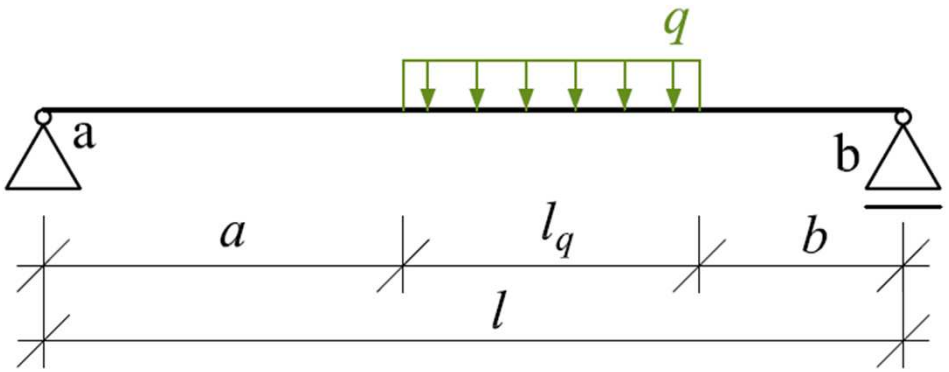
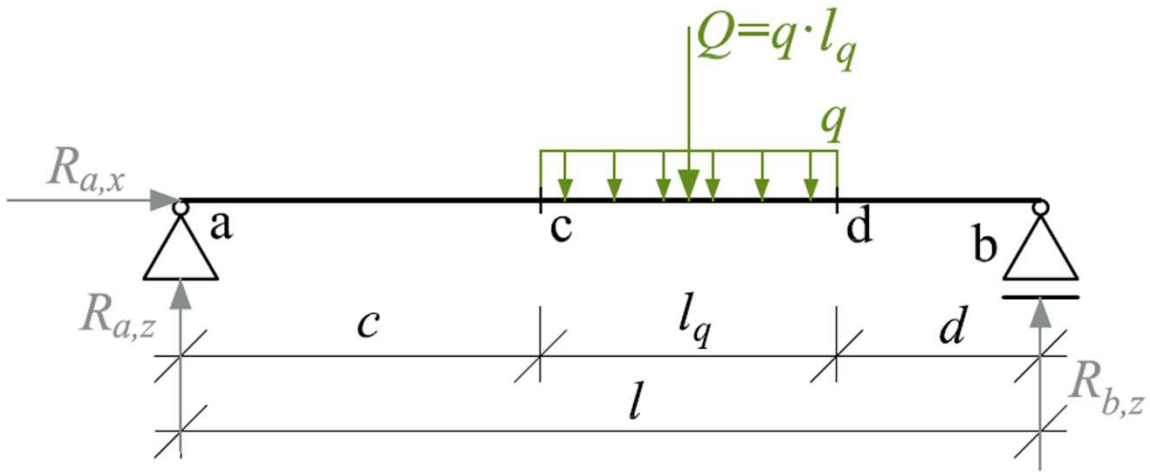
ROVINNÝ PROSTÝ NOSNÍK

