations from SolidWorks:



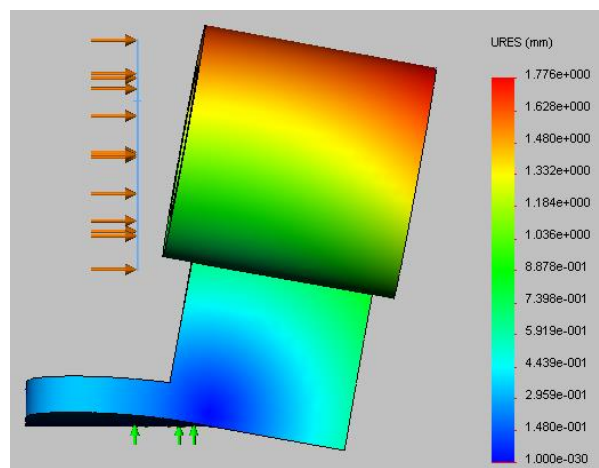
The body with restraints and loads (note background)



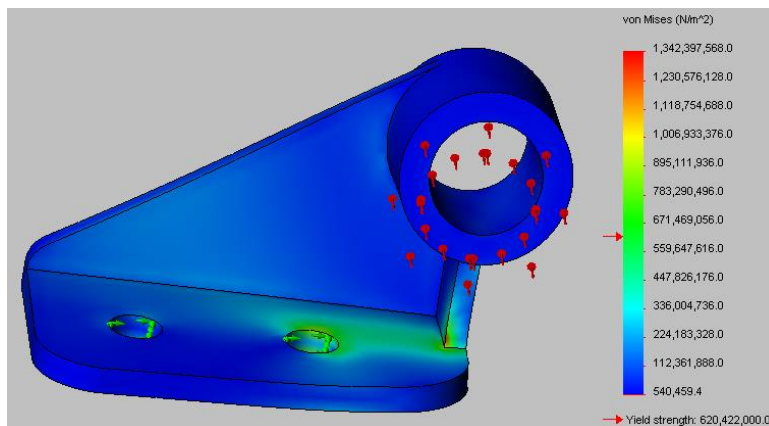
the generated mesh



Displacement isometric view

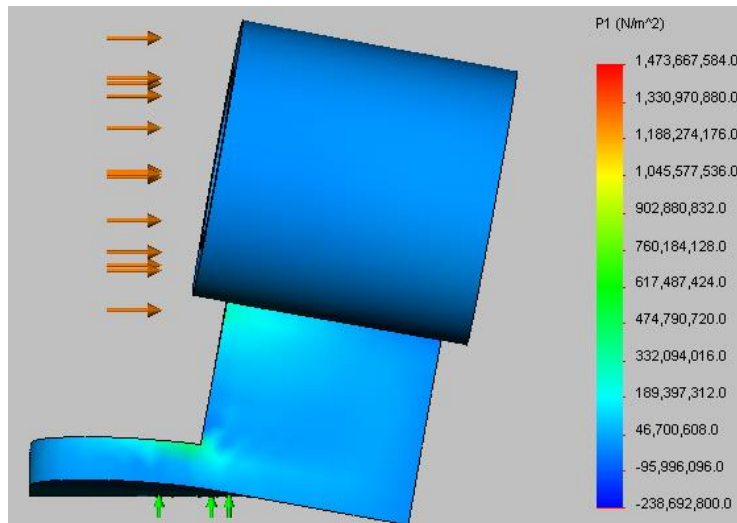


displacement, end view

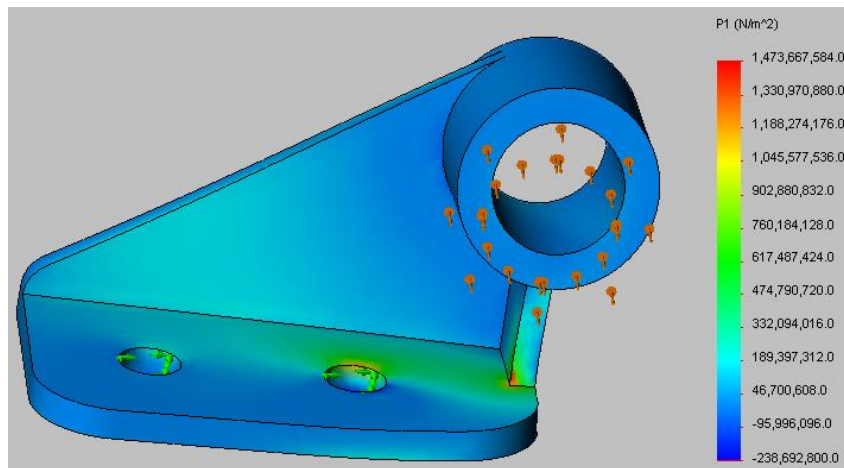


The scalar von Mises failure criterion (a ugly Blue Blob)

Select other possible material failure criterion: **Results** → **Define Stress Plot** → **Display** → **P1** (maximum tension)



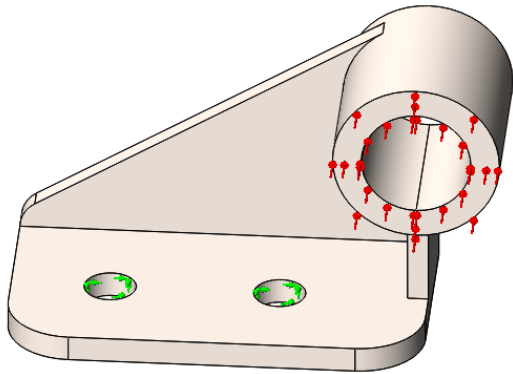
side view of max tension stress (P1) criterion



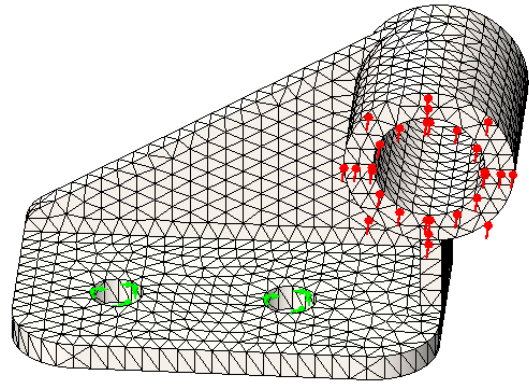
Front view of maximum tension stress

The defaults, on a dark background do NOT provide good engineering information. Also, too many significant figures are being displayed.

Better, more detailed images are used in a report. Begin by using a white background: **Options** → **System Options** → **Colors** → **Color Scheme Settings** → **Viewport Background** → **Edit**, pick white, pick plain, OK, OK. Now your report images will have white backgrounds. Turn up the part lighting: **View** → **Lights and Cameras** → **Properties** → **Ambient** slide the scale to about 0.6 or 0.7. Now, repeat and extend the previous images.

