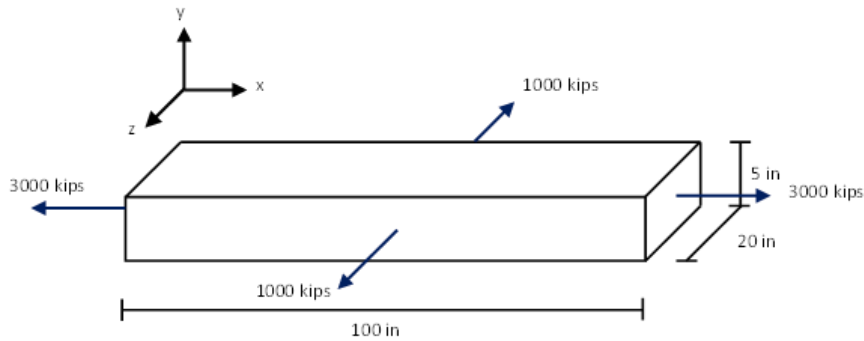
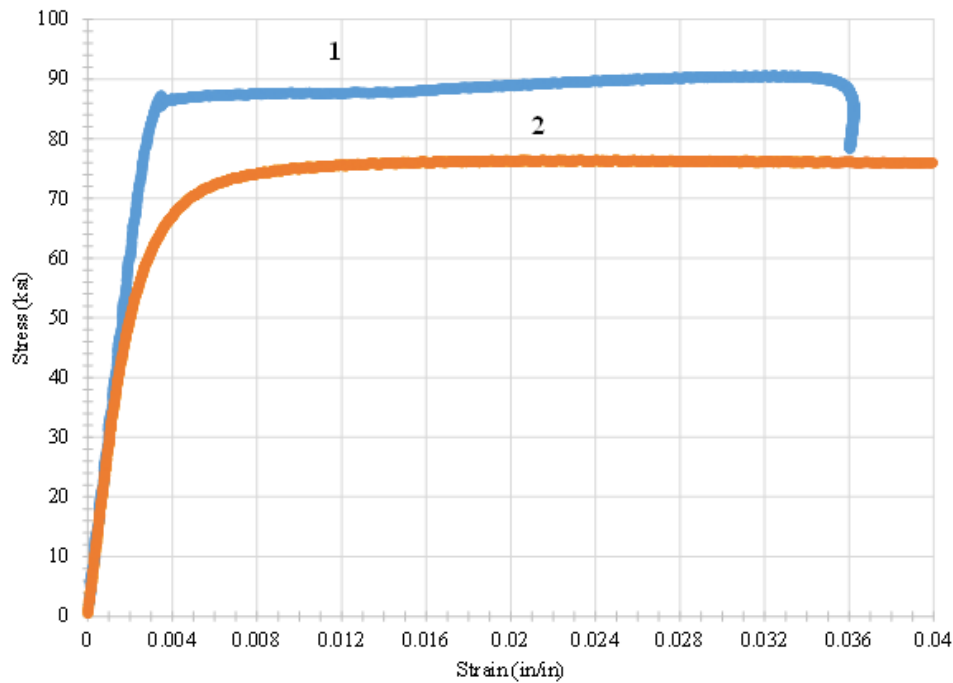


1. Describe the difference between a ductile material and a brittle material. Why is it important to know what type of material you're using for your component or structure?
2. How can you measure or describe the ductility of a material? Which of the steel coupons in the stress-strain curves on the following page is more ductile?
3. A steel bar with material properties $E = 30000 \text{ ksi}$ and $\nu=0.3$ is subjected to the following normal forces. What is the change in volume of the body?



4. The following stress-strain curves are determined for two steel coupons:



- a. From the figure, identify the yield stress for Specimen 2.
- b. From the figure, identify the ultimate stress for Specimen 1.
- c. Which specimen is made of stronger material? Explain how you know.
- d. A 20 in rod made out of the material of Specimen 1 is loaded to 60 ksi and then unloaded. Is there permanent deformation in the rod? Explain how you know.
- e. The same rod is then loaded to 88 ksi and unloaded. Is there permanent deformation in the rod? Explain how you know.
- f. The same rod is then loaded a third time to 90 ksi and unloaded. What is the permanent deformation?