Vykreslete průběhy vnitřních sil



ROVINNÝ PROSTÝ NOSNÍK

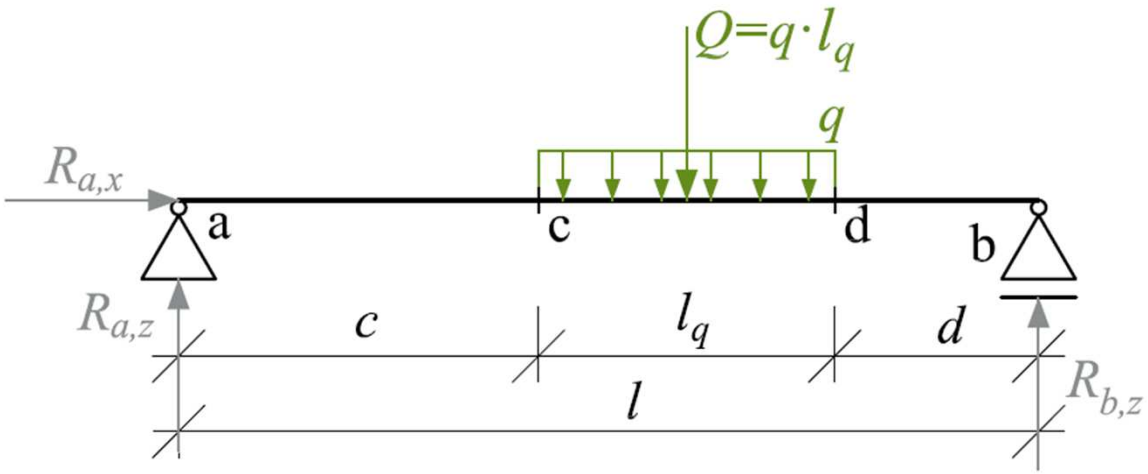
1) Výpočet reakcí

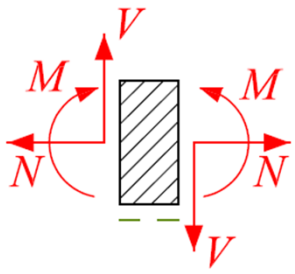


- $\sum F_{i,x} = 0 \rightarrow R_{a,x} = 0$ ⊕ →
- $\sum M_{i,a} = 0; \quad -Q \cdot \left(c + \frac{l_q}{2}\right) + R_{b,z} \cdot l = 0 \rightarrow R_{b,z} = \frac{Q}{l} \cdot \left(c + \frac{l_q}{2}\right)$ ⊕
- $\sum M_{i,b} = 0; \; -R_{a,z} \cdot l + Q \cdot \left(d + \frac{l_q}{2}\right) = 0 \rightarrow R_{a,z} = \frac{Q}{l} \cdot \left(d + \frac{l_q}{2}\right)$

ROVINNÝ PROSTÝ NOSNÍK

2) Posouvající síly

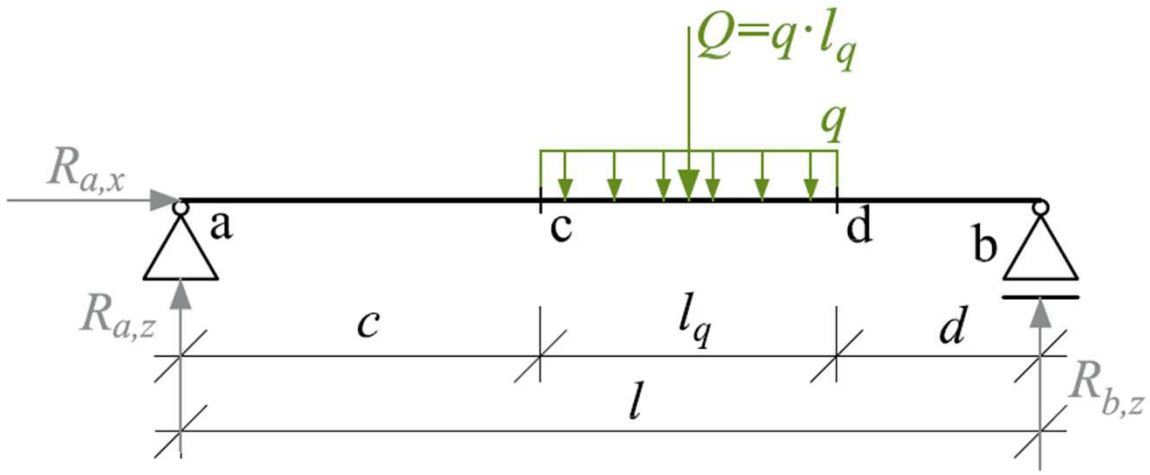


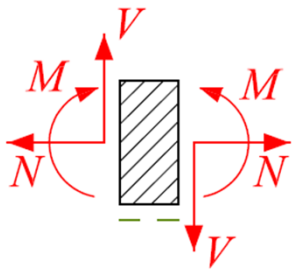


- $V_a^L = R_{a,z}$; $V_c^L = R_{a,z}$
- $V_d^L = R_{a,z} - Q = \frac{q \cdot l_q}{l} \cdot \left(d + \frac{l_q}{2}\right) - q \cdot l_q = -R_{b,z}$; $V_d^P = -R_{b,z}$
- $V_b^P = -R_{b,z}$
- $V_{x_p}^L = R_{a,z} - q \cdot x_p = 0; \rightarrow x_p = \frac{R_{a,z}}{q}$

