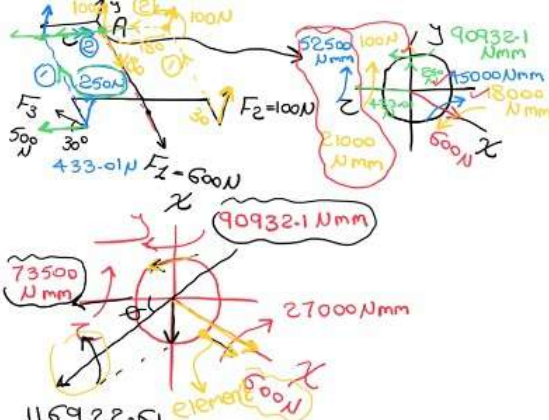




$$116922.51 \text{ N/mm}^2 \quad \theta = \tan^{-1} \frac{90932.1}{73500} = 51.05^\circ$$

$$\begin{aligned} \checkmark F(600\text{N}) \quad \checkmark M(116922.51 \text{ Nmm}) \\ \delta_x = \frac{600}{\pi/4 \cdot 12^3} & \quad \delta_x = \frac{M \cdot 6}{\pi/64 \cdot 12^4} \\ = 5.31 \text{ MPa} & \quad = 689.22 \text{ MPa} \\ K=1.45 & \quad K=1.43 \end{aligned}$$

$$\checkmark T(27000 \text{ Nmm})$$

$$\tau_o = \frac{T \cdot 6}{\pi/32 \cdot 12^4} = 79.58 \text{ MPa} \quad K=1.2$$

$$\frac{N}{d} = \frac{2.1}{12} = 0.175$$

$$\frac{D}{d} = \frac{14.5}{12} = 1.21$$

$$\delta_x = 5.31 \cdot 1.45 + 689.22 \cdot 1.43 = 993.28 \text{ MPa}$$

$$\tau = 79.58 \cdot 1.2 = 95.5 \text{ MPa}$$

$$\sigma_1, \sigma_2 = \frac{993.28}{2} \pm \sqrt{\frac{993.28^2}{4} + 95.5^2}$$

$$\sigma_1 = 1002.38 \text{ MPa}$$

$$\sigma_2 = -9.099 \text{ MPa}$$

$$\tau_{max} = \frac{\sigma_1 - \sigma_2}{2} = 505.74 \text{ MPa}$$

$$n_{MS} = \frac{621}{505.74} = 0.614 < 1$$

n_{ED} Failure will occur

$$\begin{aligned} \sigma_{von} &= \sqrt{\frac{(\sigma_1 - \sigma_2)^2}{2}} \\ &= \sqrt{\frac{(1002.38 - (-9.1))^2}{2} + (1002.38 - 0)^2 + (-9.1 - 0)^2} \end{aligned}$$

$$\sigma_{von} = 1006.96 \text{ MPa}$$

$$n_{ED} = \frac{621}{1006.96} = 0.617 < 1$$

Failure