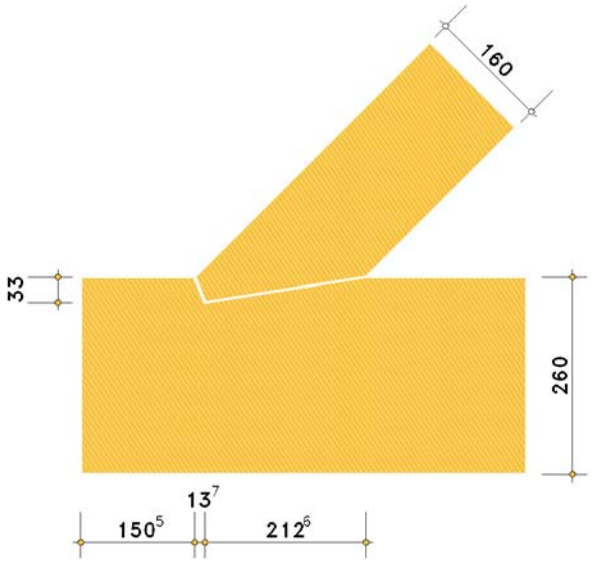
1. Input parameters

1.1. frontal offset acc. to DIN EN 1995-1-1/NA:2013-08, NCI NA.12.1

1.2. material and dimensions

sole plate of glue laminated timber EC, GL28h , ρ_k = 425 kg/m³, NKL 1
$f_{m,k}$ = 28.00 N/mm², $f_{t,k}$ = 22.30 N/mm², $f_{c,k}$ = 28.00 N/mm², $f_{v,k}$ = 3.50 N/mm², $f_{c90,k}$ = 2.50 N/mm²
strut from solid coniferous timber, C24 (S10) , ρ_k = 350 kg/m³, NKL 1
$f_{m,k}$ = 24.00 N/mm², $f_{t,k}$ = 14.50 N/mm², $f_{c,k}$ = 21.00 N/mm², $f_{v,k}$ = 4.00 N/mm², $f_{c90,k}$ = 2.50 N/mm²
sole plate **160/260 mm**, strut **160/160 mm**, γ = 45.0 °
anchoring by bolt Ø 12 mm

elevation scale 1:100, unit of length [mm]



1.3. internal forces and moments

Nr.	name	N_d kN	KLED	k_{mod} -	γ -
1	A	64.30	sh.-term	0.900	1.30

2. results

2.1. compression in contact surfaces acc. to DIN EN 1995-1-1/NA, NCI NA.12.1

k_{cr} = 0.714, $\alpha = \gamma/2$ = 22.5 °, min l_v = 164 mm (es wird eine Mindestvorholzlänge from 200 mm empfohlen)

Nr	$f_{v,d}$ N/mm²	$f_{c0,d}$ N/mm²	$f_{c90,d}$ N/mm²	$f_{c\alpha,d}$ N/mm²	$S_{1R,d}$ kN	l_v mm	u_{lv} -	$u_{SE,d1}$ -	u -
1	2.42	19.38	1.73	10.36	64.10	164	**1.000**	**1.003**	**1.003**

u_{max} = 1.003 > 1 ⇒ not ok. !!

2.2. sole plate bending and normal force

b_n = 147 mm, h_n = 227 mm ⇒ A_n = 33369 mm², W_n = 1262461 mm³, e_z = 17 mm

				left edge					right edge					
Nr	$f_{m,d}$ N/mm²	$f_{t,d}$ N/mm²	$f_{c,d}$ N/mm²	N_d kN	σ_{Nd} N/mm²	M_d kNm	$\sigma_{m,d}$ N/mm²	u_σ -	N_d kN	σ_{Nd} N/mm²	M_d kNm	$\sigma_{m,d}$ N/mm²	u_σ -	u -
1	19.38	15.44	19.38	-45.467	-1.363	0.750	0.594	0.036	0.000	0.000	0.000	0.000	0.000	**0.036**

u_{max} = 0.036 ≤ 1 ⇒ ok.

2.3. sole plate shear force

b_n = 147 mm, h_n = 227 mm ⇒ A_n = 33369 mm²

		left edge			right edge			
Nr	$f_{v,d}$ N/mm²	V_d kN	τ_d N/mm²	u_τ -	V_d kN	τ_d N/mm²	u_τ -	u -
1	2.42	45.467	2.044	0.843	0.000	0.000	**0.000**	**0.843**

u_{max} = 0.843 ≤ 1 ⇒ ok.

2.4. strut stability check

l_{eff} = 2828 mm, $E_{0,05}$ = 7333 N/mm², $G_{0,05}$ = 460 N/mm², A = 25600 mm², W_y = 682667 mm³
I_t = 92187307 mm⁴, β_c = 0.200, i_y = 46 mm, i_z = 46 mm, $k_{c,y}$ = 0.657, $k_{c,z}$ = 0.657, $\sigma_{m,krit}$ = 212 mm³
λ_y = 61.228, λ_z = 61.228, $\lambda_{rel,y}$ = 1.043, $\lambda_{rel,z}$ = 1.043, $\lambda_{rel,m}$ = 0.336, k_{krit} = 1.000
offset at both ends of the strut on the same side ⇒ e_z = 64 mm along the total beam length

Nr	$f_{m,d}$ N/mm²	$f_{t,d}$ N/mm²	$f_{c,d}$ N/mm²	$F_{c,d}$ kN	$M_{y,d}$ kNm	$\sigma_{c,d}$ N/mm²	$\sigma_{m,d}$ N/mm²	u_σ -	$u_{\sigma yr}$ -	$u_{\sigma zr}$ -	u -
1	16.62	10.04	14.54	64.300	4.083	2.512	5.981	**0.000**	**0.623**	**0.392**	**0.623**

u_{max} = 0.623 ≤ 1 ⇒ ok.

3. Summary

total utilization all verifications $u_{max,Ges}$ = 1.003 ≤ 1 ⇒ ok.