ROVINNÝ PROSTÝ NOSNÍK

3) Ohybové momenty

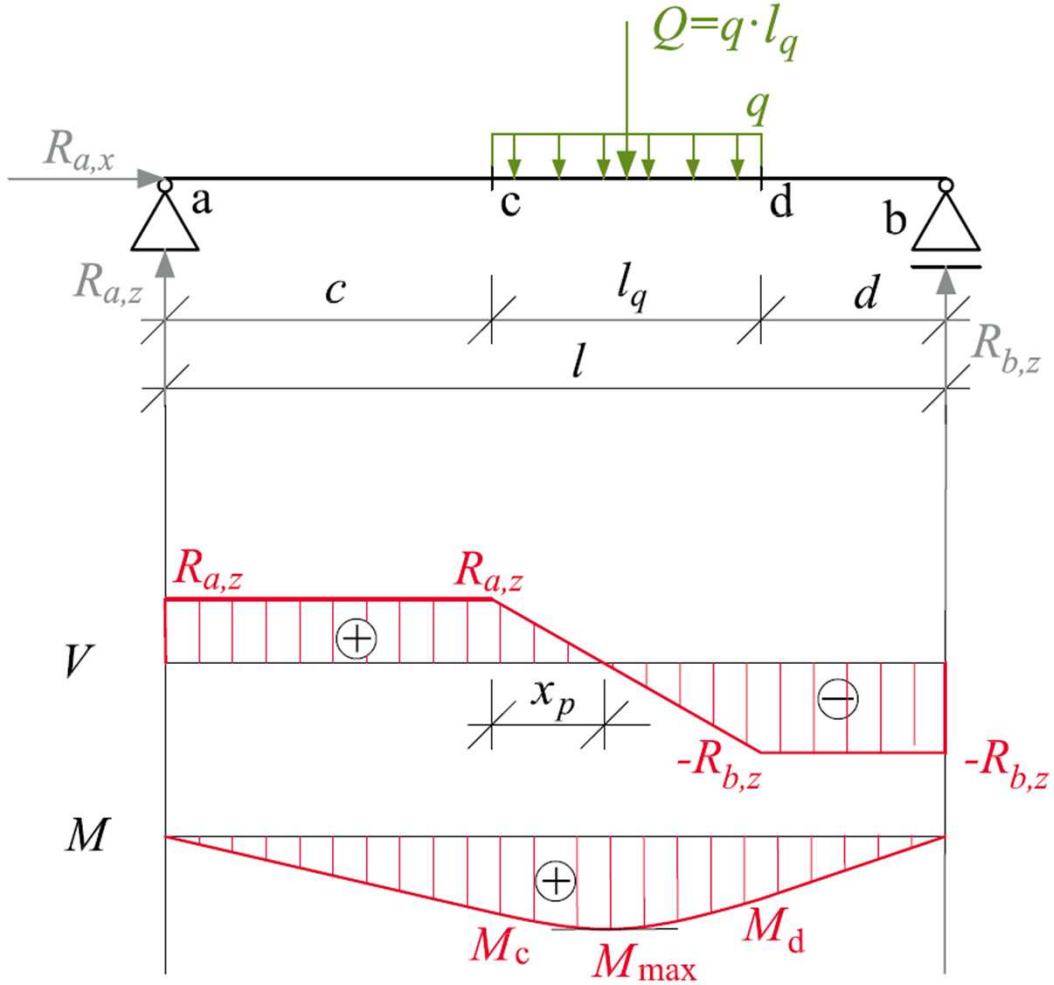


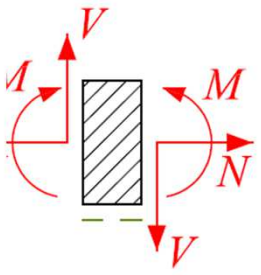


- $M_a^L = 0;\ M_b^P = 0$
- $M_c^L = R_{a,z} \cdot c$
- $M_d^L = R_{a,z} \cdot (c + l_q) - q \cdot \frac{{l_q}^2}{2};\ M_d^P = R_{b,z} \cdot d$
- $M_{x_p}^L = R_{a,z} \cdot (c + x_p) - q \cdot x_p \cdot \frac{x_p}{2} = M_{max}$

