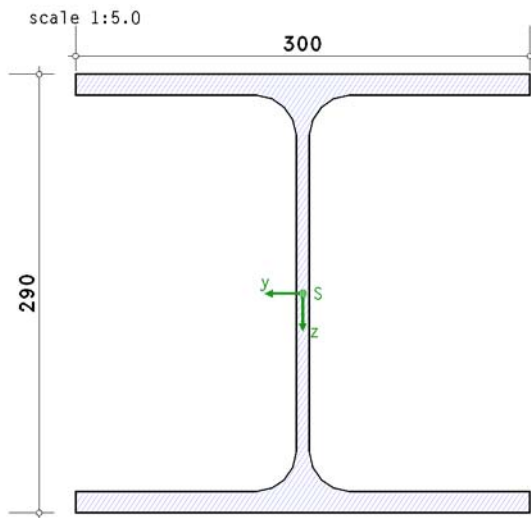


POS. 1: WAGENKNECHT 2.6.1

verification of cross-section EC 3-1-8 (12.10), NA: Deutschland

1. input report



steel

steel grade S235

material safety factor

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

geometry

section HE300A

resistance

elastic verification, calculation as thin-walled cross-section

valid normal, shear-, equivalent stress: $\sigma_{x,Rd} = 235.0 \text{ N/mm}^2$, $\tau_{Rd} = 135.7 \text{ N/mm}^2$, $\sigma_{v,Rd} = 235.0 \text{ N/mm}^2$

internal forces and moments referring to local axes of cross-section

σ -generating forces (N, M) work at centroid, τ -generating forces (V, T_t) work at shear center

Lk 1: $M_{y,Ed} = 225.00 \text{ kNm}$, $V_{z,Ed} = 160.00 \text{ kN}$

notes

buckling is not investigated.

2. Lk 1

2.1. verification of cross-section

internal forces and moments: $M_y = 225.00 \text{ kNm}$, $V_z = 160.00 \text{ kN}$

2.1.1. elastic verification

elastic verification for $M_y = 225.00 \text{ kNm}$, $V_z = 160.00 \text{ kN}$

elastic stresses: $\max |\sigma_x| = 178.67 \text{ N/mm}^2$, $\max \tau = 71.11 \text{ N/mm}^2$, $\max \sigma_v = 201.48 \text{ N/mm}^2$

$\max \sigma_x$ bei $y = 150.0 \text{ mm}$, $z = 145.0 \text{ mm}$: $\sigma_x = 178.67 \text{ N/mm}^2$, $\tau = 0.00 \text{ N/mm}^2$, $\sigma_v = 178.67 \text{ N/mm}^2$

$\min \sigma_x$ bei $y = 150.0 \text{ mm}$, $z = -145.0 \text{ mm}$: $\sigma_x = -178.67 \text{ N/mm}^2$, $\tau = 0.00 \text{ N/mm}^2$, $\sigma_v = 178.67 \text{ N/mm}^2$

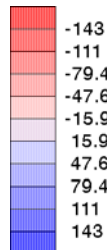
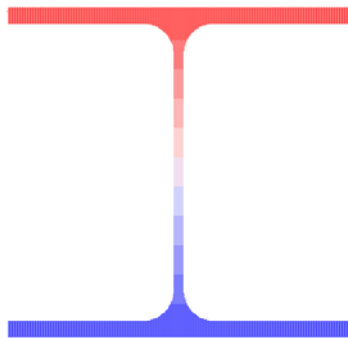
$\max \tau$ bei $y = 0.0 \text{ mm}$, $z = 0.0 \text{ mm}$: $\sigma_x = 0.00 \text{ N/mm}^2$, $\tau = 71.11 \text{ N/mm}^2$, $\sigma_v = 123.16 \text{ N/mm}^2$

$\max \sigma_v$ bei $y = 0.0 \text{ mm}$, $z = -138.0 \text{ mm}$: $\sigma_x = -170.04 \text{ N/mm}^2$, $\tau = 62.39 \text{ N/mm}^2$, $\sigma_v = 201.48 \text{ N/mm}^2$

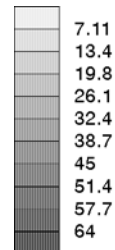
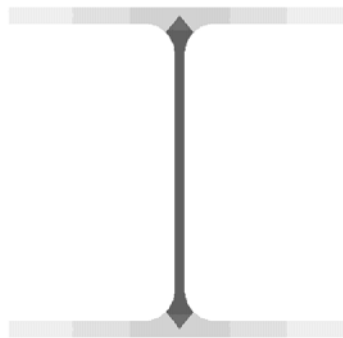
valid equivalent stress: $\sigma_{v,Rd} = 235.0 \text{ N/mm}^2$

verification: $\sigma_v = 201.48 \text{ N/mm}^2 < \sigma_{v,Rd} = 235.00 \text{ N/mm}^2 \Rightarrow U_\sigma = 0.857 < 1$ **ok**

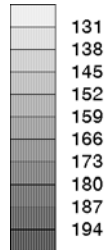
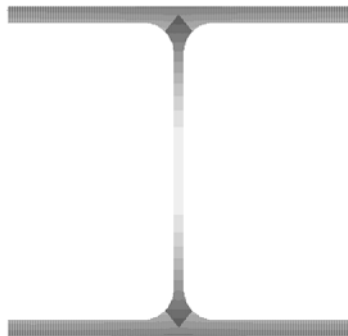
normal stresses σ_x [N/mm²]
min σ_x = -178.7, max σ_x = 178.7



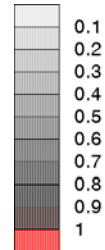
shear stresses τ [N/mm²]
max τ = 71.1



equivalent stresses σ_v [N/mm²]
max σ_v = 201.5



utilization U_σ
max U_σ = 0.858



stresses, utilizations

y mm	z mm	σ_x N/mm ²	τ N/mm ²	σ_v N/mm ²	U_σ
0.0	0.0	-178.65	0.00	178.65	0.760
-150.0	7.0	-170.10	62.39	201.52	0.858
-145.8	145.0	0.00	71.11	123.16	0.524
0.0	290.0	178.65	0.00	178.65	0.760

y,z: node coordinates; σ_x, τ, σ_v : stresses; U_σ : stress utilization

3. final result

maximum utilization: resistance max $U = 0.857 < 1$ **ok**

verification succeeded