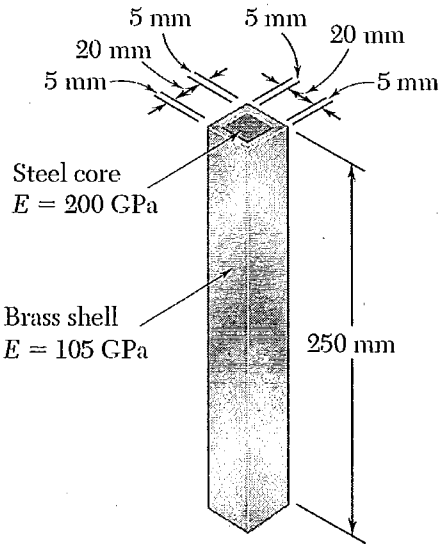
1) GIVEN: A centric axial force of 60 kN is applied to the assembly shown.
REQ'D: (a) Normal stress in the brass shell.
(b) Deformation of the assembly. (B9.25)



a) $A_S = (.02m)(.02m) = 0.40\times10^{-3}\,m^2$

$A_B = (.03m)(.03m) - 0.40\times10^{-3}\,m^2 = 0.50\,m^2$

$\Delta L_B = \frac{P_B L_B}{A_B E_B}$ AND $\Delta L_S = \frac{P_S L_S}{A_S E_S}$

$\Delta L_B = \Delta L_S$ BECAUSE BONDED TOGETHER

$\frac{P_B L_B}{A_B E_B} = \frac{P_S L_S}{A_S E_S} \Rightarrow P_B = P_S\left(\frac{A_B E_B}{A_S E_S}\right)$

$P_B = P_S\left[\frac{(0.5\times10^{-3}m)(105\times10^9\,Pa)}{(0.4\times10^{-3}m)(200\times10^9\,Pa)}\right] = 0.6563\,P_S$

$P_S + P_B = 60\,kN$ TOTAL LOAD CARRIED BY STEEL AND BRASS

$P_S + 0.6563\,P_S = 60\,kN \Rightarrow P_S = 36.23\,kN$

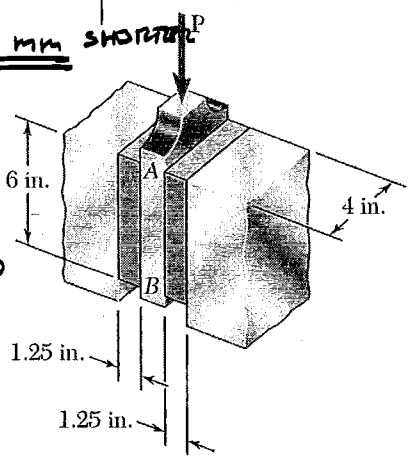
$P_B = 0.6563(36.23\,kN) = 23.79\,kN\,(C)$

$\sigma_B = \frac{P_B}{A_B} = \frac{23.23\times10^3\,N}{0.50\times10^{-3}\,m^2} = 47.5\,MPa\,(C)$

b) $\Delta L = \Delta L_B = \sigma_B\left(\frac{L_B}{E_B}\right) = 47.5\times10^6\,Pa\left(\frac{.25\,m}{105\times10^9\,Pa}\right) = .1132\times10^{-3}\,m$

$\Rightarrow .1132\,mm$ SHORTER

2) GIVEN: Two blocks of hard rubber are bonded to plate AB as shown.
P = 6 kips and G = 2.5 ksi.
REQ'D: Vertical deflection of plate AB. (B9.62)



$V = \frac{P}{2} = \frac{6\,kips}{2} = 3\,kips$ EACH SIDE TAKES ½ LOAD

$\delta_s = \frac{f\,V}{A\,G} = \frac{(1.25\,in)(3\times10^3\,\#)}{(6in)(4in)(2.5\times10^3\,psi)}$

$= 0.0625\,in$ VERTICAL DEFLECTION OF PLATE AB