ROVINNÝ PROSTÝ NOSNÍK

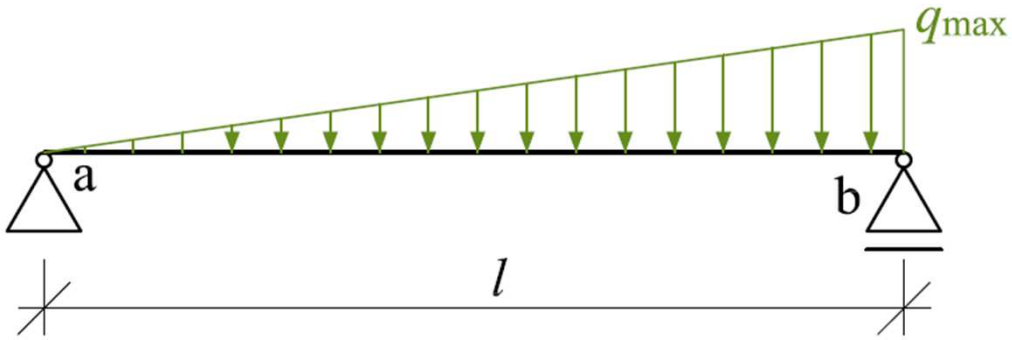
4) Průběhy vnitřních sil





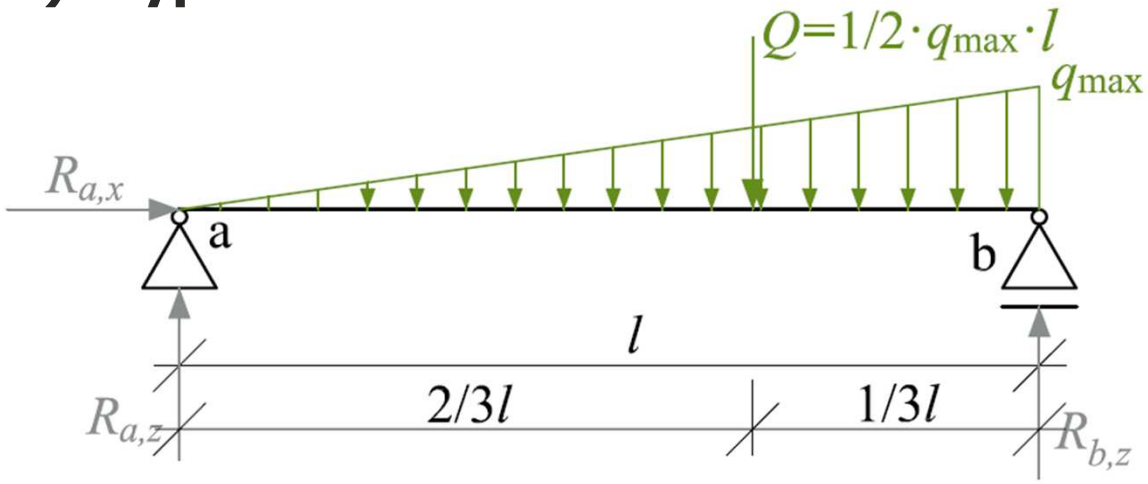
ROVINNÝ PROSTÝ NOSNÍK

Vykreslete průběhy vnitřních sil



ROVINNÝ PROSTÝ NOSNÍK

1) Výpočet reakcí



- $\sum F_{i,x} = 0 \rightarrow R_{a,x} = 0$ ⊕ →
- $\sum M_{i,a} = 0; \quad -Q \cdot \frac{2}{3} l + R_{b,z} \cdot l = 0 \rightarrow R_{b,z} = \frac{2}{3} \cdot Q = \frac{2}{3} \cdot \frac{q_{max} \cdot l}{2} = \frac{q_{max} \cdot l}{3}$
- $\sum M_{i,b} = 0; \; -R_{a,z} \cdot l + Q \cdot \frac{1}{3} l = 0 \rightarrow R_{a,z} = \frac{1}{3} \cdot Q = \frac{1}{3} \cdot \frac{q_{max} \cdot l}{2} = \frac{q_{max} \cdot l}{6}$
- $\sum F_{i,z} = 0 \rightarrow \frac{1}{2} \cdot q_{max} \cdot l - \frac{q_{max} \cdot l}{6} - \frac{q_{max} \cdot l}{3} = 0 \rightarrow 0 = 0$

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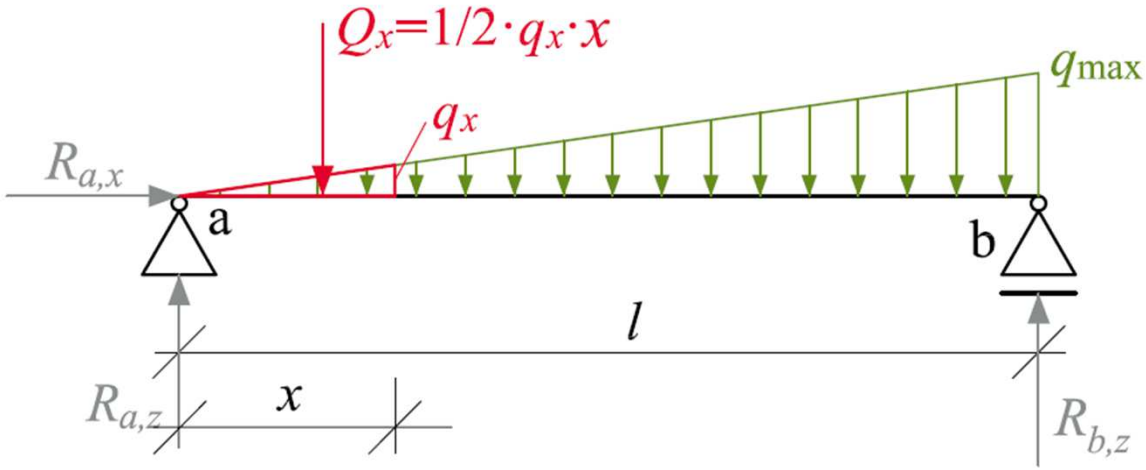
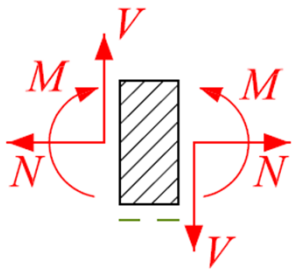
ROVINNÝ PROSTÝ NOSNÍK

