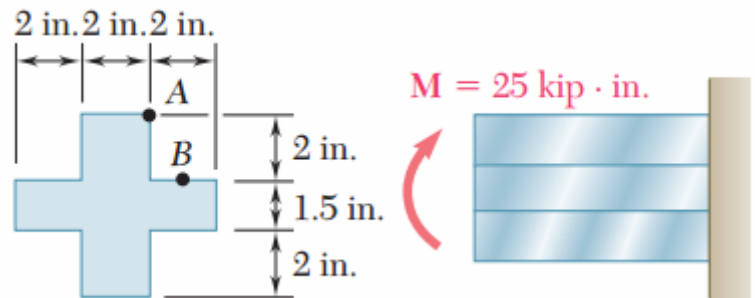


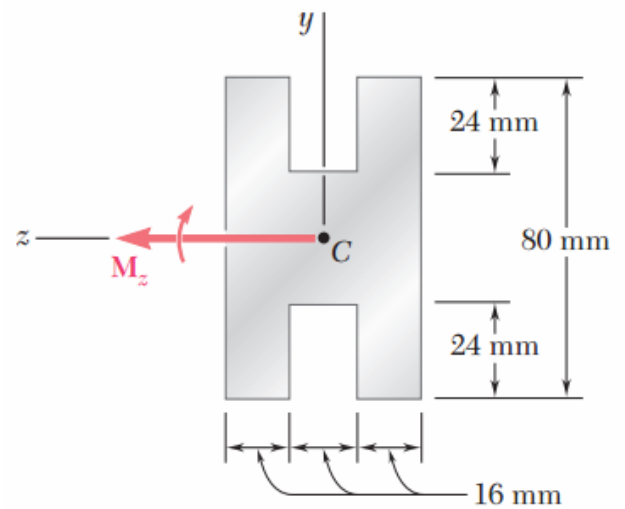


Chapter 4

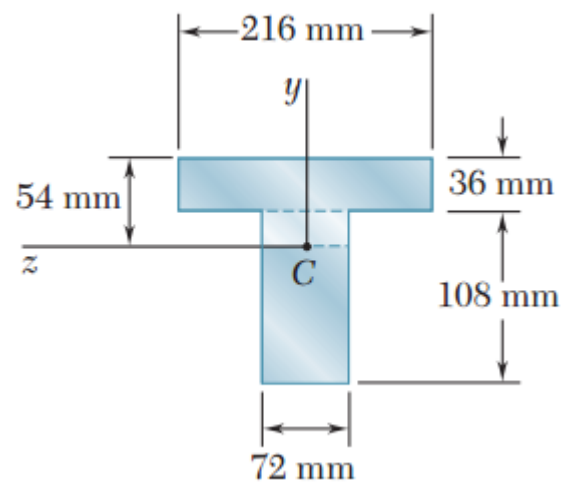
4.1 and 4.2 Knowing that the couple shown acts in a vertical plane, determine the stress at (a) point A, (b) point B.



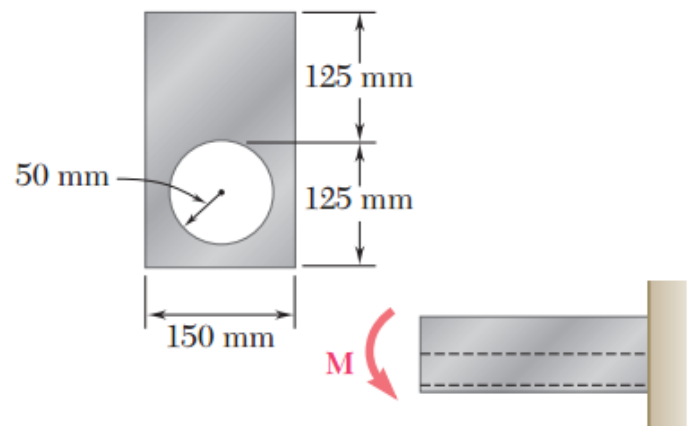
- 4.5** A beam of the cross section shown is extruded from an aluminum alloy for which $\sigma_Y = 250$ MPa and $\sigma_U = 450$ MPa. Using a factor of safety of 3.00, determine the largest couple that can be applied to the beam when it is bent about the z axis.