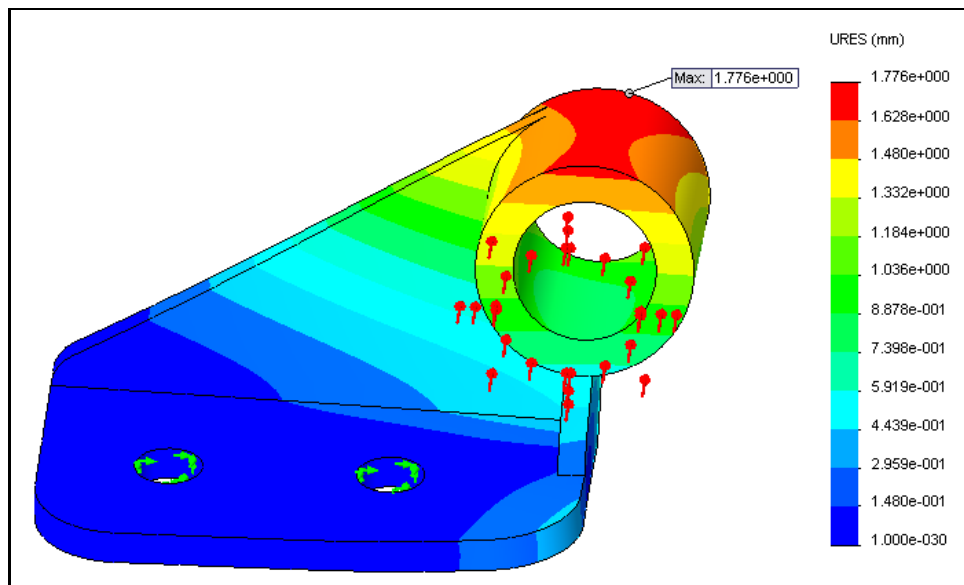


The body with restraints and loads



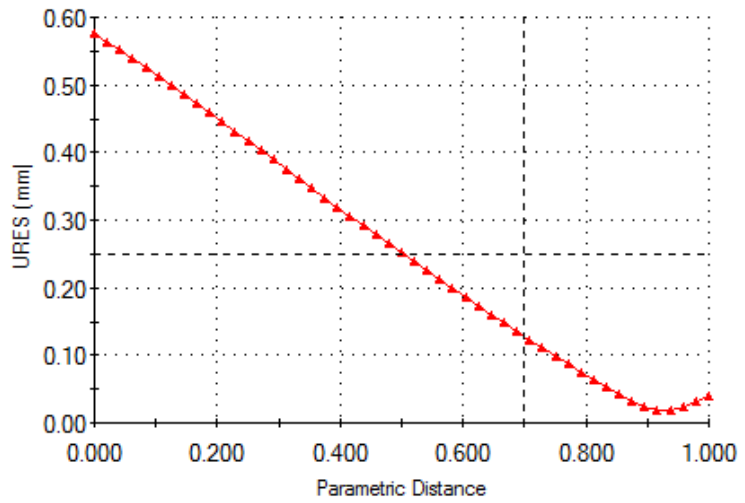
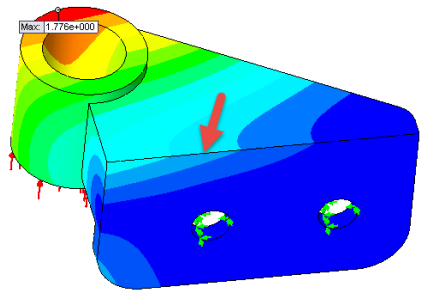
the generated (poor) mesh

Double click **Displacements** → **Settings** → **Fringe Options** → **Discrete**. Include max or min values and locations:
Displacements → **Chart Options** → **Show Maximum**. Make sure the text can be read by sizing the image.

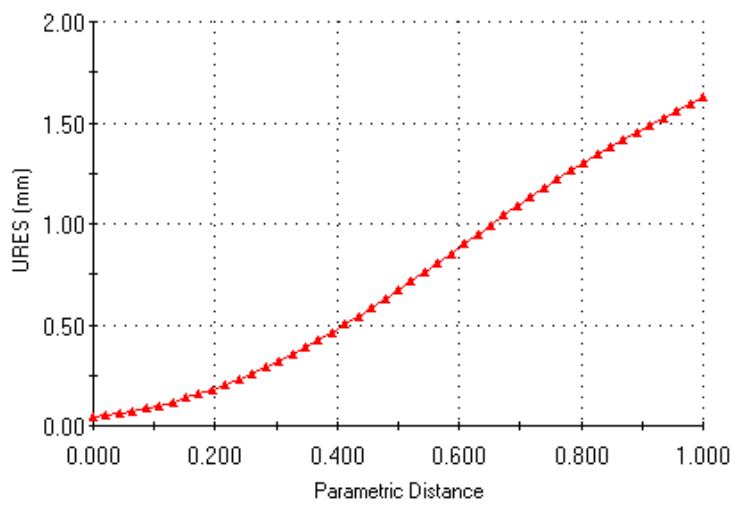


Use Windows to put a box around the image.

