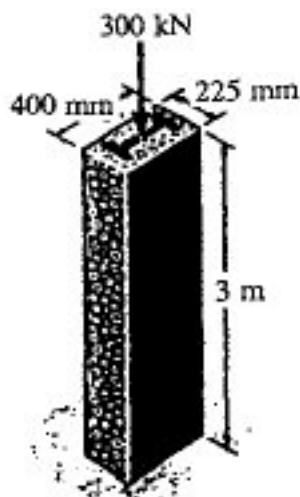
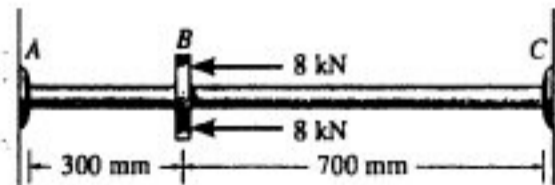


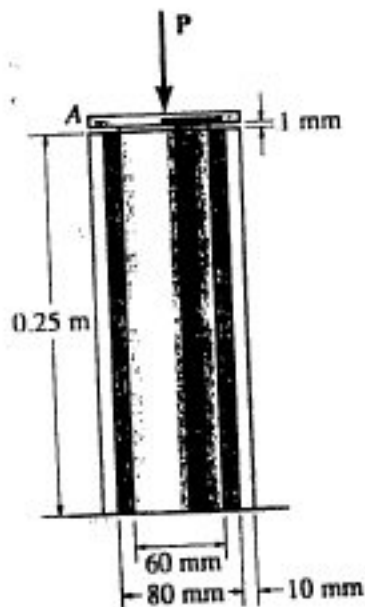
4-31. The A-36 steel column, having a cross-sectional area of $10\,500\text{ mm}^2$, is encased in high-strength concrete as shown. If an axial force of 300 kN is applied to the column, determine the average compressive stress in the concrete and in the steel. How far does the column shorten? It has an original length of 3.0 m . $E_{\text{A-36}} = 210\text{ GPa}$.



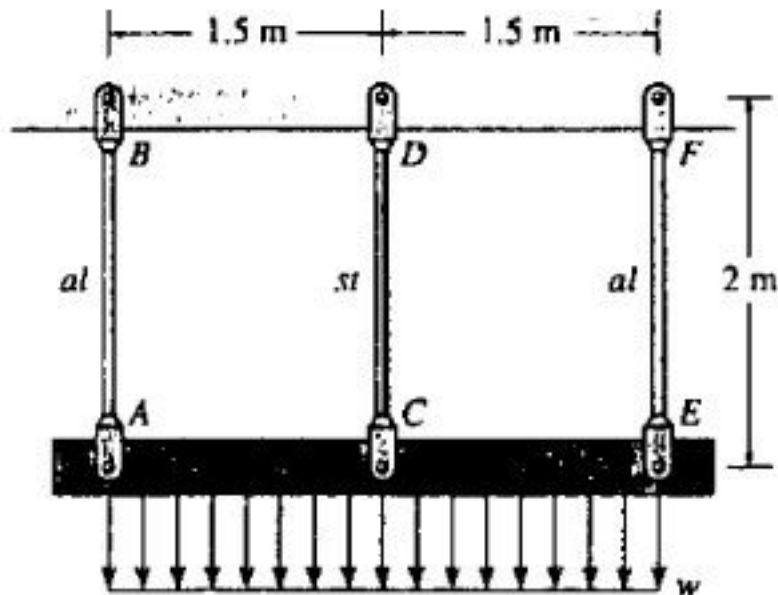
*4-36. The A-36 steel pipe has an outer radius of 20 mm and an inner radius of 15 mm. If it fits snugly between the fixed walls before it is loaded, determine the reaction at the walls when it is subjected to the load shown.



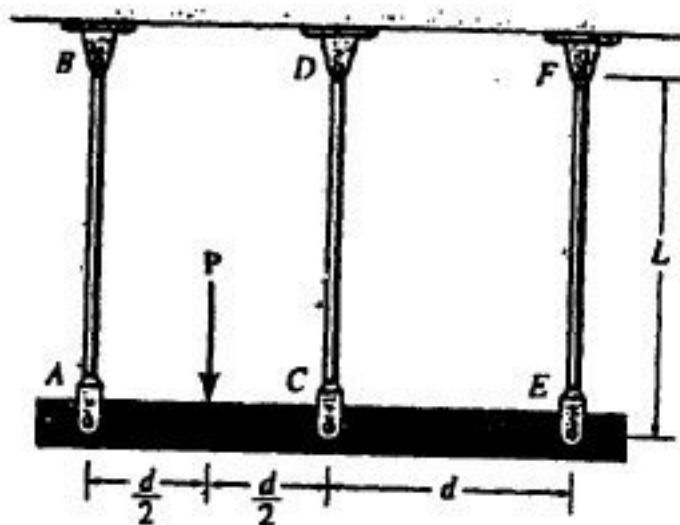
4-41. The support consists of a solid red brass C83400 post surrounded by a 304 stainless steel tube. Before the load is applied the gap between these two parts is 1 mm. Given the dimensions shown, determine the greatest axial load that can be applied to the rigid cap A without causing yielding of any one of the materials. $E_{br} = 101 \text{ GPa}$, $E_{ss} = 193 \text{ GPa}$.



4-45. The distributed loading is supported by the three suspender bars. AB and EF are made from aluminum and CD is made from steel. If each bar has a cross-sectional area of 450 mm^2 , determine the maximum intensity w of the distributed loading so that an allowable stress of $(\sigma_{\text{allow}})_{st} = 180 \text{ MPa}$ in the steel, and $(\sigma_{\text{allow}})_{al} = 94 \text{ MPa}$ in the aluminum is not exceeded. $E_{st} = 200 \text{ GPa}$, $E_{al} = 70 \text{ GPa}$.



4-50. The three suspender bars are made of the same material and have equal cross-sectional areas A . Determine the average normal stress in each bar if the rigid beam ACE is subjected to the force P .



4-118. The assembly consists of two A-36 steel suspender rods AC and BD attached to the 500 N uniform rigid beam AB . Determine the position x for the 1500 N loading so that the beam remains in a horizontal position both before and after the load is applied. Each rod has a diameter of 12 mm.

