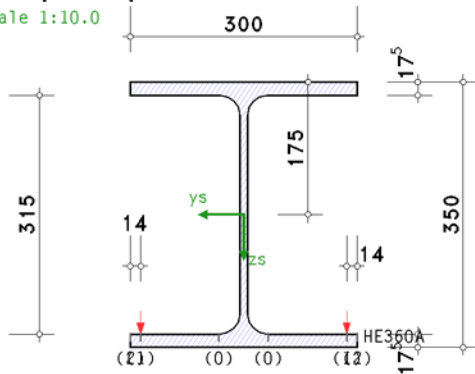


1. input report

scale 1:10.0



steel grade

steel grade S235

cross-section

beam: section HE360A

loading

internal forces and moments at limit state of resistance (ULS):

Lk 1: EK 1 (ULS)

$$M_{y,Ed} = 174.7 \text{ kNm}, M_{z,Ed} = 6.2 \text{ kNm}$$

transverse loading on lower edge of cross-section:

vertical wheel pressure $F_{z,Ed,ULS} = 14.78 \text{ kN}$

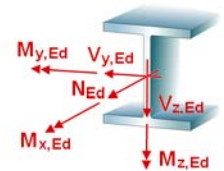
distance of wheel axles $a_R = 100.0 \text{ cm}$

distance of wheel from lateral edge of flange $n_y = 14.0 \text{ mm}$

wheel at end of beam (unsupported lower flange, reinforced)

partial safety factors for material

resistance of cross-sections $\gamma_{M0} = 1.00$



2. verification der local loading due to crane gantry

reinforcement of lower flange at end of beam: minimum dimensions $t_p = 17.5 \text{ mm} \times b_p = 300.0 \text{ mm}$

cross-sectional properties

$$A = 142.76 \text{ cm}^2, z_s = 175.0 \text{ mm}, I_y = 33090.11 \text{ cm}^4, y_s = 0.0 \text{ mm}, I_z = 7886.85 \text{ cm}^4$$

effective loading length from crane gantry

wheel at unsupported end of flange

$$\text{effective length } l_{eff} = 2 \cdot (m+n) = 246.8 \text{ mm}, m = 109.4 \text{ mm}, n = 14.0 \text{ mm}$$

2.1. resistance of lower flange (ULS)

permissible stress: $\sigma_{Rd} = f_y / \gamma_{M0} = 235.0 \text{ N/mm}^2$

Lk 1: $M_{y,Ed} = 174.7 \text{ kNm}, M_{z,Ed} = 6.2 \text{ kNm}$

normal stress $\sigma_{x,Ed} = 87.8 \text{ N/mm}^2$

$$F_{z,Rd} = (l_{eff} \cdot t_{fu}^2 \cdot \sigma_{Rd}) / (4 \cdot m) \cdot [1 - (\sigma_{x,Ed} / \sigma_{Rd})^2] = 34.9 \text{ kN}$$

$$F_{z,Ed} = 14.8 \text{ kN} < F_{z,Rd} = 34.9 \text{ kN} \Rightarrow U = 0.423 < 1 \text{ ok}$$

maximum utilization: $\max U_{ULS} = 0.423 < 1 \text{ ok}$

3. final result

maximum utilization: $\max U = 0.423 < 1 \text{ ok}$

verification succeeded