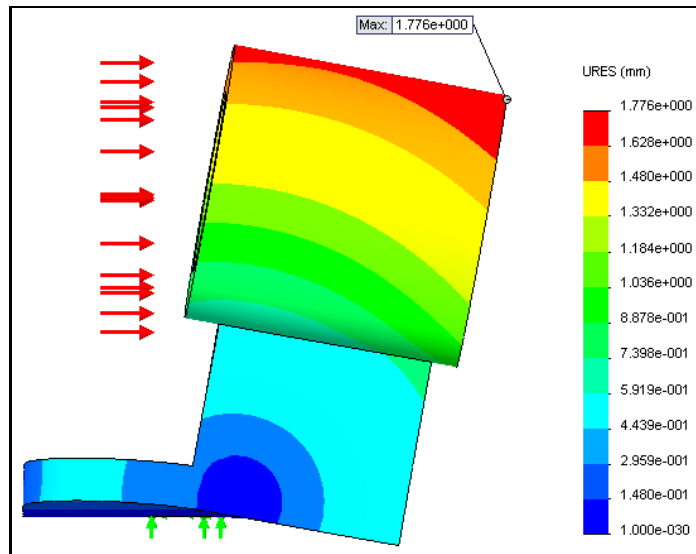
Graph the back edge displacement: rotate part, **Displacements** → **List Selected**, pick bottom back edge, **Update**, **Report Options** → **Graph**



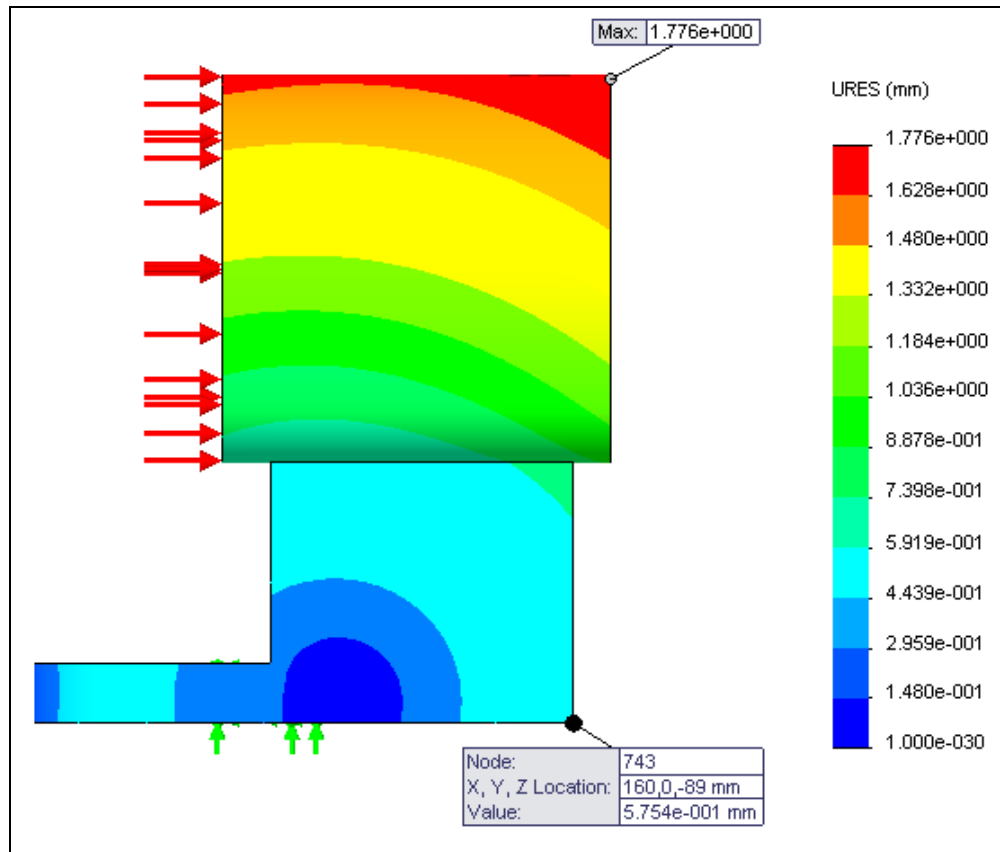
Also plot the displacements on the back inclined edge: **Displacements** → **List Selected**, pick inclined back edge, **Update**, **Report Options** → **Graph**



