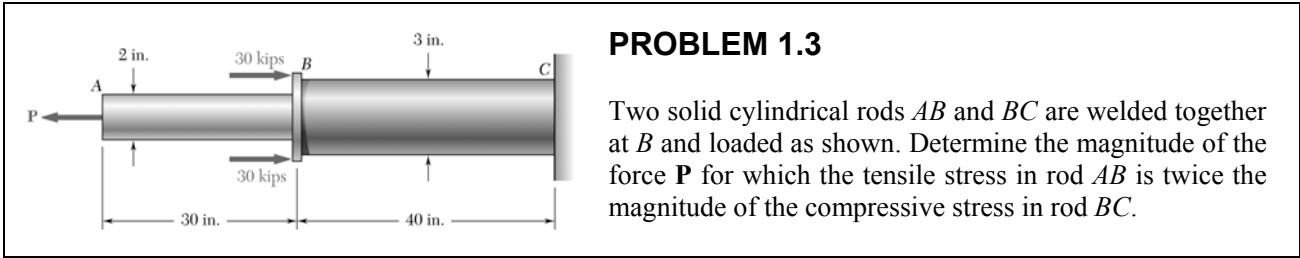


EN0310: Mechanics of Solids and Structures

Homework 1: Concept of Stress

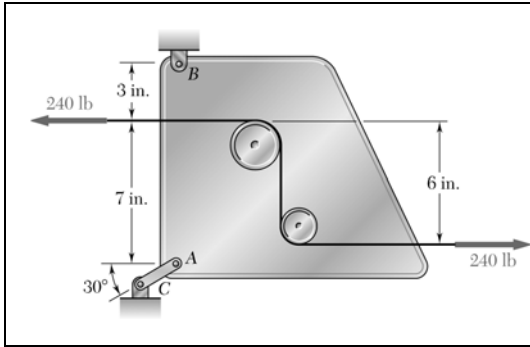
Due on Friday, 09/23/11, at 1pm outside Prof. Shenoy's office (BH604) in a box labeled EN31----Drop Off (on the top of white cabinet).

From textbook "Mechanics of Materials" by Beer, Johnston, DeWolf and Mazurek, 6th Edition, McGraw-Gill.



PROBLEM 1.3

Two solid cylindrical rods AB and BC are welded together at B and loaded as shown. Determine the magnitude of the force P for which the tensile stress in rod AB is twice the magnitude of the compressive stress in rod BC .



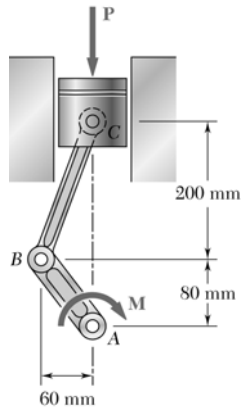
PROBLEM 1.9

Link AC has a uniform rectangular cross section $\frac{1}{16}$ in. thick and $\frac{1}{4}$ in. wide. Determine the normal stress in the central portion of the link.

Dimensions in mm

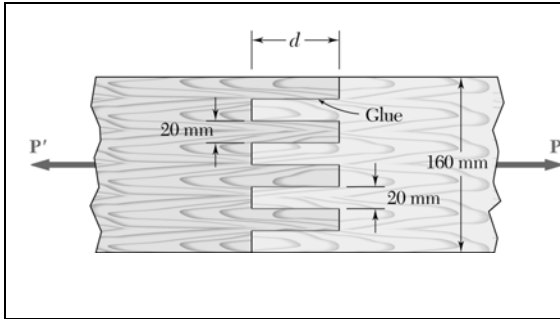
PROBLEM 1.13

An aircraft tow bar is positioned by means of a single hydraulic cylinder connected by a 25-mm-diameter steel rod to two identical arm-and-wheel units DEF . The mass of the entire tow bar is 200 kg, and its center of gravity is located at G . For the position shown, determine the normal stress in the rod.



PROBLEM 1.14

A couple M of magnitude $1500\text{ N} \cdot \text{m}$ is applied to the crank of an engine. For the position shown, determine (a) the force P required to hold the engine system in equilibrium, (b) the average normal stress in the connecting rod BC , which has a 450-mm^2 uniform cross section.



PROBLEM 1.18

Two wooden planks, each 22 mm thick and 160 mm wide, are joined by the glued mortise joint shown. Knowing that the joint will fail when the average shearing stress in the glue reaches 820 kPa, determine the smallest allowable length d of the cuts if the joint is to withstand an axial load of magnitude $P = 7.6$ kN.