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# Engineering 1181

## Homework #2

Make sure to label your problems on the Excel spreadsheet.

1. You have a rectangular solid beam of thickness 5.10 mm and width of 3.00 cm. The beam is loaded 27.0 cm from a clamped end with a load of 30.1 N. Assume the loading is such that  $W = 3.00$  cm.

- A. What is the area moment of inertia of the beam? (Watch units.)
- B. If the deflection is 2.80 mm, what is the modulus of elasticity of the beam?
- C. Rewrite your answer for the modulus of elasticity in 1B with proper significant figures and units labels in a new cell. (If you want to use Excel to do this, go to Home→Number→more formats→ scientific then set number of decimal places. Otherwise just write in your answer and label in a new cell.)

2. You have an open square box beam with an outside height of 3.5 cm. The inside dimension is 3.0 cm.

- A. What is the area moment of inertia of the beam?
- B. The beam is loaded 27 cm from a clamped end and has a deflection of 3 mm. The beam is made of aluminum with a modulus of Elasticity of  $7 \times 10^6$  N/cm<sup>2</sup>. What is the load on the beam?
- C. How many significant figures should your answer in 2B have?

3. Using the information from problem 2, what would be the deflections with loads of 1000N, 2000N, 3000 N, 4000N and 5000N? Show the data in two columns with load in one column then deflection in the other column.

4. Graph the data in problem 3 with a graph of expected deflection vs. load. Be sure the graph is titled with labeled axes. The Y axis is deflection. X axis is load.
5. What is the slope of the line in problem 4 including units?