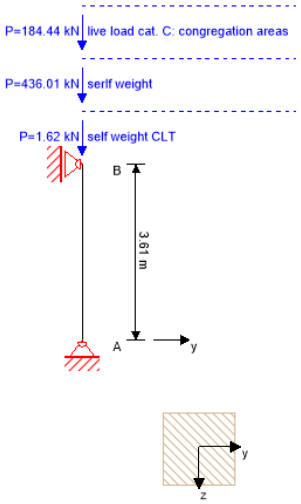
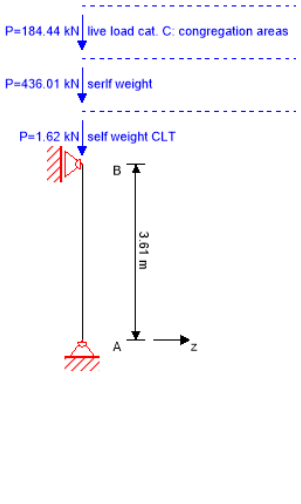
system

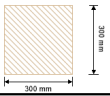




global utilization ratio 91 %

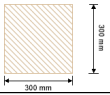
ULS	91 %	ULS fire	42 %

section: wooden beam 30/30



section width	section height	area	Iy	Iz
[cm]	[cm]	[mm²]	[mm⁴]	[mm⁴]
30	30	90,000	675,000,100	675,000,100

section fire: wooden beam 30/30



section width	section height	area	Iy	Iz
[cm]	[cm]	[mm²]	[mm⁴]	[mm⁴]
30	30	90,000	675,000,100	675,000,100

fire resistance class:R 0

time **0 min**

fire protection layering : no additional fire protection

k_0	d_0	$d_{char,0,h}$	$d_{ef,h}$	$d_{char,0,v}$	$d_{ef,v}$
[-]	[mm]	[mm]	[mm]	[mm]	[mm]
1	7	0.0	0.0	0.0	0.0

material values

material	$f_{m,k}$	$f_{t,0,k}$	$f_{t,90,k}$	$f_{c,0,k}$	$f_{c,90,k}$	$f_{v,k}$	$f_{r,k\ min}$	$E_{0,mean}$	G_{mean}	$E_{0,5}$
	[N/mm²]	[N/mm²]	[N/mm²]	[N/mm²]	[N/mm²]	[N/mm²]	[N/mm²]	[N/mm²]	[N/mm²]	[N/mm²]
GL 32h	32.00	25.60	0.50	32.00	2.50	2.50	1.20	14,200.00	350.00	11,800.00

load

load case groups

	load case category	Typ	duration	Kmod	γ_{inf}	γ_{sup}	Ψ_0	Ψ_1	Ψ_2
LC1	self weight CLT	G	permanet	0.6	1	1.35	1	1	1
LC2	serlf weight	G	permanet	0.6	1	1.35	1	1	1
LC3	live load cat. C: congregation areas	Q	short term	0.9	0	1.5	0.7	0.7	0.6

LC1:self weight CLT

vertical load		
P_k	ex. y	ex. z
[kN]	[m]	[m]
1.6245	0.00	0.00

LC2:serlf weight

vertical load		
P_k	ex. y	ex. z
[kN]	[m]	[m]
436.01	0.00	0.08

LC3:live load cat. C: congregation areas

vertical load		
P_k	ex. y	ex. z
[kN]	[m]	[m]
184.44	0.00	0.08

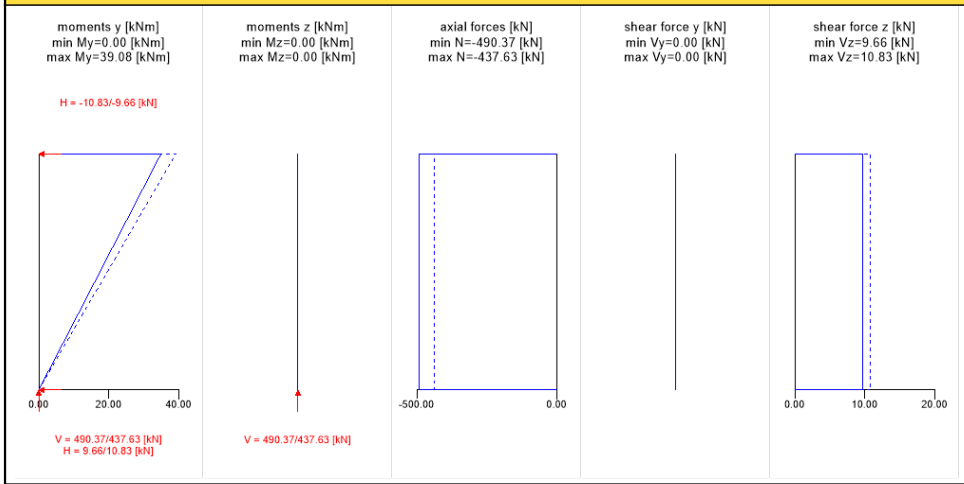
ULS combinations

	combination rule
LCO1	1.12/1.00 * LC1 + 1.12/1.00 * LC2
LCO2	1.12/1.00 * LC1 + 1.12/1.00 * LC2 + 1.25/0.00 * LC3

ULS combinations fire

	combination rule
LCO1	1.00/1.00 * LC1 + 1.00/1.00 * LC2
LCO2	1.00/1.00 * LC1 + 1.00/1.00 * LC2 + 1.00/0.00 * 0.60 * LC3