2) Posouvající síly

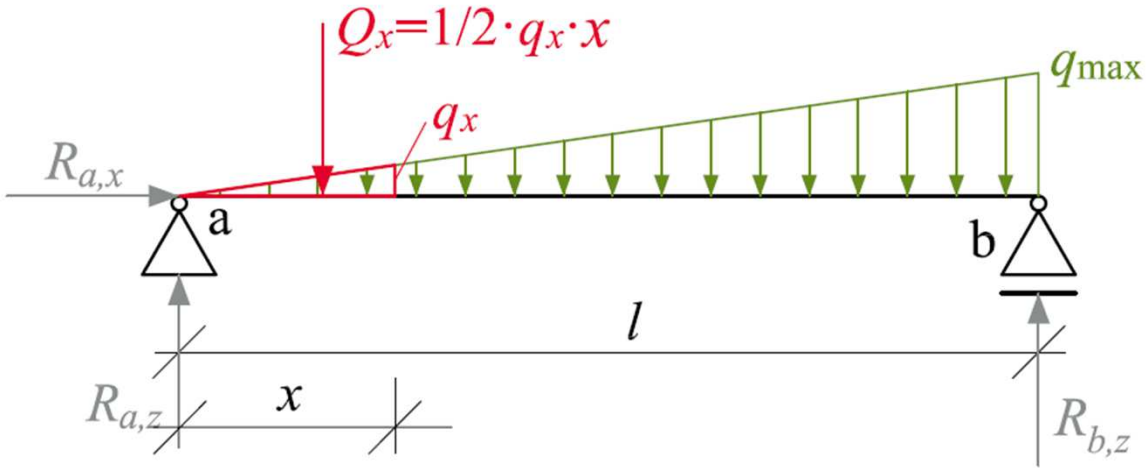


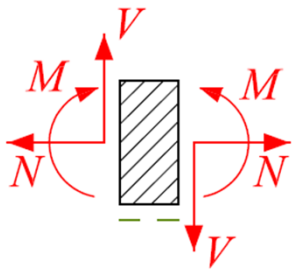


- $V_a^L = R_{a,z}$
- $V_x^L = R_{a,z} - \frac{1}{2} q_x \cdot x = \frac{q_{max} \cdot l}{6} - \frac{1}{2} \cdot \frac{q_{max} \cdot x}{l} \cdot x$
- $\frac{q_x}{x} = \frac{q_{max}}{l} \rightarrow q_x = \frac{q_{max} \cdot x}{l}$
- $V_b^P = -R_{b,z}$

ROVINNÝ PROSTÝ NOSNÍK

2) Posouvající síly – přechodový průřez

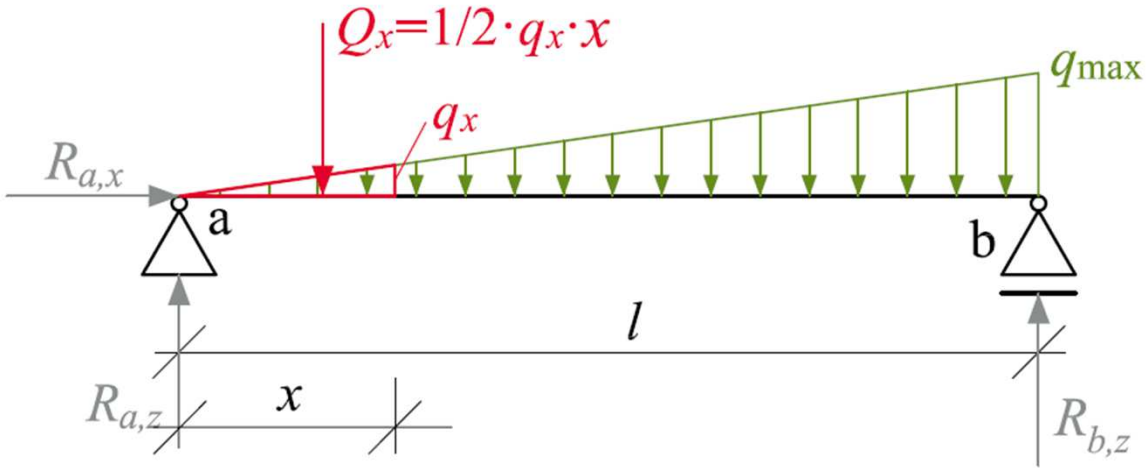


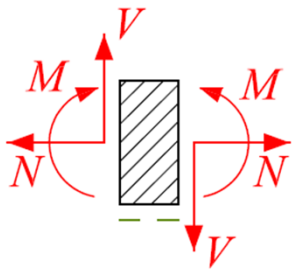


- $V_{x_p}^L = R_{a,z} - \frac{1}{2} q_{x_p} \cdot x_p = 0$
- $\frac{q_{\max} \cdot l}{6} - \frac{1}{2} \cdot \frac{q_{\max} \cdot x_p}{l} \cdot x_p = 0$
- $\frac{q_{\max} \cdot l}{6} = \frac{q_{\max} \cdot x_p^2}{2l}; \frac{1}{3} l^2 = x_p^2 \rightarrow x_p = \frac{l}{\sqrt{3}}$

