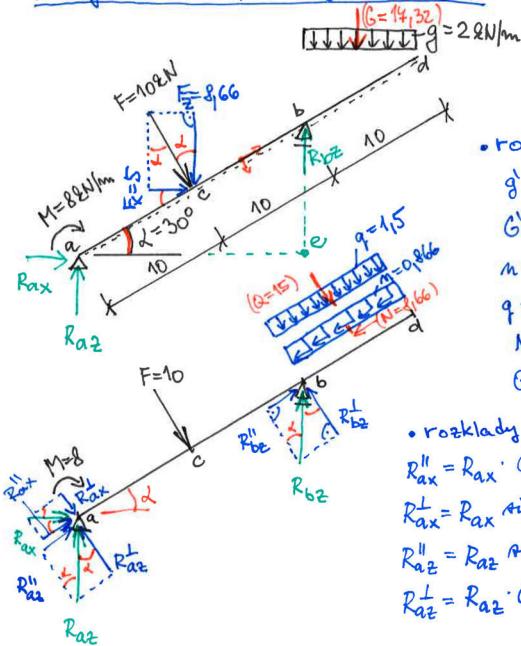


Šikmý nosník s převislým koncem



$$F_x = F \sin \alpha = 5 \text{ kN}$$

$$F_z = F \cos \alpha = 8,66 \text{ kN}$$

• rozklad spojitého zátěže

$$g' = g \cos \alpha = 1,432 \text{ kN/m}$$

$$G' = G = g' \cdot 10 = 14,32 \text{ kN}$$

$$n = g \sin \alpha \cos \alpha = 0,866 \text{ kN/m}$$

$$q = g \cos^2 \alpha = 1,5 \text{ kN/m}$$

$$N = n \cdot 10 = 8,66 \text{ kN}$$

$$Q = q \cdot 10 = 15 \text{ kN}$$

• rozklady reakcí

$$R_{ax}'' = R_{ax} \cdot \cos \alpha$$

$$R_{ax}^\perp = R_{ax} \sin \alpha$$

$$R_{az}'' = R_{az} \sin \alpha$$

$$R_{az}^\perp = R_{az} \cdot \cos \alpha$$

$$R_{bz}'' = R_{bz} \sin \alpha$$

$$R_{bz}^\perp = R_{bz} \cos \alpha$$

1) Reakce

$$\sum F_{ix} = 0 \quad \oplus \rightarrow$$

$$R_{ax} + F_x = 0 \Rightarrow R_{ax} = -F_x = -5 \text{ kN}$$

$$R_{ax}'' = R_{ax} \cdot \cos \alpha = -4,33 \text{ kN}$$

$$R_{ax}^\perp = R_{ax} \sin \alpha = -2,5 \text{ kN}$$

$$\sum M_{ia} = 0 \quad \oplus \downarrow$$

$$M + F \cdot 10 - R_{bz}^\perp \cdot 20 + Q \cdot 25 = 0$$

$$R_{bz}^\perp = 24,15 \text{ kN}$$

$$R_{bz} = \frac{R_{bz}^\perp}{\cos \alpha} = 24,866 \text{ kN}$$

$$R_{bz}'' = R_{bz} \sin \alpha = 13,943 \text{ kN}$$

$$\sum M_{ib} = 0 \quad \oplus \downarrow$$

$$R_{az}^\perp \cdot 20 - R_{ax}^\perp \cdot 20 + M - F \cdot 10 + Q \cdot 5 = 0$$

$$R_{az}^\perp = -1,65 \text{ kN}$$

$$R_{az} = \frac{R_{az}^\perp}{\cos \alpha} = -1,905 \text{ kN}$$

$$R_{az}'' = R_{az} \sin \alpha = -0,953 \text{ kN}$$

kontrola:

$$\sum F_z = 0 \quad \oplus \uparrow$$

$$R_{az} - F_z + R_{bz} - G = 0$$

$$-1,905 - 8,66 + 24,866 -$$

$$-14,32 = 0$$

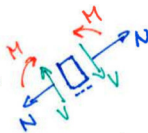
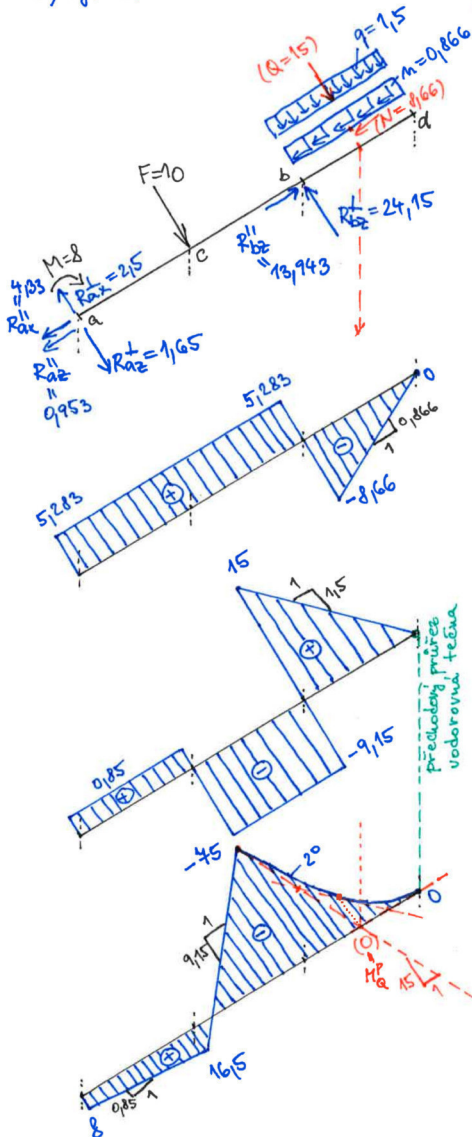
$$0 = 0 \quad \checkmark$$

místo $\sum M_{ib}$ by
šlo použít $\sum M_{ie}$

↓
výhoda: kromě R_{az}
vstupují ostatní
reakce do výpočtu

↓
výhoda:
nutné dopočítat
rozklady dělek
do směrů x a z

2) vykreslení vnitřních sil



$$N_{ab}^L = R_{ax}'' + R_{az}'' = 5,283 \text{ kN} = N_{ba}^L$$

$$N_{bd}^L = R_{ax}'' + R_{az}'' - R_{bz}'' = -8,66 \text{ kN}$$

$$N_{db}^P = 0$$

kontrola:

$$N_{bd}^P = -N = -8,66 \text{ kN} \checkmark$$

$$V_{ac}^L = R_{ax}^L - R_{az}^L = 0,85 \text{ kN} = V_{ca}^L$$

$$V_{cb}^L = R_{ax}^L - R_{az}^L - F = -9,15 \text{ kN} = V_{bc}^L$$

$$V_{db}^P = 0$$

$$V_{bd}^P = Q = 15 \text{ kN}$$

kontrola:

$$V_{bc}^P = Q - R_{bz}^L = -9,15 \text{ kN} \checkmark$$

$$M_a^L = M = 8 \text{ kNm}$$

$$M_c^L = M + (R_{ax}^L - R_{az}^L) \cdot 10 = 16,5 \text{ kNm}$$

$$M_b^L = M + (R_{ax}^L - R_{az}^L) \cdot 10 - F \cdot 10 = -75 \text{ kNm}$$

$$M_d^P = 0$$

kontrola:

$$M_b^P = -Q \cdot 5 = -75 \text{ kNm} \checkmark$$

- pomocné řešení

$$M_Q^P = (\text{pod } Q \text{ bez } q) = 0$$