

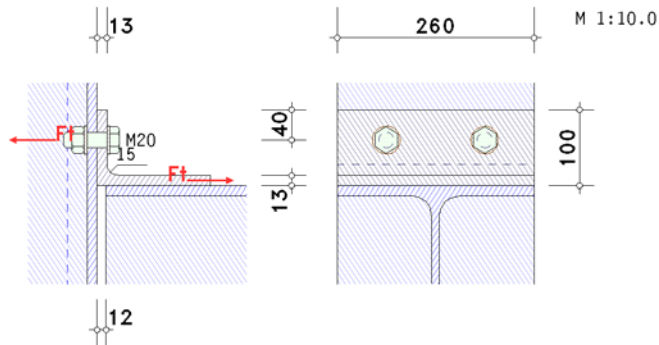
## POS. 28: FLANGE CLEAT IN BENDING

4H-EC3GK version: 1/2012-1k

### flange cleat in bending

#### Basic component 6

EC 3-1-8 (12.10), NA: Germany



flange cleat:

leg thickness  $t_a = 13.0$  mm, leg length (leg 1 at the column)  $l_{1a} = 100.0$  mm

root radius  $r_a = 15.0$  mm

width of flange cleat  $b_a = 260.0$  mm

steel grade S 275

distance of beam head from column flange  $g_a = 12.0$  mm

connection device:

bolt, property class 8.8, bolt size M20

large width across flats (high tensile bolt), preloaded

distance of bolt-row (in leg 1) from edge  $e_1 = 40.0$  mm

partial safety factors for material:  $\gamma_{M0} = 1.00$ ,  $\gamma_{M2} = 1.25$

stress:

Lk 1 :  $F_{a,Ed} = 50.0$  kN per bolt

#### design resistance

effective length of the T-stub flange (angle):

in mode 1+2:  $\Sigma l_{eff} = 0.5 \cdot b_a = 130.0$  mm

design tension resistance of the T-stub flange:

in mode 1+2:  $M_{pl,Rd} = (0.25 \cdot \Sigma l_{eff} \cdot t^2 \cdot f_y) / \gamma_{M0} = 1.51$  kNm

tension resistance of all bolts:  $\Sigma F_{t,Rd} = 2 \cdot n_b \cdot F_{t,Rd} = 282.24$  kN,  $F_{t,Rd} = 141.12$  kN

$L_b \leq L_b^* \Rightarrow$  prying forces may develop

$F_{T,1,Rd} = (4 \cdot M_{pl,1,Rd}) / m = 112.93$  kN

$F_{T,2,Rd} = (2 \cdot M_{pl,2,Rd} + n \cdot \Sigma F_{t,Rd}) / (m+n) = 153.05$  kN,  $n = 40.0$  mm,  $m = 53.5$  mm

$F_{T,3,Rd} = \Sigma F_{t,Rd} = 282.24$  kN

tension resistance of T-stub flange:  $F_{T,Rd} = \min(F_{T,1,Rd}, F_{T,2,Rd}, F_{T,3,Rd}) = 112.93$  kN

design resistance of flange cleat in bending

$F_{a,Rd} = 112.9$  kN, ass.  $l_{eff} = 130.0$  mm

#### verification

Lk 1: bolt-row:  $F_{Ed} = 2 \cdot F_{a,Ed} = 100.0$  kN

$F_{Ed} = 100.0$  kN <  $F_{Rd} = 112.9$  kN  $\Rightarrow$  utilization = 0.886 < 1 **ok.**