ROVINNÝ PROSTÝ NOSNÍK

3) Ohybové momenty

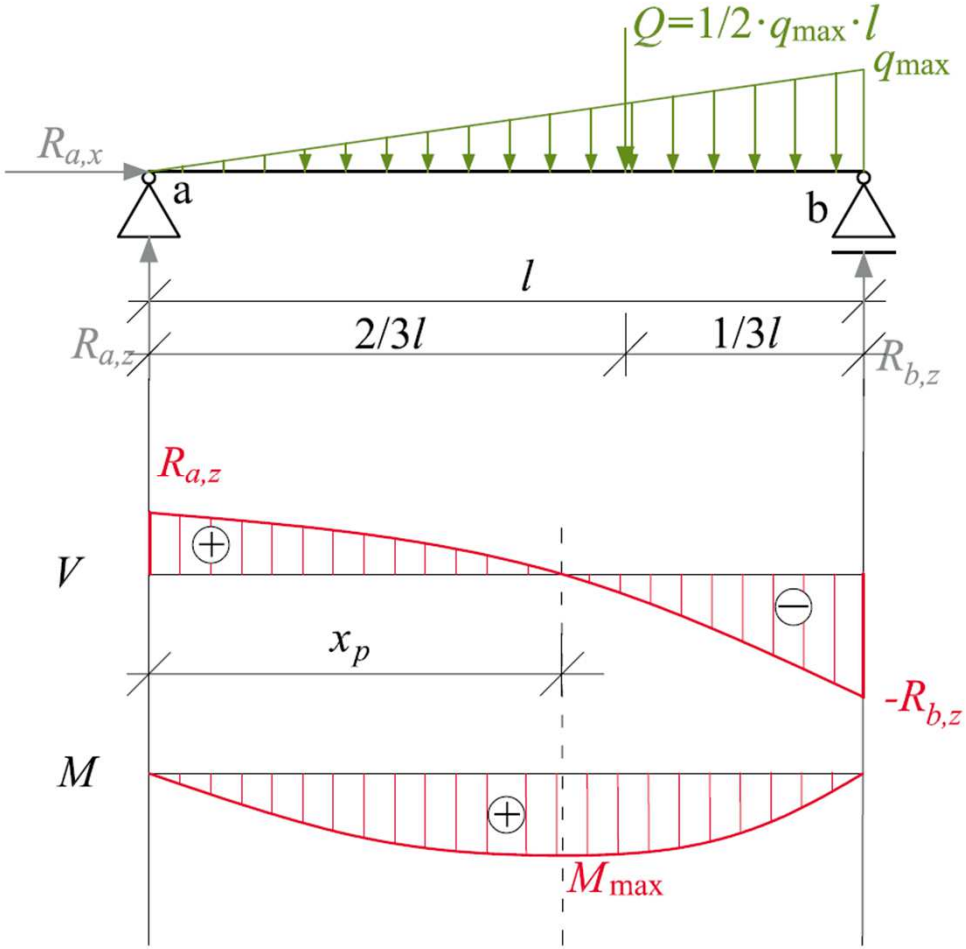


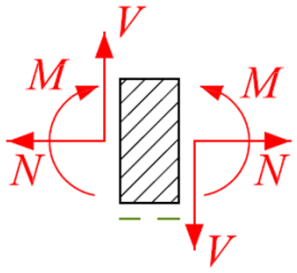


- $M_a^L = 0;\ M_b^P = 0$
- $M_x^L = R_{a,z}\cdot x - \frac{1}{2}\cdot q_x\cdot x\cdot\frac{x}{3} = \frac{q_{max}\cdot l}{6}\cdot x - \frac{1}{2}\cdot\frac{q_{max}\cdot x}{l}\cdot x\cdot\frac{x}{3} = \frac{q_{max}\cdot x}{6}\left(l - \frac{x^2}{l}\right)$
- $M_{x_p}^L = \frac{q_{max}\cdot l}{6\cdot\sqrt{3}}\left(l - \frac{l^2}{3l}\right) = \frac{q_{max}\cdot l}{6\cdot\sqrt{3}}\cdot\frac{(3l^2-l^2)}{3l} = \frac{q_{max}}{6\cdot\sqrt{3}}\cdot\frac{2l^2}{3} = \frac{q_{max}\cdot l^2}{9\cdot\sqrt{3}} = M_{max}$

