

ANSYS - Crank 8 Postprocess the results Content

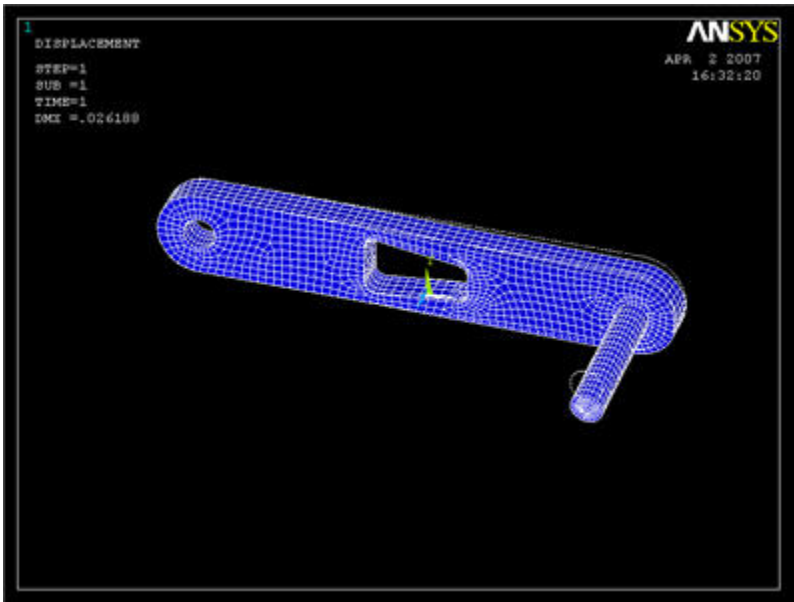
Step 8: Postprocess the Results

Plot Deformed Shape

Main Menu > General Postproc > Plot Results > Deformed Shape

Select Def + undef edge and click OK.

This plots the deformed and undeformed shapes in the *Graphics* window. The maximum deformation *DMX* is **.026188in** as reported in the *Graphics* window. We should check that our results make sense. It appears that the boundary conditions have been satisfied as the tip of the shaft moves downward and the other end of the crank is undeformed.



Animate the deformation

Utility Menu > PlotCtrls > Animate > Deformed Shape...

Select Def + undeformed and click OK. Select Forward Only in the *Animation Controller*.

Plot Nodal Solution of von Mises Stress

Main Menu > General Postproc > Plot results > Contour Plot > Nodal Solu

For a quick refresher on von Mises stress, click Help. Search for von mises and click on the result 2.4 Combined Stresses and Strains. This can be useful if your MAE212 book isn't lying around.

Select *Nodal Solution* > *Stress* > *von Mises stress* and click OK. To change the range of stresses displayed, go to

Utility Menu > PlotCtrls > Style > Contours > Uniform Contours ...

and select User specified. Specify a range of minimum 0 and maximum 25000. We can now see more color variation in the model, and easily pick out the red areas.

When you plot the "Nodal Solution", ANSYS obtains a continuous distribution as follows:

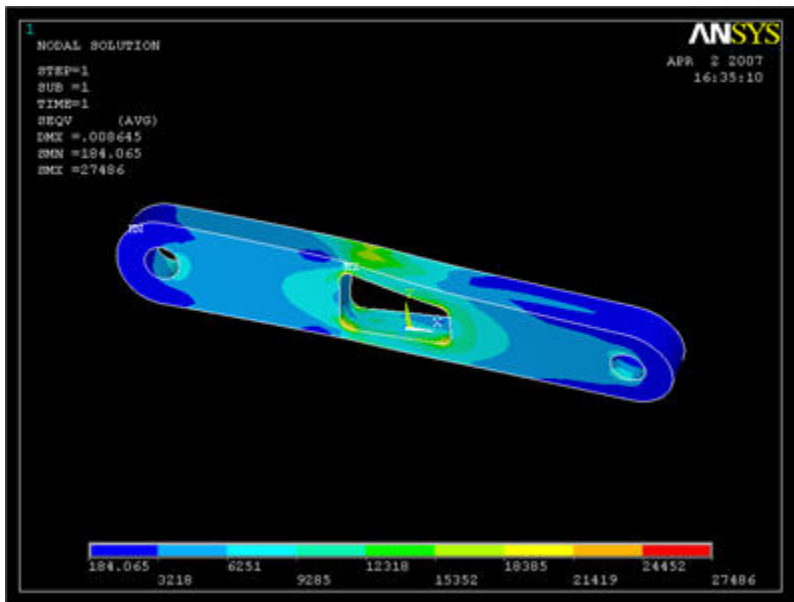
1. It determines the average at each node of the values of all elements connected to the node.
2. Within each element, it linearly interpolates the average nodal value obtained in the previous step.

