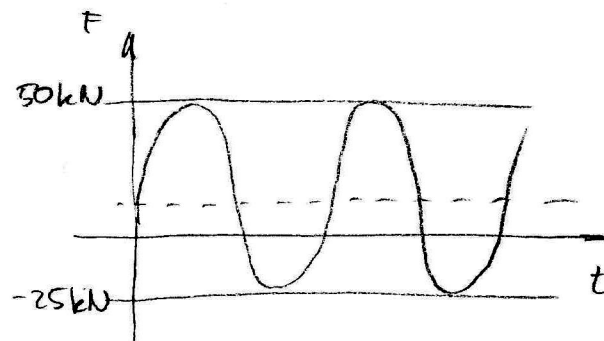
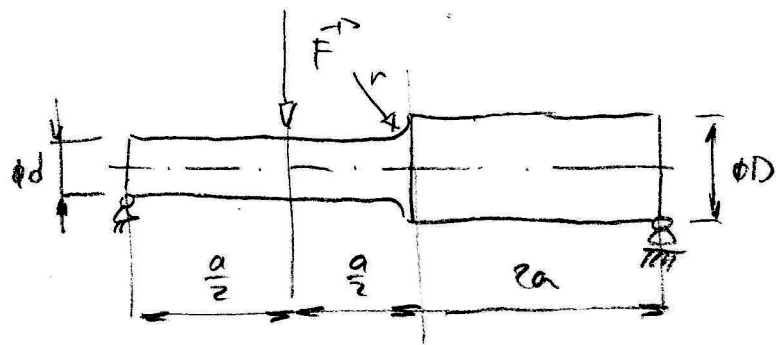
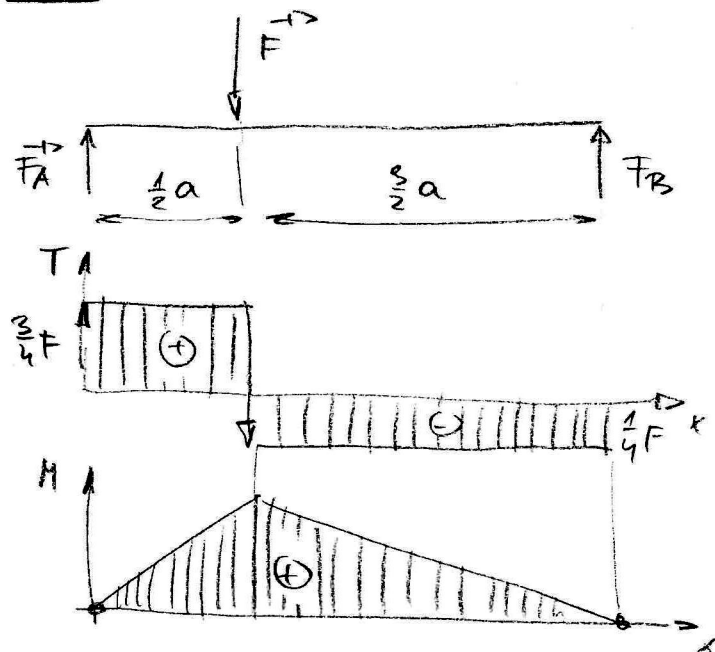


Pr: U punktu podle obrázku stanovte bezpečnost vzhledem k HŠ neomezené životnosti.



$a = 1 \text{ m}$   $h_1 = 10 \text{ mm}$   
 $d = 160 \text{ mm}$   $r = 2 \text{ mm}$   
 $D = 200 \text{ mm}$   
 materiál je ocel, povrch broušený,  
 kuličkování,  $\alpha = 1.8$   
 $\sigma_{pt} = 600 \text{ MPa}$   
 $\sigma_c = 290 \text{ MPa}$   
 $\sigma_{cov} = 260 \text{ MPa}$

1. VVV



$$F_A \cdot 2a - F \cdot \frac{3}{2}a = 0$$

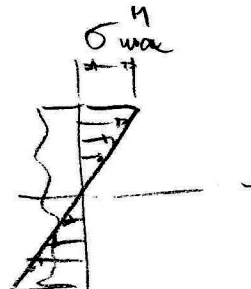
$$F_A = \frac{3}{4}F$$

$$F_B \cdot 2a - F \cdot \frac{1}{2}a = 0$$

$$F_B = \frac{1}{4}F$$

$$M_1 = F_A \cdot x_1 = \frac{3}{4}F \cdot x_1 \quad x_1 \in (0, \frac{1}{2}a)$$

$$M_2 = F_B \cdot x_2 = \frac{1}{4}F \cdot x_2 \quad x_2 \in (0, \frac{3}{2}a)$$



2. Řešení

$$\sigma_{max} = \frac{\frac{3}{4} \cdot 30000 \cdot \frac{1000}{2}}{\frac{\pi \cdot 160^3}{32}} = 44 \text{ MPa}$$

$$\sigma_{min} = \frac{-\frac{3}{4} \cdot 25000 \cdot \frac{1000}{2}}{\frac{\pi \cdot 160^3}{32}} = -24 \text{ MPa}$$

$$\sigma_m = \frac{1}{2}(\sigma_{max} + \sigma_{min}) = 12 \text{ MPa}$$

$$\sigma_a = \frac{1}{2}(\sigma_{max} - \sigma_{min}) = 36 \text{ MPa}$$

$$\sigma_c^* = \frac{N_2 \eta_2}{\beta_2} \sigma_c = \frac{0.93 \cdot 1.4}{1.57} 290 = 202 \text{ MPa}$$

soucinitel velikosti

$$\eta_2 = \eta_1 \cdot \eta_2 = 0.84 \cdot 0.93 = 0.78$$

$$N_1 = 1 - \sqrt{k \cdot \log \frac{h}{h_1}} = 1 - \sqrt{2 \cdot 10^{-2} \cdot \log \frac{200}{10}} = 0.84$$

$$N_2 = 1 + \left( \frac{\sigma_{rou}}{\sigma_c} - 1 \right) \sqrt{\frac{h}{h_1}} = 1 + \left( \frac{200}{290} - 1 \right) \sqrt{\frac{10}{200}} = 0.93$$

Goodman.

$$\frac{\sigma_a}{\sigma_c^*} + \frac{\sigma_m}{\sigma_{pt}} = \frac{1}{k} \Rightarrow k = \frac{\sigma_c^*}{\sigma_m \frac{\sigma_c^*}{\sigma_{pt}} + \sigma_a} = \frac{202}{12 \cdot \frac{202}{600} + 36} = 5$$

soucinitel unben

$$\beta_2 = \frac{\alpha}{1 + \frac{\alpha \cdot 1}{\alpha} \frac{k}{1r}} = \frac{1.8}{1 + \frac{1.8-1}{1.8} \frac{0.44}{\sqrt{2}}} = 1.57$$

$$k = \frac{280}{600} = 0.44$$

soucinitel pomalu

$$\eta_2 = \eta_1 \eta_2 = 1.4$$

$$\eta_1 = 0.9$$

$$\eta_2 = 1.55$$