- 4.12** Knowing that a beam of the cross section shown is bent about a horizontal axis and that the bending moment is $6 \text{ kN} \cdot \text{m}$, determine the total force acting on the top flange.

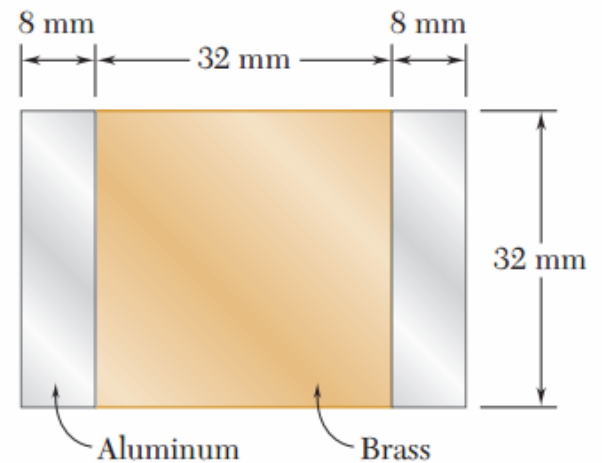


4.19 and 4.20 Knowing that for the extruded beam shown the allowable stress is 120 MPa in tension and 150 MPa in compression, determine the largest couple $\mathbf{M}$ that can be applied.

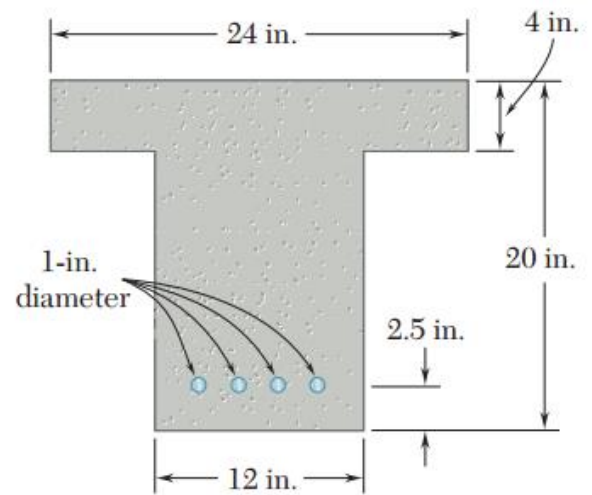


4.33 and 4.34 A bar having the cross section shown has been formed by securely bonding brass and aluminum stock. Using the data given below, determine the largest permissible bending moment when the composite bar is bent about a horizontal axis.

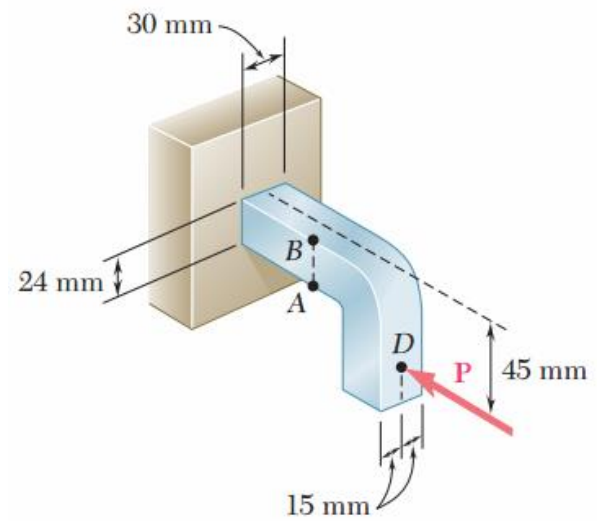
	Aluminum	Brass
Modulus of elasticity	70 GPa	105 GPa
Allowable stress	100 MPa	160 MPa



