

866

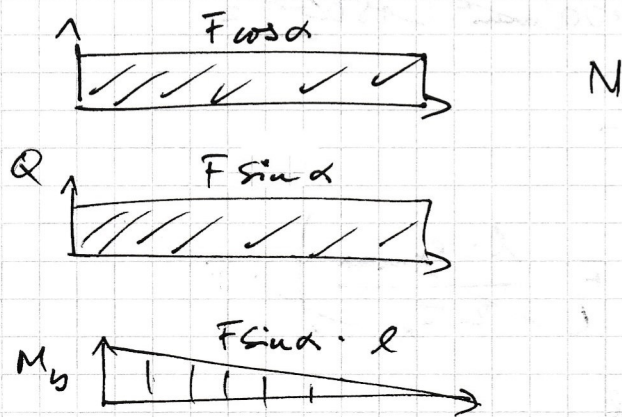


$$\sum F_x = 0 = F \cos \alpha - A_x = 0 \Rightarrow A_x = F \cos \alpha$$

$$\sum F_z = 0 = -F \sin \alpha + A_z = 0 \Rightarrow A_z = F \sin \alpha$$

$$\sum M_A = 0 = M_A - F \cdot l \cdot \sin \alpha \Rightarrow M_A = F \cdot l \cdot \sin \alpha$$

$$\sigma_{\text{zul}} = 150 \frac{\text{N}}{\text{mm}^2}$$



c)

F bei $\alpha = 90^\circ$ = reine Querkraft

$$\Rightarrow \sigma_{\text{zul}} \stackrel{!}{=} \sigma_b = \frac{M_{b\text{max}}}{W_b} \quad \text{mit } W_b = \frac{I_x}{e_{x\text{max}}}$$

$$\text{mit } M_{b\text{max}} = F \cdot \sin 90^\circ \cdot l$$

$$\Rightarrow \sigma_{\text{zul}} = \frac{F \cdot l}{W_b} \Leftrightarrow F = \frac{\sigma_{\text{zul}} \cdot W_b}{l}$$

$$\Rightarrow F = \frac{\sigma_{\text{zul}} \cdot I_x}{l \cdot e_{x\text{max}}} \quad \text{mit } e_{x\text{max}} = 100 - e_x = 63,3$$

$$\Rightarrow F = 3341,23 \text{ N} \cdot 2 = 6682,464 \text{ N}$$

d) $\sigma_N \stackrel{!}{\leq} \sigma_{zul}$ Ausführung 1

$$\sigma_N = \sigma_{zP} + \sigma_b$$

$$\sigma_{zul}^2 = \frac{\frac{\sqrt{2}}{2} F}{A \cdot 2} = \frac{\sqrt{2} F}{4A}$$

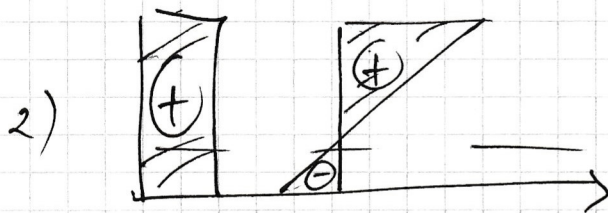
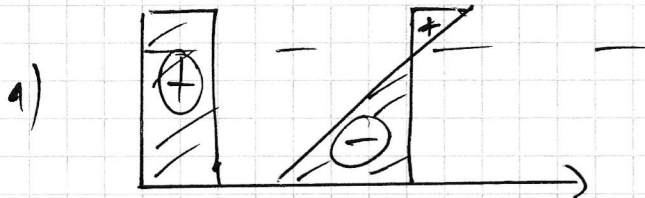
$$\sigma_b = \frac{M_{bmax}}{W_b} = \frac{F \cdot \sin 45^\circ \cdot l}{2 I_x} \cdot e_{xmax}$$

$$\Rightarrow \sigma_{zul} \stackrel{!}{\geq} \frac{\sqrt{2} F}{4A} + \frac{\sqrt{2} F \cdot e_{xmax} \cdot l}{4 I_x}$$

$$\Rightarrow F = \frac{\sigma_{zul}}{\frac{\sqrt{2}}{4A} + \frac{\sqrt{2} \cdot e_{xmax} \cdot l}{4 I_x}} = 9603,225 \text{ N} //$$

Ausführung 2

Es herrscht Druckspannung vor



bei Variante 2 also mehr Zuganteil:

$$F = \frac{\sigma_{zul}}{\frac{\sqrt{2}}{4A} + \frac{\sqrt{2} e_{xmax} \cdot l}{4 I_x}} = 9302,424 \text{ N} //$$

Diagramme zu Aufgabenteil b)

