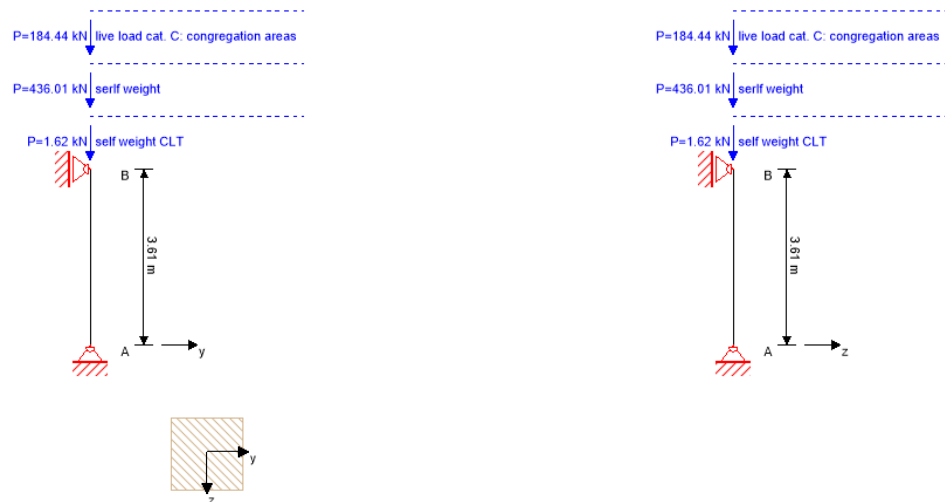


system



global utilization ratio


91 %

ULS	91 %	ULS fire	42 %
-----	------	----------	------

section: wooden beam 30/30

	section width	section height	area	I_y	I_z
	[cm]	[cm]	[mm ²]	[mm ⁴]	[mm ⁴]
	30	30	90,000	675,000,100	675,000,100

section fire: wooden beam 30/30

	section width	section height	area	I_y	I_z			
	[cm]	[cm]	[mm ²]	[mm ⁴]	[mm ⁴]			
	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/mm ²]	[N/mm ²]	[N/mm ²]	[N/mm ²]	[N/mm ²]	[N/mm ²]	[N/mm ²]	[N/mm ²]	[N/mm ²]	[N/mm ²]
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	serif 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