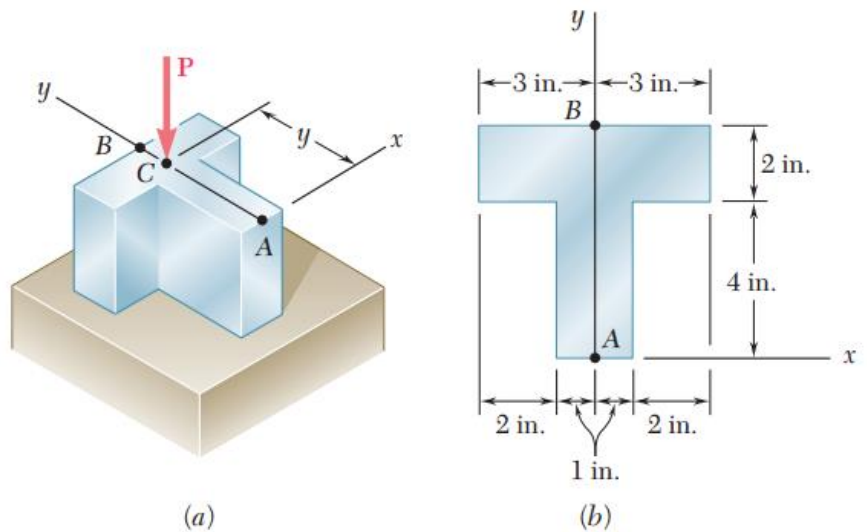
- 4.52** Knowing that the bending moment in the reinforced concrete beam is $+100 \text{ kip} \cdot \text{ft}$ and that the modulus of elasticity is $3.625 \times 10^6 \text{ psi}$ for the concrete and $29 \times 10^6 \text{ psi}$ for the steel, determine (a) the stress in the steel, (b) the maximum stress in the concrete.



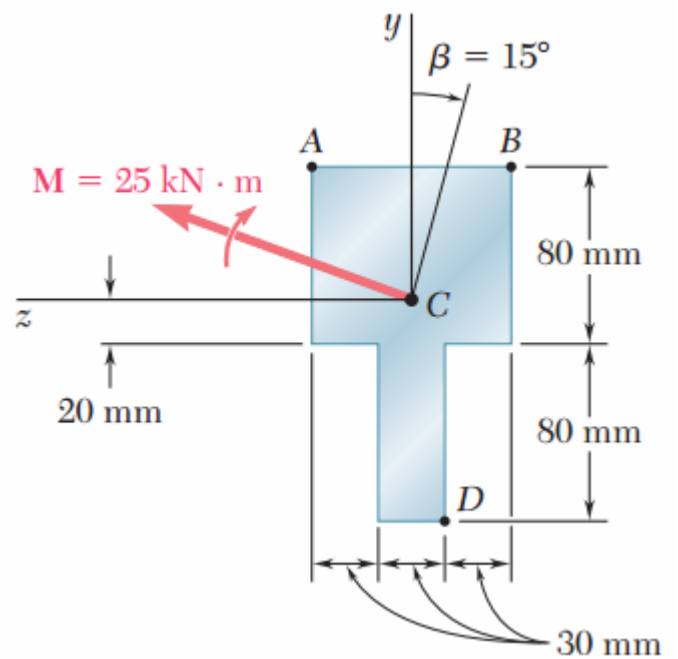
4.101 Knowing that the magnitude of the horizontal force $\mathbf{P}$ is 8 kN, determine the stress at (a) point A, (b) point B.



4.117 A vertical force $\mathbf{P}$ of magnitude 20 kips is applied at point C located on the axis of symmetry of the cross section of a short column. Knowing that $y = 5$ in., determine (a) the stress at point A , (b) the stress at point B , (c) the location of the neutral axis.



4.127 through 4.134 The couple $\mathbf{M}$ is applied to a beam of the cross section shown in a plane forming an angle β with the vertical. Determine the stress at (a) point A, (b) point B, (c) point D.



- 4.144** The tube shown has a uniform wall thickness of 12 mm. For the loading given, determine (a) the stress at points A and B, (b) the point where the neutral axis intersects line ABD .