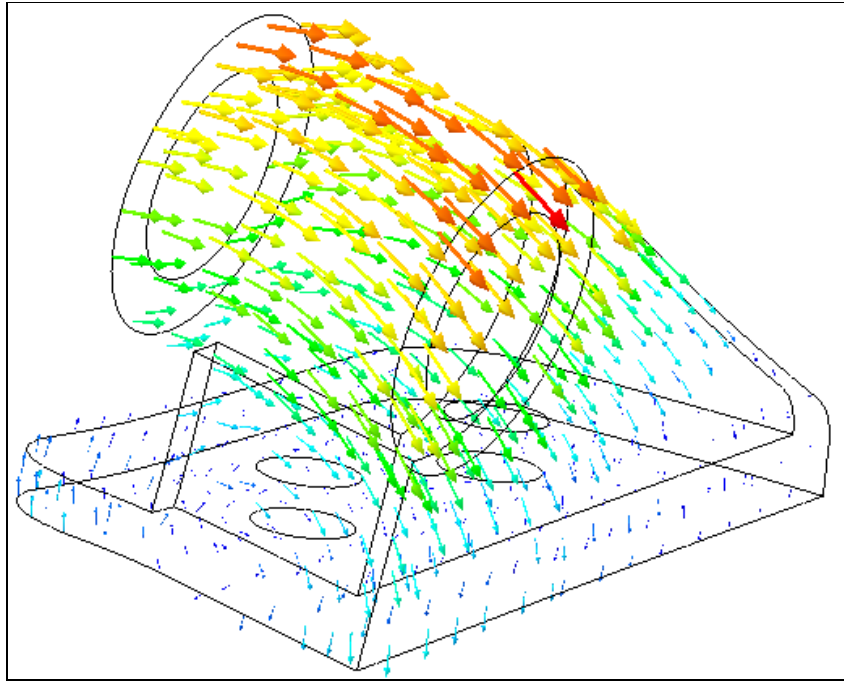
Present other views of the displacements, like the front view. (This shows bending of the bottom, so the one layer mesh will not give accurate stresses there.)



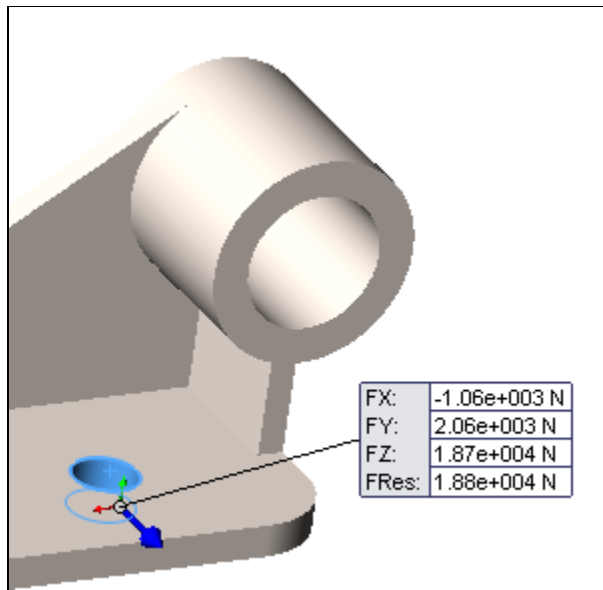
Probe the corner to show the displacement components there



