

# 1. Input parameters

## 1.1. notch at the support bottom perpendicular acc. to EC5-1-1, 6.5, NA Germany

### 1.2. beam

beam of glue laminated timber EC, GL32h 160/1150 mm,  $\rho_k = 440 \text{ kg/m}^3$ , NKL 1

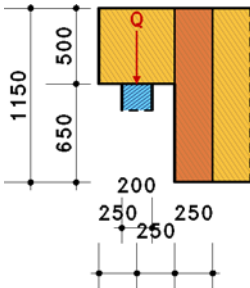
$h_{ef} = 500 \text{ mm}$ ,  $x = 250 \text{ mm}$  (expressions acc. to EC 5, 6.5 figure 6.11)

$f_{m,k} = 32.00 \text{ N/mm}^2$ ,  $f_{t,k} = 25.60 \text{ N/mm}^2$ ,  $f_{c,k} = 32.00 \text{ N/mm}^2$ ,  $f_{v,k} = 3.50 \text{ N/mm}^2$ ,  $f_{t90,k} = 0.50 \text{ N/mm}^2$

### 1.3. reinforcement by glued lugs

plywood F50/25  $l_r = 250 \text{ mm}$ ,  $t_r = 12 \text{ mm}$ ,  $f_{t,k} = 36.00 \text{ N/mm}^2$  parallel zur Fibrerichtung der Deckfurniere

elevation scale 1:500, unit of length [mm]



## 1.4. support reactions

Nr.	name	$V_d$ kN	KLED	$k_{mod}$ -	$\gamma$ -
1	V	77.00	sh.-term	0.900	1.30

## 2. results

### 2.1. shear stresses

$k_{cr} = 0.714 \Rightarrow b_{eff} = 114.286 \text{ mm}$

$h_{min} = 500 \text{ mm}$ ,  $f_{k2,k} = 0.75 \text{ N/mm}^2$  (table NA.12),  $k_n = 6.5$ ,  $\alpha = 0.435 \Rightarrow k_v = 0.256$

Nr	$V_d$ kN	$f_{k2,d}$ N/mm <sup>2</sup>	$F_{t90,d}$ kN	$f_{t,d}$ N/mm <sup>2</sup>	$\tau_{ef,d}$ N/mm <sup>2</sup>	$\sigma_{t,d}$ N/mm <sup>2</sup>	$u_{\tau_{ef,d}}$ -	$u_{\sigma_{t,d}}$ -	u -
1	77.00	0.519	59.787	24.92	0.239	9.96	0.461	0.800	0.800

$u_{max} = 0.800 \leq 1 \Rightarrow \text{ok.}$

### 2.2. bending at the notch angle

beam width = 160 mm, beam height = 500 mm  $\Rightarrow W = 6666667 \text{ mm}^3$ ,  $e = 250 \text{ mm}$

Nr	$M_d$ kNm	$f_{m,d}$ N/mm <sup>2</sup>	$\sigma_{m,d}$ N/mm <sup>2</sup>	u -
1	19.25	22.15	2.888	0.130

$u_{max} = 0.130 \leq 1 \Rightarrow \text{ok.}$

### 2.3. shear at the reduced cross section

beam width = 160 mm, beam height = 500 mm,  $k_{cr} = 0.714 \Rightarrow A_{ef} = 57143 \text{ mm}^2$

Nr	$V_d$ kN	$f_{v,d}$ N/mm <sup>2</sup>	$\tau_{m,d}$ N/mm <sup>2</sup>	u -
1	77.00	2.42	2.021	0.834

$u_{max} = 0.834 \leq 1 \Rightarrow \text{ok.}$

## 3. Summary

total utilization all verifications  $u_{max,Ges} = 0.834 \leq 1 \Rightarrow \text{ok.}$