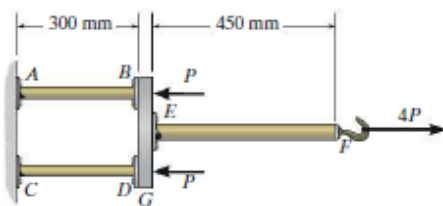


## MAK 206 HW #3

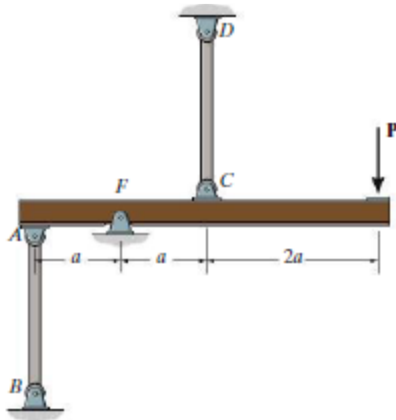
**4-9.** The assembly consists of two 10-mm diameter red brass C83400 copper rods  $AB$  and  $CD$ , a 15-mm diameter 304 stainless steel rod  $EF$ , and a rigid bar  $G$ . If  $P = 5$  kN, determine the horizontal displacement of end  $F$  of rod  $EF$ .

**4-10.** The assembly consists of two 10-mm diameter red brass C83400 copper rods  $AB$  and  $CD$ , a 15-mm diameter 304 stainless steel rod  $EF$ , and a rigid bar  $G$ . If the horizontal displacement of end  $F$  of rod  $EF$  is 0.45 mm, determine the magnitude of  $P$ .



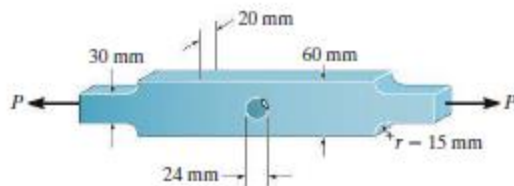
**Probs. 4-9/10**

**4-58.** Two identical rods  $AB$  and  $CD$  each have a length  $L$  and diameter  $d$ , and are used to support the rigid beam, which is pinned at  $F$ . If a vertical force  $P$  is applied at the end of the beam, determine the normal stress developed in each rod. The rods are made of material that has a modulus of elasticity of  $E$ .



**Probs. 4-58/59**

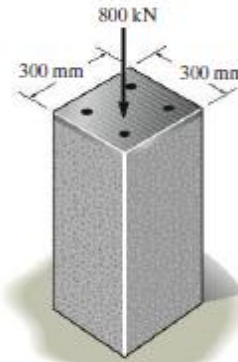
**4-89.** The steel bar has the dimensions shown. Determine the maximum axial force  $P$  that can be applied so as not to exceed an allowable tensile stress of  $\sigma_{allow} = 150$  MPa.



**Prob. 4-89**

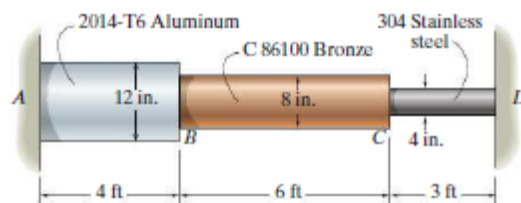
**4-31.** The concrete column is reinforced using four steel reinforcing rods, each having a diameter of 18 mm. Determine the stress in the concrete and the steel if the column is subjected to an axial load of 800 kN.  $E_{st} = 200$  GPa,  $E_c = 25$  GPa.

**\*4-32.** The column is constructed from high-strength concrete and four A-36 steel reinforcing rods. If it is subjected to an axial force of 800 kN, determine the required diameter of each rod so that one-fourth of the load is carried by the steel and three-fourths by the concrete.  $E_{st} = 200$  GPa,  $E_c = 25$  GPa.



**Probs. 4-31/32**

**4-69.** The assembly has the diameters and material make-up indicated. If it fits securely between its fixed supports when the temperature is  $T_1 = 70^\circ\text{F}$ , determine the average normal stress in each material when the temperature reaches  $T_2 = 110^\circ\text{F}$ .



**Prob. 4-69**