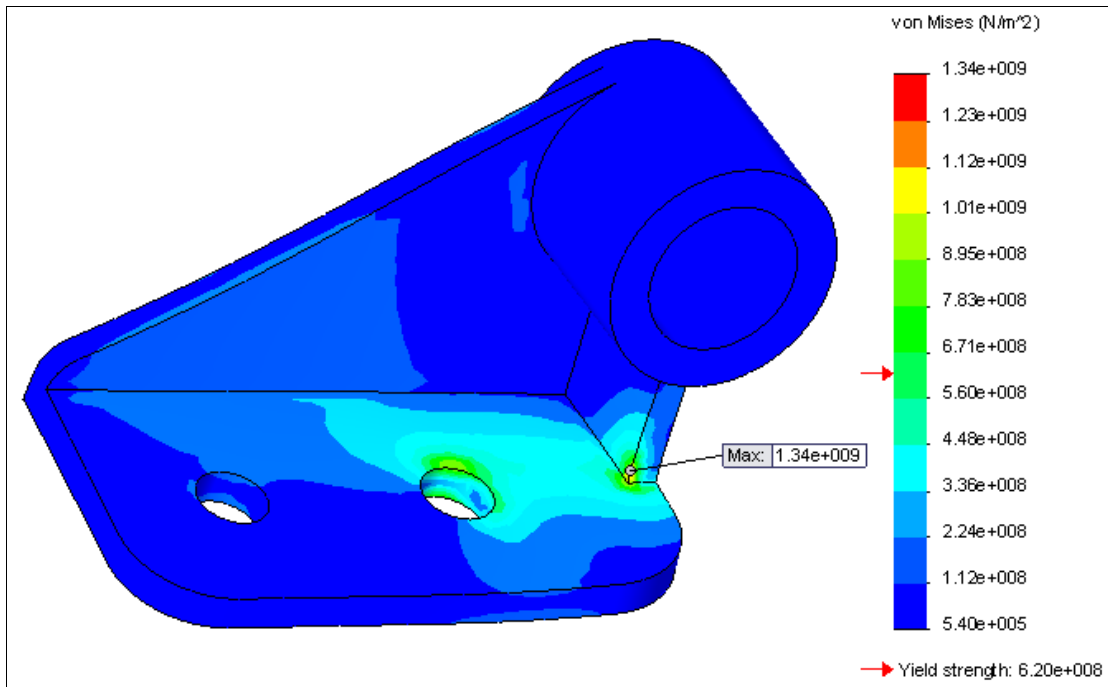
Since the displacements are vector quantities plot them as vectors: **Displacements** → **Edit Definition** → **Advanced Options** → **Show as Vector Plot**. Control the number and size of the arrows: **Displacements** → **Vector plot options** → **Surface only**, scale up the maximum arrow size and scale down the number of arrows displayed. Rotate the part to find a good view angle. (Often hide the load vectors, and/or fixture vectors.)



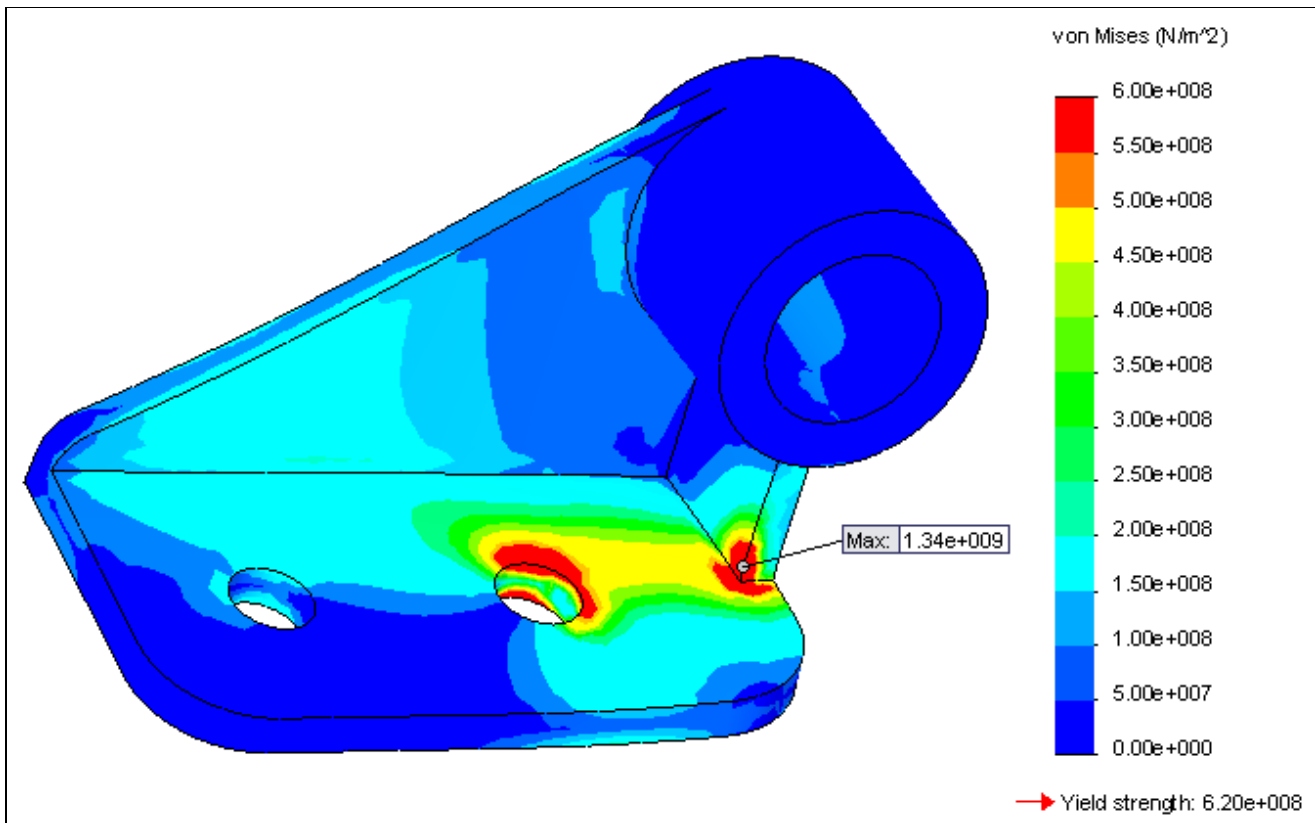
How much force was required to restrain the part: Results → List Force Result → Selection pick bolt hole on the right. The program displays the reaction force values components vectors:



