

Now find Stresses.

$$\text{Torque} \rightarrow \tau = \frac{16T}{\pi d^3} K_f = 16.3 \text{ MPa}$$

$$\text{axial } \sigma = \frac{P}{A} K_f = -1.24 \text{ MPa}$$

$$\text{bending } \sigma = \frac{32M}{\pi d^3} K_f = 65 \text{ MPa} \quad ] \text{ fully reversed}$$

Need Equivalent stresses

$$\sigma_{\text{mean}} = \frac{\sigma_{\text{mean}}}{2} + \sqrt{\tau_{\text{mean}}^2 + \left(\frac{\sigma_{\text{mean}}}{2}\right)^2}$$

$$\sigma_{\text{mean}} = -1.24$$

$$\tau_{\text{mean}} = 16.3$$

$$\sigma_{\text{mean}} = 15.7 \text{ MPa}$$

$$\sigma_{\text{alt}} = \sqrt{\sigma_{\text{alt}}^2 + 3\tau_{\text{alt}}^2}$$

$$\sigma_{\text{alt}}^2 = 65 \text{ MPa}$$

$$\tau_{\text{alt}} = 0$$

$$\sigma_{\text{alt}} = 65 \text{ MPa}$$

$$\sigma_{\text{mean}} = 15.6$$

$$\sigma_{\text{alt}} = 65 \text{ MPa}$$