Chapter 15, Problem 27

A riveted structural connection supports a load of 10 kN, as shown in Figure P15.27. What is the value of the force on the most heavily loaded rivet in the bracket? Determine the values of the shear stress for 20-mm rivets and the bearing stress if the Gusset plate is 15 mm thick.

Given: The applied loading is P = 10 kN.

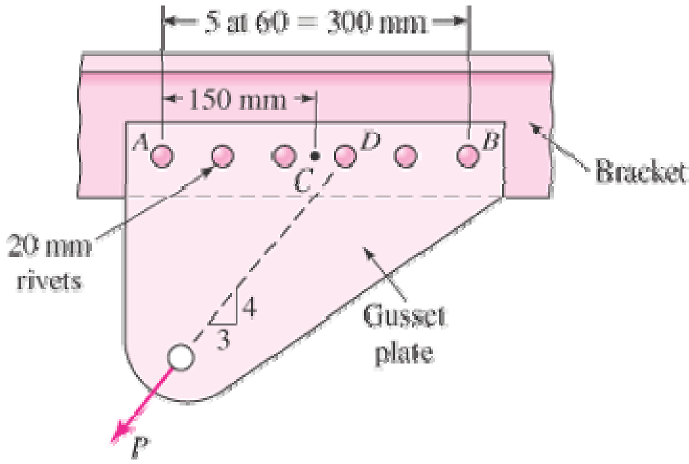

Figure P15.27

Chapter 15, Solution 27

Vertical and horizontal components of the force P=10 kN are 8 kN and 6 kN at B, respectively. Rivet B is most heavily loaded. The centroid of the group of rivets is at C. We have

$$F_B = \frac{Mr_B}{\sum r_j^2} = \frac{8\times30(150)}{2[30^2+90^2+150^2]} = 0.571\ kN$$

$$V_B = [1^2 + 1.904^2]^{\frac{1}{2}} = 2.15\ kN \quad \text{(Fig.a)}$$

Therefore

$$\tau_B = \frac{V_B}{\pi d^2/4} = \frac{2{,}150}{\pi(20)^2/4} = 6.843\ MPa$$

$$\sigma_B = \frac{V_B}{dt} = \frac{2{,}150}{20\times15} = 7.167\ MPa$$

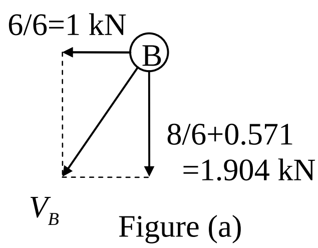

Figure (a)

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