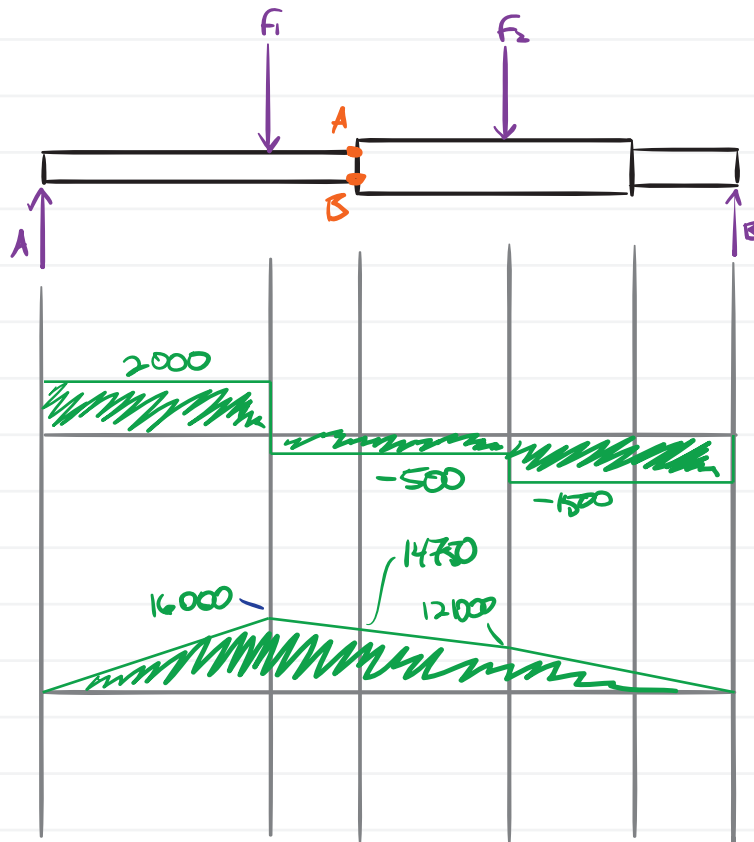


6-17FBD

Reactions:

$$\begin{aligned}
 A+B &= F_1+F_2 \\
 -8 \cdot F_1 - 16 \cdot F_2 + 24B &= 0 \\
 \Rightarrow B &= \frac{F_1 + 2F_2}{3} \\
 &= 1500 \text{ lbf.}
 \end{aligned}$$

$$A = 2000 \text{ lbf.}$$



A: compression  $\sigma_A = -\frac{M_{AC}}{I} = -\frac{14750 \cdot (15/2)}{\frac{\pi}{64} (15/2)^4} = -35000 \text{ psi} = -35.0 \text{ kpsi}$

B: tension  $\sigma_B = 35.0 \text{ kpsi}$

$$S_y = 71 \text{ kpsi}$$

Stress concentration

$$K_t = 1.95 \quad \text{notch sensitivity: } q = 0.76$$

$$K_f = 1 + q(K_t - 1) = 1.72 \quad \text{fatigue stress concentration factor}$$

Endurance limit

$$S_e' = 0.5 \cdot 85 = 42.5 \text{ kpsi}$$

Marin Factors surface finish  $k_a = (2.70)(85)^{-0.245} = 0.83$

size factor  $k_b = 0.879 \cdot (1.75)^{-0.107} = 0.8345$

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↓  
should use most conservative, so,

$$k_b = 0.879 (1.75)^{-0.107} = 0.8218$$

loading factor  $k_c = 1$

assuming room temp.  $k_d = 1$

for 50% reliability  $k_e = 1$

assuming no miscellaneous effects  $k_f = 1$

$$S_e = k_a k_b k_c k_d k_e k_f S'_e$$
$$= 29.0 \text{ Kpsi}$$

$$n_f = \frac{S_e}{K_f \sigma_{rev}} = 0.48 \longrightarrow \frac{no}{no \text{ infinite life.}}$$

Finite life