FEM (EML 4536/5537)

Course Project (Due on Dec 1st 2004)

A 150 mm C-clamp is used to exert a 2500 N force to a pair of components in order to hold them together. Design a suitable shape for the C part of the clamp. The C should be at least 100 mm wide and the maximum deflection should be no more than 3 mm. (You can ignore the threaded screw used to tighten the clamp.)

Perform a 2-D FEM analysis to refine the shape and estimate the points of maximum stress etc. You will need at least two mesh refinements on at least two shapes (an initial shape and a final shape at least).

Using your final 2-D shape as a basis, design the full 3-D C shape and perform a single FEM analysis on this shape. How do your results compare to the simplified 2-D model? Hint: don't make the shapes too complex.

Comment on the differences and similarities between the two models. Also suggest additional changes necessary to reduce stress or improve you design in other ways. Each group of no more that 3 members is to submit a Word report, appropriate CAD models, and all Algor files on a single disk.

Or

Design a 30 inch long connecting rod with a hole of 1.0 inch diameter at one end and a hole of 0.5 inch at the other end (to house pins) is required to transfer an axial load of 10,000 N. Limit the maximum axial displacement to 2 mm. Use appropriate material and limit the stresses not to exceed 60% of yield stress and also safegaurd against buckling. (Ignore the threading)

Perform a 2-D FEM analysis to refine the shape and estimate the points of maximum stress etc. You will need at least two mesh refinements on at least two shapes (an initial shape and a final shape at least).

Using your final 2-D shape as a basis, design the full 3-D shape and perform a single FEM analysis on this shape. How do your results compare to the simplified 2-D model? Hint: don't make the shapes too complex.

Comment on the differences and similarities between the two models. Also suggest additional changes necessary to reduce stress or improve you design in other ways. Each group of no more that 4 members is to submit a Word report, appropriate CAD models, and all Algor files on a single disk.

See the pictures for guideline.

Or

Any design project you are already working on with instructor's approval.