

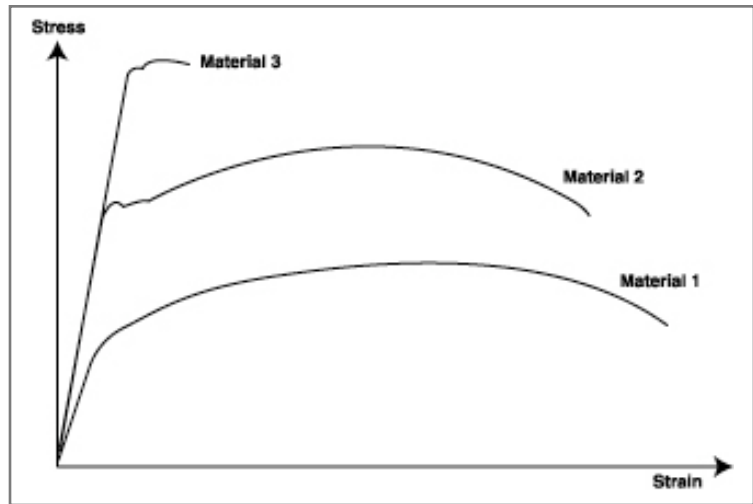
Problem Set 6

E-344 Spring, 2004

1. A tensile test is to be performed on a piece of plain-carbon steel plate. Suppose its yield stress is 50 ksi and its ultimate tensile stress is 65 ksi. The plate is 16 gage (i.e. thickness = 0.05082"). For a flat tensile specimen cut from this plate with a gauge width of 0.75 in, does the tensile test instrument have sufficient capacity to break tensile bars of this steel if the maximum load it can apply is 10,000 lbs.? Quantitatively justify your answer.

2. Using the diagram below, identify which material has:

- the highest yield stress
- the highest tensile stress
- the lowest ductility
- the highest ductility
- the highest modulus



3. Problem 7-12 in Ohring

4. Consider a long steel column with a diameter of 10 inches which is being used as a piling in the foundation of a new building. The design specifications indicate that the piling can not be loaded to a stress greater than 0.5 of its yield stress. If a column with a diameter of 12 inches is used as a substitute, the allowable weight that can be borne by the piling will

- increase
- decrease
- stay the same
- none of the above relative to the 10 inch diameter column.

5. Dislocation motion can be impeded by:

- other dislocations;
- interstitial atoms;
- substitutional alloying elements;
- grain boundaries;
- all of the above.