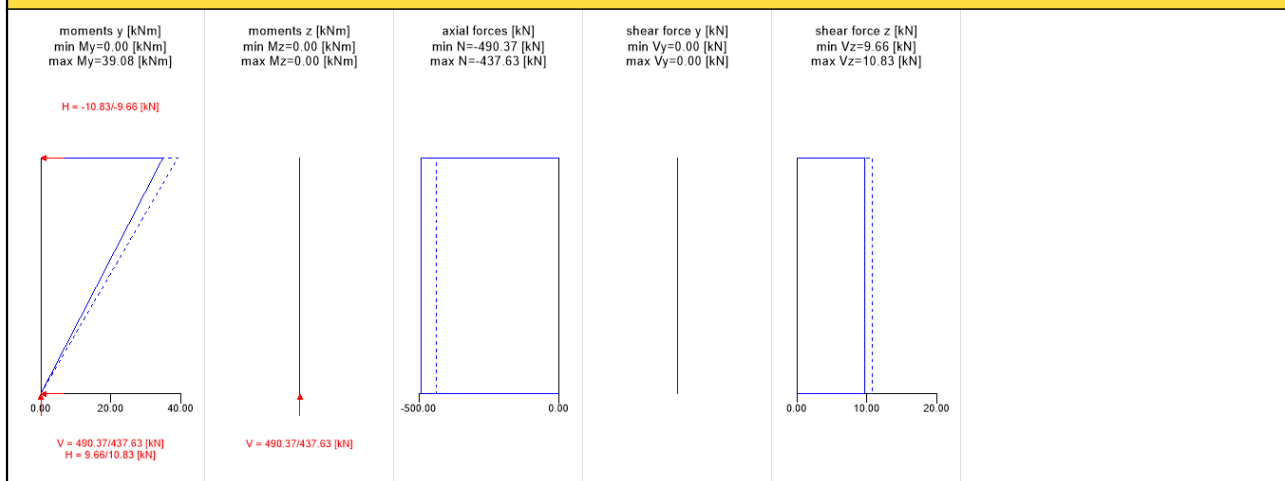
ULS combinations

	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/mm ²]	[N/mm ²]	[N/mm ²]	[N/mm ²]	[N/mm ²]
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}	σ _{m,y,d}	σ _{c,d}	σ _{t,d}	ratio		
[kNm]	[kN]	[kN]	[N/mm ²]	[N/mm ²]	[N/mm ²]			
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	$T_{v,d}$	ratio	
[m]	[N/mm ²]	[-]	[-]	[N/mm ²]	[kN]	[N/mm ²]		
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	$T_{v,d}$	ratio	
[m]	[N/mm ²]	[-]	[-]	[N/mm ²]	[kN]	[N/mm ²]		
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}	$f_{v,d}$	$V_{y,d}$	$V_{z,d}$	$T_{v,y,d}$	$T_{v,z,d}$	ratio	
[m]	[N/mm ²]	[-]	[-]	[N/mm ²]	[kN]	[kN]	[N/mm ²]	[N/mm ²]		
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/mm ²			
$N_{c,d}$	=	-490.37	kN	γ_m	=	1.25	-			
				k_{mod}	=	0.60	-			
				$k_{sys,y}$	=	1.00	-			
				k_{hm}	=	1.07	-			
				k_i	=	1.00	-			
$\sigma_{c,d}$	=	5.45	N/mm ²	$f_{c,d}$	=	15.36	N/mm ²			
$\sigma_{m,y,d}$	=	8.69	N/mm ²	$f_{m,y,d}$	=	16.46	N/mm ²			✓
								<		
utilization ratio								65 %		

shear stress analysis Y										
V_d	=	0.00	kN	$f_{v,k}$	=	2.50	N/mm ²			
				γ_m	=	1.25	-			
				k_{mod}	=	0.90	-			
$T_{v,d}$	=	0.00	N/mm ²	$f_{v,d}$	=	1.80	N/mm ²			✓
								<		
utilization ratio								0 %		

shear stress analysis Z										
V_d	=	10.83	kN	$f_{v,k}$	=	2.50	N/mm ²			
				γ_m	=	1.25	-			
				k_{mod}	=	0.60	-			
$T_{v,d}$	=	0.18	N/mm ²	$f_{v,d}$	=	1.20	N/mm ²			✓
								<		
utilization ratio								15 %		

shear stress analysis										
$V_{y,d}$	=	0.00	kN	$V_{z,d}$	=	10.83	kN			
$f_{v,k}$	=	2.50	N/mm ²	γ_m	=	1.25	-			
$f_{v,d}$	=	1.20	N/mm ²	k_{mod}	=	0.60	-			
$T_{v,y,d}$	=	0.00	N/mm ²	$T_{v,z,d}$	=	0.18	N/mm ²			
								<		
utilization ratio								2 %		

buckling analysis										
$M_{y,d}$	=	39.08	kNm	$f_{m,k}$	=	32.00	N/mm ²			
$N_{c,d}$	=	-490.37	kN	γ_m	=	1.25	-			
				k_{mod}	=	0.60	-			
				$k_{sys,y}$	=	1.00	-			
$\sigma_{c,d}$	=	5.45	N/mm ²	$f_{c,d}$	=	15.36	N/mm ²			
$\sigma_{m,y,d}$	=	8.69	N/mm ²	$f_{m,y,d}$	=	16.46	N/mm ²			✓
$\sigma_{m,z,d}$	=	0.00	N/mm ²	$f_{m,z,d}$	=	16.46	N/mm ²			
								<		
utilization ratio								91 %		

lateral torsional buckling analysis					
$M_{y,d} =$	0.00	kNm	$f_{m,k} =$	32.00	N/mm ²
$N_{c,d} =$	-490.37	kN	$\gamma_m =$	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/mm ²	$f_{c,d} =$	15.36	N/mm ²
$\sigma_{m,y,d} =$	0.00	N/mm ²	$f_{m,y,d} =$	16.46	N/mm ²
		<			✓
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

The software was created to assist engineers in their daily business. The software is an engineering software that is dealing with a very complex matter of structural analysis and building physics analysis. Therefore, this software shall only be operated by skilled, experienced engineers, with a deep understanding of structural engineering and building physics related to timber structures. The user of the software is obliged to check all input values, no matter if they were given by the user or given by default by the software and all results for plausibility.

The use of the results of the software should not be relied upon as the basis for any decision or action. Any use of results of the software is only allowed, if the results have been verified and approved regarding completeness and correctness by a project structural/building physics engineer. The user has the possibility to make print-outs from the software. Any modification of those are not allowed.

Stora Enso Wood Products GmbH does not assume any warranty regarding the software. The software has been developed with utmost diligence, nevertheless Stora Enso Wood Products GmbH, neither expressly nor implicitly, provides any warranty in terms of accuracy, validity, timeliness and completeness of information and data created by the software. Stora Enso Wood Products GmbH does also not assume any warranty for the general usability of the software, its suitability for a special purpose or for the compatibility of the software with the ones of third party producers or providers.

Stora Enso Wood Products GmbH is only liable for damages caused by gross negligence or intent through Stora Enso Wood Products GmbH; the liability for slight negligence is excluded. This does not apply to personal injury. Under the aforementioned conditions Stora Enso Wood Products GmbH is as well not liable for operational failures or the loss of programs and/or data of the user's data processing system.

Applicable Law: These terms of use shall be governed by the laws of Austria excluding however any conflict of laws rules and any laws regarding the Convention of the International Sale of Goods (CISG).