Ultimate limit state (ULS) - design results



ULS flexural design

dist.	γ_m	k_{mod}	$k_{sys,z}$	$f_{m,k}$	$f_{m,y,d}$	$f_{m,z,d}$	$f_{t,d}$	$f_{c,d}$
[m]	[-]	[-]	[-]	[N/mm²]	[N/mm²]	[N/mm²]	[N/mm²]	[N/mm²]
3.61	1.25	0.60	1.00	32.00	16.46	16.46	13.17	15.36
$M_{y,d}$	$N_{c,d}$	$N_{t,d}$	$\sigma_{m,y,d}$	$\sigma_{c,d}$	$\sigma_{t,d}$	ratio		
[kNm]	[kN]	[kN]	[N/mm²]	[N/mm²]	[N/mm²]			
39.08	-490.37	0.00	8.69	5.45	0.00	65 %	LCO1	

ULS shear analysis Y

dist.	$f_{v,k}$	γ_m	k_{mod}	$f_{v,d}$	V_d	$\tau_{v,d}$	ratio	
[m]	[N/mm²]	[-]	[-]	[N/mm²]	[kN]	[N/mm²]		
3.61	2.50	1.25	0.90	1.80	0.00	0.00	0 %	LCO2

ULS shear analysis Z

dist.	$f_{v,k}$	γ_m	k_{mod}	$f_{v,d}$	V_d	$\tau_{v,d}$	ratio	
[m]	[N/mm²]	[-]	[-]	[N/mm²]	[kN]	[N/mm²]		
0.0	2.50	1.25	0.60	1.20	10.83	0.18	15 %	LCO1

ULS shear analysis combined

dist.	$f_{v,k}$	γ_m	k_{mod}	$f_{v,d}$	$V_{y,d}$	$V_{z,d}$	$\tau_{v,y,d}$	$\tau_{v,z,d}$	ratio	
[m]	[N/mm²]	[-]	[-]	[N/mm²]	[kN]	[kN]	[N/mm²]	[N/mm²]		
0.0	2.50	1.25	0.60	1.20	0.00	10.83	0.00	0.18	2 %	LCO1

flexural stress analysis

$M_{y,d}$ =	39.08	kNm		$f_{m,k}$ =	32.00	N/mm²	
$N_{c,d}$ =	-490.37	kN		γ_m =	1.25	-	
				k_{mod} =	0.60	-	
				$k_{sys,y}$ =	1.00	-	
				k_{hm} =	1.07	-	
				k_l =	1.00	-	
$\sigma_{c,d}$ =	5.45	N/mm²		$f_{c,d}$ =	15.36	N/mm²	
$\sigma_{m,y,d}$ =	8.69	N/mm²	<	$f_{m,y,d}$ =	16.46	N/mm²	✓

utilization ratio 65 %

shear stress analysis Y

V_d =	0.00	kN		$f_{v,k}$ =	2.50	N/mm²	
				γ_m =	1.25	-	
				k_{mod} =	0.90	-	
$\tau_{v,d}$ =	0.00	N/mm²	<	$f_{v,d}$ =	1.80	N/mm²	✓

utilization ratio 0 %

shear stress analysis Z

V_d =	10.83	kN		$f_{v,k}$ =	2.50	N/mm²	
				γ_m =	1.25	-	
				k_{mod} =	0.60	-	
$\tau_{v,d}$ =	0.18	N/mm²	<	$f_{v,d}$ =	1.20	N/mm²	✓

utilization ratio 15 %

shear stress analysis

$V_{y,d}$ =	0.00	kN		$V_{z,d}$ =	10.83	kN	
$f_{v,k}$ =	2.50	N/mm²		γ_m =	1.25	-	
$f_{v,d}$ =	1.20	N/mm²		k_{mod} =	0.60	-	
$\tau_{v,y,d}$ =	0.00	N/mm²		$\tau_{v,z,d}$ =	0.18	N/mm²	

utilization ratio 2 %

buckling analysis

$M_{y,d}$ =	39.08	kNm		$f_{m,k}$ =	32.00	N/mm²	
$N_{c,d}$ =	-490.37	kN		γ_m =	1.25	-	
				k_{mod} =	0.60	-	
				$k_{sys,y}$ =	1.00	-	
$\sigma_{c,d}$ =	5.45	N/mm²		$f_{c,d}$ =	15.36	N/mm²	
$\sigma_{m,y,d}$ =	8.69	N/mm²		$f_{m,y,d}$ =	16.46	N/mm²	
$\sigma_{m,z,d}$ =	0.00	N/mm²	<	$f_{m,z,d}$ =	16.46	N/mm²	✓

utilization ratio 91 %

lateral torsional buckling analysis

$M_{y,d}$ =	0.00	kNm		$f_{m,k}$ =	32.00	N/mm²	
$N_{c,d}$ =	-490.37	kN		γ_m =	1.25	-	
				k_{mod} =	0.60	-	
				$k_{sys,y}$ =	1.00	-	
				k_{hm} =	1.07	-	
				k_l =	1.00	-	
$\sigma_{c,d}$ =	5.45	N/mm²		$f_{c,d}$ =	15.36	N/mm²	
$\sigma_{m,y,d}$ =	0.00	N/mm²	<	$f_{m,y,d}$ =	16.46	N/mm²	✓

utilization ratio 38 %

support reaction

load case category	k_{mod}	A_y	A_z	B_x	B_y	B_z
		[kN]	[kN]	[kN]	[kN]	[kN]
self weight CLT	0.6	0.00	0.00	1.62	0.00	0.00
		0.00	0.00	1.62	0.00	0.00
serlf weight	0.6	0.00	-9.66	436.01	0.00	9.66
		0.00	-9.66	436.01	0.00	9.66
live load cat. C: congregation areas	0.9	0.00	0.00	0.00	0.00	4.09
		0.00	-4.09	184.44	0.00	0.00

Disclaimer