ROVINNÝ PROSTÝ NOSNÍK

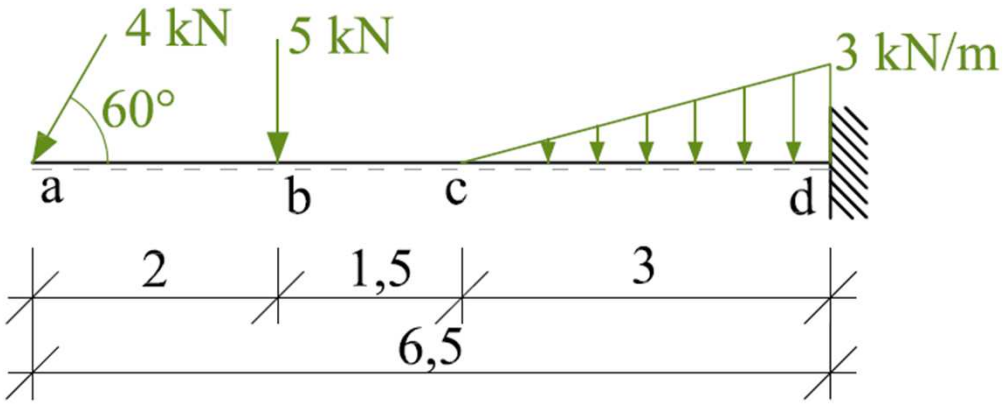
4) Průběhy vnitřních sil





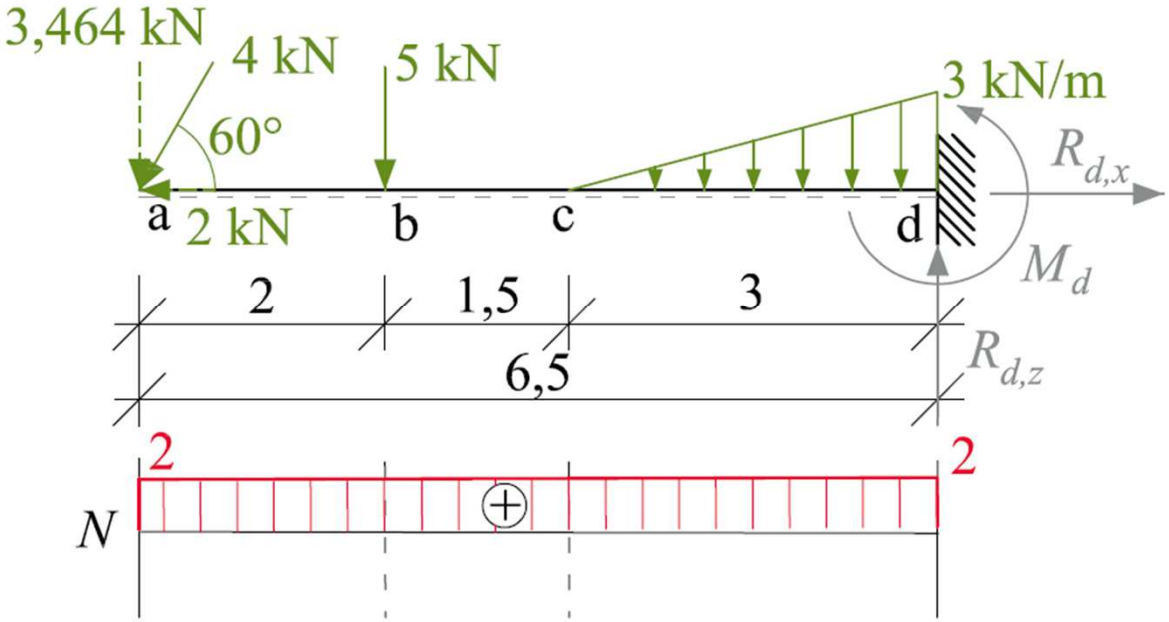
ROVINNÝ KONZOLOVÝ NOSNÍK

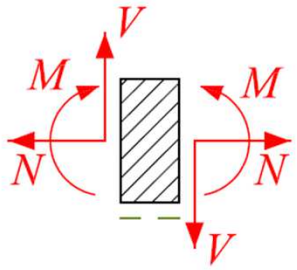
Vykreslete průběhy vnitřních sil



ROVINNÝ KONZOLOVÝ NOSNÍK

1) Normálové síly

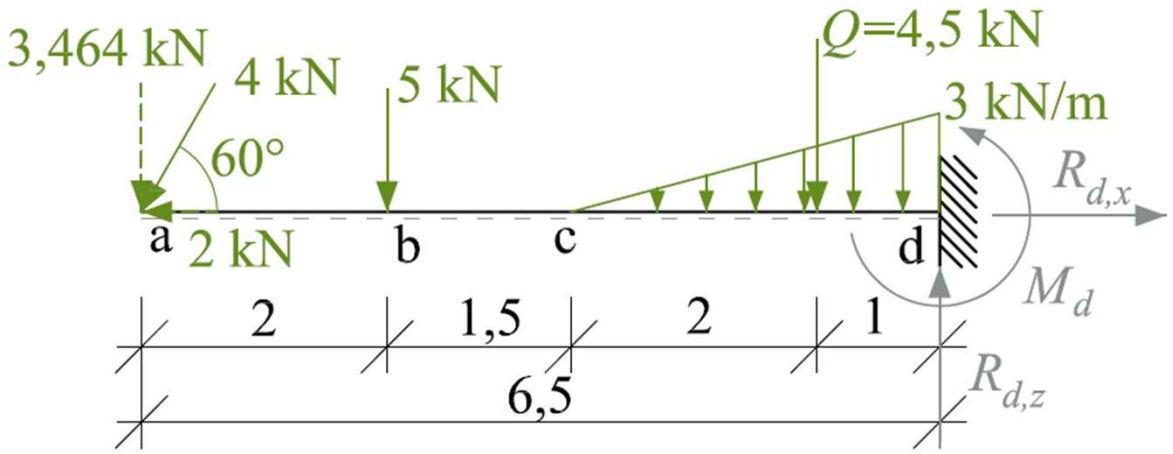


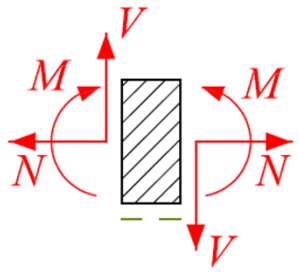


- $N_a^L = 2$ kN
- $N_d^L = 2$ kN
- $N_d^P = R_{d,x} \rightarrow R_{d,x} = 2$ kN

ROVINNÝ KONZOLOVÝ NOSNÍK

2) Posouvající síly

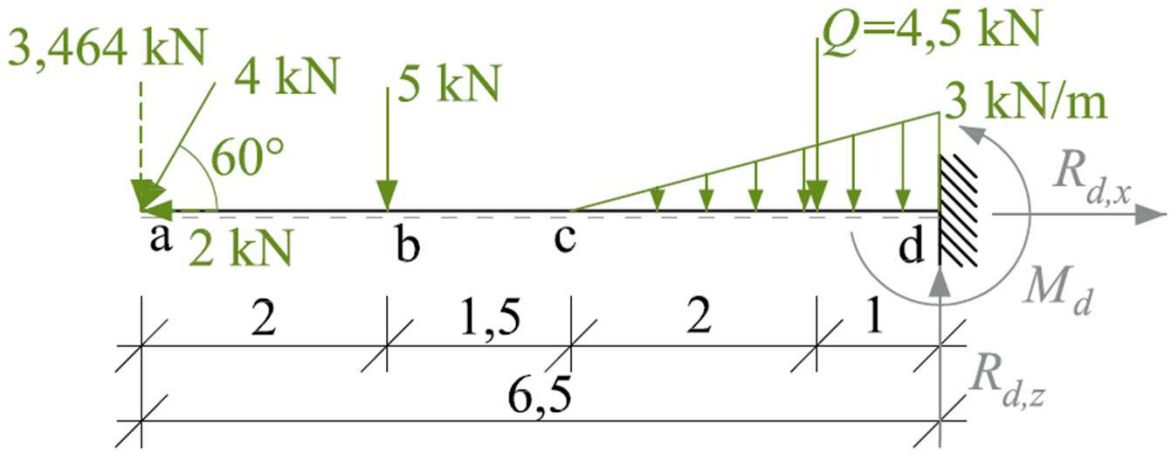


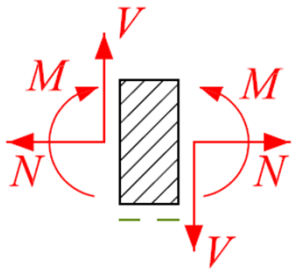


- $V_a^L = -3{,}464$ kN
- $V_{ba}^L = -3{,}464$ kN; $V_{bc}^L = -3{,}464 - 5 = -8{,}464$ kN
- $V_c^L = -8{,}464$ kN
- $V_d^L = -8{,}464 - 4{,}5 = -12{,}964$ kN; $V_d^P = -R_{d,z} \rightarrow R_{d,z} = 12{,}964$ kN

ROVINNÝ KONZOLOVÝ NOSNÍK

3) Ohybové momenty





- $M_a^L = 0; M_b^L = -3{,}464 \cdot 2 = -6{,}928\ \text{kNm}$
- $M_c^L = -3{,}464 \cdot 3{,}5 - 5 \cdot 1{,}5 = -19{,}624\ \text{kNm}$
- $M_d^L = -3{,}464 \cdot 6{,}5 - 5 \cdot 4{,}5 - 4{,}5 \cdot 1 = -49{,}516\ \text{kNm}$
- $M_d^P = M_d \rightarrow M_d = -49{,}516\ \text{kNm}$

ROVINNÝ KONZOLOVÝ NOSNÍK