

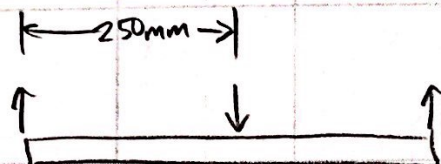
6061-T6 ALUMINUM

$$S_{ut} = 310 \text{ MPa}$$

$$S_y = 276 \text{ MPa}$$

$$E = 68.9 \text{ GPa}$$

SOLID BAR



$$AREA = (100 \text{ mm})(25 \text{ mm}) = 2500 \text{ mm}^2 = 2.5 \times 10^{-3}$$

$$C = 12.5$$

$$I = \frac{(100)(25)^3}{12} = 130208 = 130 \times 10^{-9}$$

$$\sigma = \frac{Mc}{I}$$

$$\sigma = \frac{276 \text{ MPa}}{2 \text{ (F.O.S)}} = 138 \text{ MPa}$$

$$M = \frac{\sigma I}{c} = \frac{(138)(130208)}{12.5} = 1435.2$$

$$M = F \cdot d, F = 5740.8 \text{ N}, \text{ DIVIDE OVER } 0.0075 \text{ m}^2 \text{ AREA}$$

$$P = 765440 \frac{\text{N}}{\text{m}^2} = 0.765 \text{ MPa}$$

$$\text{USE PRESSURE OF } 300 \text{ lb} = 136.078 \text{ kg} \approx 150 \text{ kg}$$

$$\text{PATCH AREA} = (75 \text{ mm})(100 \text{ mm}) = 7500 \text{ mm}^2 \left(\frac{\text{m}^2}{1000^2 \text{ mm}} \right) = 0.0075 \text{ m}^2$$

PRESSURE MAGNITUDE

$$\frac{(9.81)(150 \text{ kg})}{(0.0075 \text{ m}^2)} = 196,200 \frac{\text{N}}{\text{m}^2}$$

$$1471.5 \text{ N}$$

ROARK'S TABLE 8.13 EQN. 1d Pg 260

$$I_x = \frac{bd^3 - bid^3}{12} = 76479.5 \quad \text{Pg 802}$$

$$= 76.48 \times 10^{-9}$$

$$F = \frac{2M}{a(l-a)} = \frac{2(1971.054)(0.5)}{0.25(0.5-0.25)}$$

$$Z_x = \frac{bd^2 - bid^2}{4} = 7141.5$$

$$= 7.1415 \times 10^{-6}$$

$$= 31536.864$$

$$M_p = (\sigma_{\text{yield}})(Z_x) = 1971.054$$