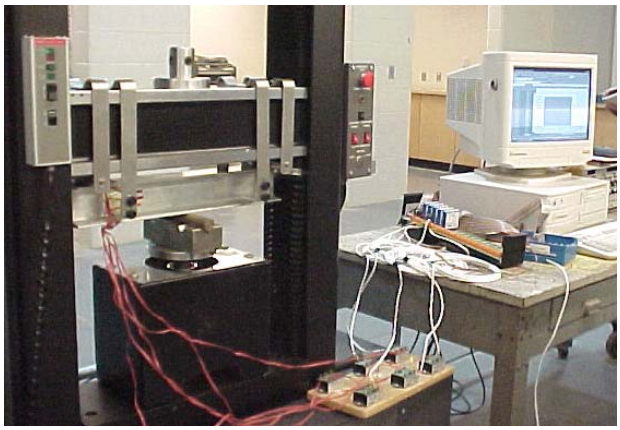
BACKGROUND

The stress and strain distribution in the cross section of a I-beam will be determined in this laboratory. The I-beam will be loading by symmetric three point bending, meaning that a transverse distributed line load will be applied symmetrically between two roller supports near the ends of the beam. Strain gages have already been attached to the web and flange of the beam midway between the load and one of the supports to determine the strain distribution in the beam cross section.



PRELAB

Tabulate the cross sectional properties of the S3 X 7.5 designated I-beam to be tested, which may be found in Appendix C of your text. Be prepared to determine the bending moment, normal stresses and normal strains along a beam under three point bending.

EXPERIMENTAL PROCEDURE

(1) Measure the dimensions of the beam.
(2) Determine the location of each strain gage.
(3) Verify the material and location of the applied load.
(4) Draw a schematic of the set-up.
(5) Record the strain from each gage as a function of applied load.
(6) Record any relevant observations in your lab notebook.

DATA ANALYSIS

(1) Construct spreadsheets containing the (imported if need be) experimental data.
(2) Prepare a plot of the recorded strains as a function of applied bending moment to verify that the material remained in the elastic range.
(3) Prepare plots of the recorded and theoretical strains versus distance from the neutral axis for the maximum bending moment, and compare the strain distributions. Prepare the plots so that the distance is the ordinate.
(4) Prepare plots of the derived experimental and theoretical stresses versus distance from the neutral axis for the maximum bending moment, and compare the stress distributions. Prepare the plots so that the distance is the ordinate.
(5) Explain the advantage of the I-beam over, e.g., a rectangular shape.