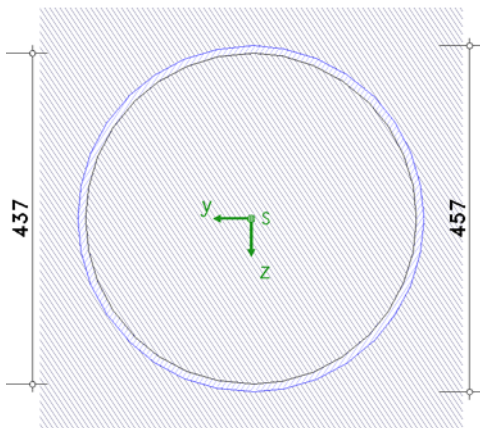


POS. 3: WAGENKNECHT 2.5.3

Welded connection EC 3-1-8 (04.25), NA: Deutschland

1. input report

scale 1:10.0



material

steel grade S235

material safety factors

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

resistance of bolts, welds, plates in bearing $\gamma_{M2} = 1.25$

geometry

section R457X10.0

plate: thickness $t_p = 15.0$ mm

surrounding fillet weld: $a_w = 5.0$ mm

resistance

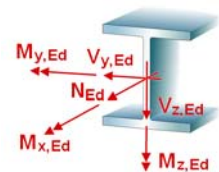
elastic cross-sectional check

weld verification with the simplified method

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

Lc 1: $N_{Ed} = -525.00$ kN, $M_{y,Ed} = 86.00$ kNm, $V_{z,Ed} = 120.00$ kN

$M_{z,Ed} = 57.50$ kNm, $V_{y,Ed} = -110.00$ kN, $M_{x,Ed} = -85.00$ kNm



2. Lc 1

2.1. verification of cross-section

elastic verification for $N = -525.00$ kN, $M_y = 86.00$ kNm, $V_z = 120.00$ kN, $M_z = 57.50$ kNm

$V_y = -110.00$ kN, $T_t = -85.00$ kNm

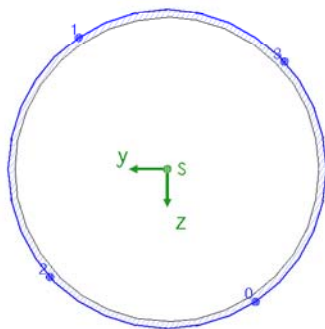
verification: $\sigma_v = 121.85$ N/mm² < $\sigma_{v,Rd} = 235.00$ N/mm² $\Rightarrow U_\sigma = 0.519 < 1$ ok

c/t-ratio (reg. section class 3):

utilization $U_{c/t} = 0.221 < 1$ ok

2.2. verification of welds

calculation section:



weld 1: $a_w = 5.0$ mm $l_w = 1435.7$ mm

design values referring to centroid of the section:

$N_{Ed} = -525.00$ kN, $M_{y,Ed} = 86.00$ kNm, $V_{z,Ed} = 120.00$ kN, $M_{z,Ed} = 57.50$ kNm, $V_{y,Ed} = -110.00$ kN, $M_{x,Ed} = -85.00$ kNm

cross-sectional properties referring to centroid of the line cross-section:

$\Sigma A_w = 71.79$ cm², $A_{w,y} = 35.89$ cm², $A_{w,z} = 35.89$ cm², $\Sigma l_w = 143.6$ cm

$I_{w,y} = 18740.39$ cm⁴, $I_{w,z} = 18740.39$ cm⁴, $W_{w,t} = 1640.30$ cm³, $\Delta y_w = 0.0$ mm, $\Delta z_w = 0.0$ mm

verification of line section:

due to torsion: $\tau_{w,T} = -51.82$ N/mm²

pt. 0: $\sigma_{w,x} = 53.00$ N/mm² $\tau_{w,t} = -44.93$ N/mm² $\Rightarrow U_w = 0.334 < 1$ ok

pt. 1: $\sigma_{w,x} = -199.27 \text{ N/mm}^2$ $\tau_{w,t} = -58.71 \text{ N/mm}^2$ $\Rightarrow U_w = 1.000 < 1$ ok
 pt. 2: $\sigma_{w,x} = -53.96 \text{ N/mm}^2$ $\tau_{w,t} = -6.47 \text{ N/mm}^2$ $\Rightarrow U_w = 0.261 < 1$ ok
 pt. 3: $\sigma_{w,x} = -92.31 \text{ N/mm}^2$ $\tau_{w,t} = -97.17 \text{ N/mm}^2$ $\Rightarrow U_w = 0.645 < 1$ ok

Result:

pt. 1: $\sigma_{w,x} = -199.27 \text{ N/mm}^2$ $\tau_{w,t} = -58.71 \text{ N/mm}^2$
 Max: $F_{w,Ed} = 1038.71 \text{ kN/m} < F_{w,Rd} = 1039.23 \text{ kN/m} \Rightarrow U_w = 1.000 < 1$ ok

3. final result

maximum utilization: resistance max $U = 1.000 < 1$ ok
 c/t-ratio max $U = 0.221 < 1$ ok

verification succeeded