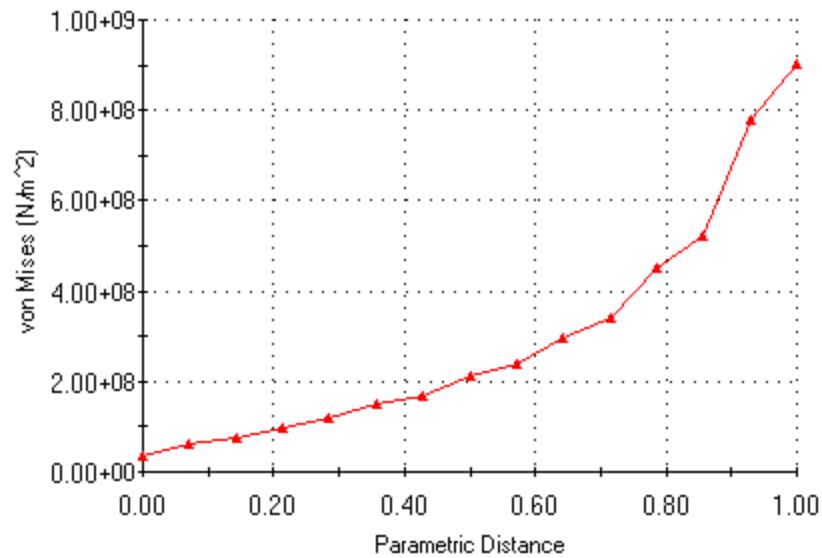
Next select the von Mises material failure criterion, but reduce the number of significant figures to 3 or 4: **Stress** → **Chart Options** → **Position/Format** → **Scientific**, with two decimals after the decimal point. . You can also relocate the color bar in the graphics area while here (or click and move it in the graphics area, and wait.) While continuous colors are physically correct, they do not print well or project well, so convert to a discrete set: **Stress** → **Settings** → **Fringe Options** → **Discrete**. However, this gives another ugly, hard to understand blue blob:



