Assignment 4—Stress Analysis using FEA

- The objective of this assignment is to familiarize you with the capability of COSMOS to perform stress analysis. You will continue to develop your skill in determining which methods of loading and setting boundary conditions most accurately reflect the physical model.
- This assignment will also reintroduce you to the impact of stress risers on parts.

You should model the part shown below in Cosmos and find the highest principal stresses at the critical section. The plate is 0.125 inches thick.



You will run three studies:

Study 1: The whole plate as shown Study 2: Half of the plate Study 3: Quarter plate Answer the following questions related to your findings:

- 1. What is the analytical value of stress at the critical section? Show your work
- 2. How did you model forces and boundary conditions for the whole plate?
- 3. What values of principal stresses did you get at the critical section for the whole plate?
- 4. How did you model forces and boundary conditions for the half plate?
- 5. What values of principal stresses did you get at the critical section for the half plate?
- 6. How did you model forces and boundary conditions for the quarter plate?
- 7. What values of principal stresses did you get at the critical section for the quarter plate?
- 8. Which model do you have the most confidence in? Why?
- 9. If the model's forces were offset from the geometric center of the plate, i.e. if loading was not symmetric, how would you model the loads? What types of stress exist due to this loading?
- 10. If the hole in the plate were not in the center of the plate, how would you model the loadings?

Turn in your answers to the questions given above, and turn in plots of the deflected shape of the plate along with the values for Von Mises stresses.