9th-Jan-2004

If you apply K_f only to

~~the~~ τ_a

$$\tau_a = \frac{3922}{d^3} \qquad \tau_m = \frac{15685}{1.54\, d^3}$$

$$\approx \frac{10000}{d^3}$$

$$\frac{\tau_a}{\tau_m} = 0.4 \quad (\text{not } 0.25)$$

this load line has also been plotted on the constant Life fatigue diagram, and it will give us a somewhat different failure point

either way, find τ_a at failure (approx 150 MPa)

Substitute into

$$\tau_a = \frac{3922}{d^3} \Rightarrow d^3 = \frac{3922}{\tau_a}$$

need to be careful with units.

τ_a was calculated in terms of Nm, so stick with that

$$\tau_a = 150\ \text{MPa} = 150 \times 10^6\ \text{Pa}$$

$$d = \sqrt[3]{\frac{3922}{150 \times 10^6}} = 0.0296 \simeq 30\ \text{mm}$$