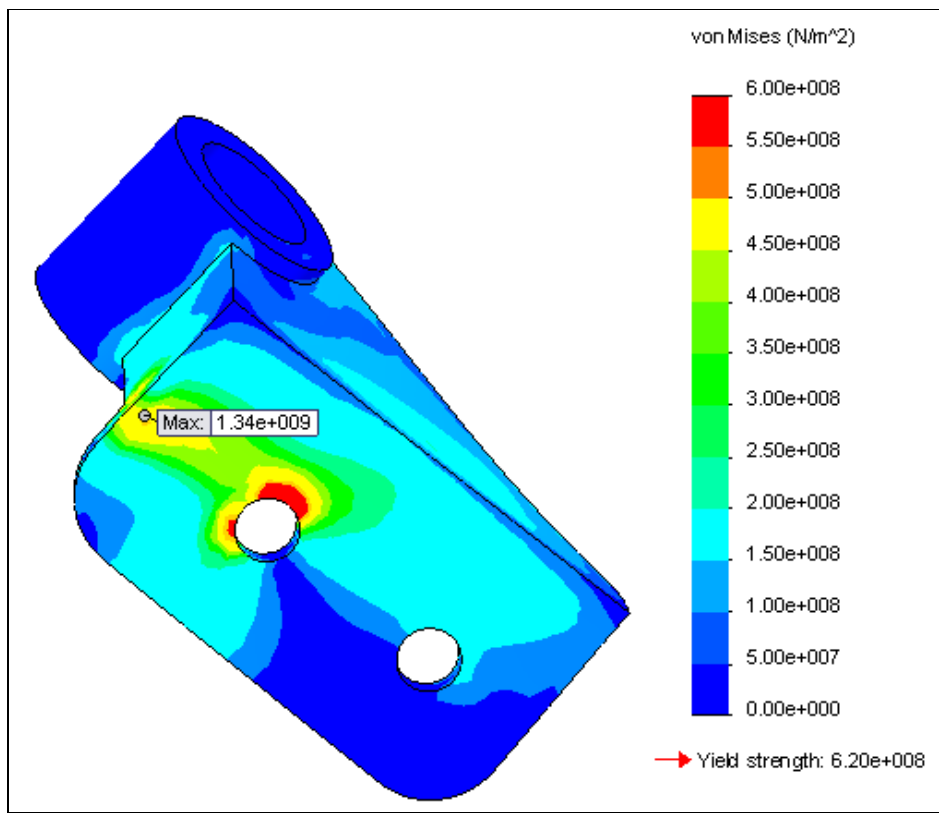
So we control the range on the color bar and/or change the number of increments: **Stress** → **Chart Options** → **Display options** turn off Automatic scale and select **Define** and pick a max value in the mid-range. Now all the red regions are above the failure level:



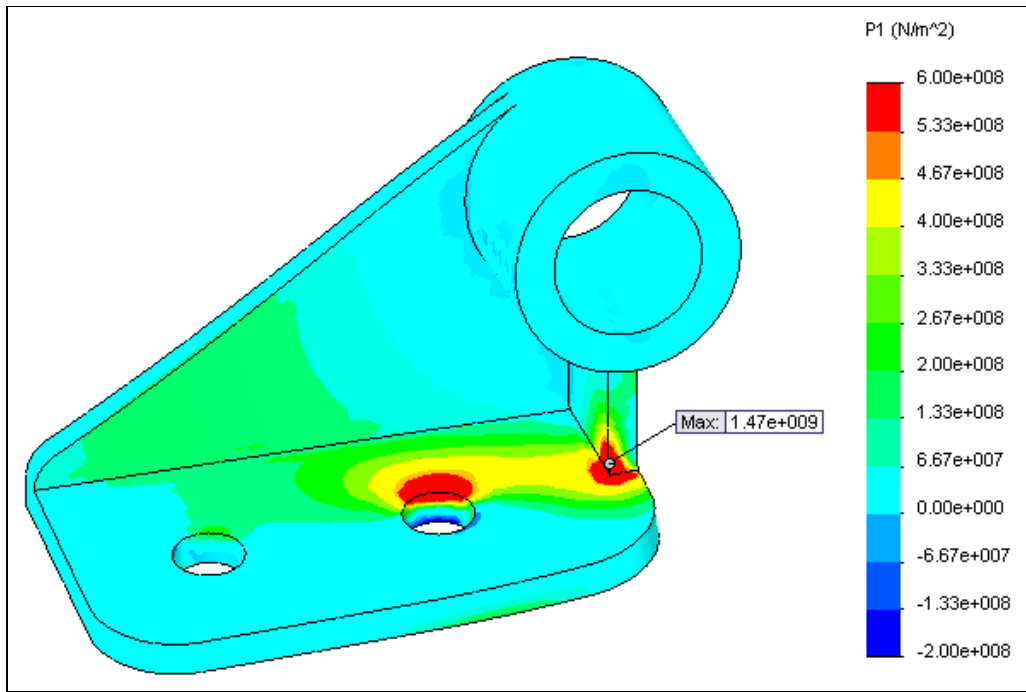
(Compare this to the original fifth figure.) Also graph the value from the inner corner to the near max stress: **Stress** → **List Selected** → **Graph**:



Also consider if a section view would be helpful, **Stress → Section Clipping**, or if seeing just the highest stressed material would be useful **Stress → Iso Clipping**. Also consider other views of the stresses:



Next check the maximum tension stress, making similar control changes:



And (twice) the maximum shear stress