The stress concentration located at the tip of the shaft can be ignored as the force is applied as a point load. To hide the crank shaft, go to

Utility menu > Select > Entities ...

Select Volumes, By Num/Pick, From Full and click Apply. Pick the crank volume and click OK. After we've selected a volume, we must select all the elements in this volume to be plotted. In the Select Entities window, select Elements, Attached to, Volumes and click Apply. Click Replot to display the new selection. Notice the deformation is exaggerated, revealing that deformation is primarily caused by torsion.

To see the whole model again, go to the Select Entities window and click Sele All and Replot. (If for some reason select all fails, you can always go to Utility Menu > Select > Everything)



Comparing the Sigma_xx Stress with von Mises Stress

To verify that the bending stress in the crank is relatively insignificant, we can compare the element sigma_xx solution with the elemental von Mises solution.

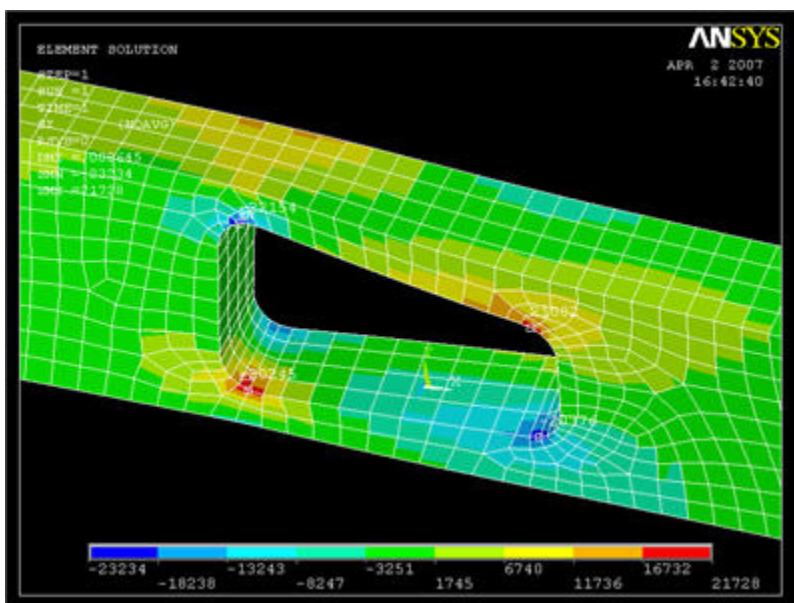
General Postproc > Plot Results > Contour Plot > Element Solu

Click on Stress, then X-Component of stress, then the Apply. Notice that the top-left and bottom-right corners of the cutout area are now blue, and that the scale has been readjusted to show that blue is now a large negative stress value. If this were a case of pure bending, we would expect the top of the crank to be in tension, not compression! (Note: if grey areas are appearing in your contour plots, you should go to Utility Menu > PlotCtrls > Style > Contours > Uniform Contours ..., select Auto calculated, and click OK.)

To find out information about specific points on the model, go to

General Postproc > Query Results > Subgrid Solu

Select Stress, X-direction SX, and click OK. The picking window will appear, and you can click on any point in the model. Click OK when finished.



Compare the stress values with the von Mises stress. (Click on von Mises stress, then OK)

Investigate the Stress Concentration

