

NPRE 331 (borrowed from ME 231)

Fall 2003

Impact & Fracture

Analysis of Results and Points for Discussion

1. Plot the impact energy absorbed by each specimen as a function of temperature. Use the data from all materials (polymers and metals) and all four groups in your lab section on one plot. Label each data set clearly. In a similar fashion, plot the maximum load absorbed as a function of temperature for all materials.
2. Compare the energy absorbed, maximum load, time to failure, and type of fracture for the different impact specimens at the various temperatures. What can you say about the ductility of each material tested? Discuss the relationship between maximum load and impact energy. Can you characterize toughness by measuring only the maximum load?
3. Indicate which materials exhibit a brittle-ductile transition temperature, and estimate the temperature. For those not showing a transition, do you expect to see one if the samples were tested at a higher temperature? How about testing at a lower temperature? Compare your measured transition temperatures to published values (be sure to include reference).
4. From the K_{IC} tests, plot load-displacement curves for both materials, determine which type of curve you have, and find P_Q and P_{max} . Report these in a table.
5. Determine K_Q for both the 2024 and 7075 specimens based on the ASTM standard procedure described in the lab manual. Also determine whether or not this particular data represents a valid test. Report the K_Q or K_{IC} value. Explain the validity of your K_{IC} tests. Compare the measured K_{IC} value with published data (be sure to include the reference).