

MASTERSERIES – TIMBER DESIGN

SAMPLE OUTPUT

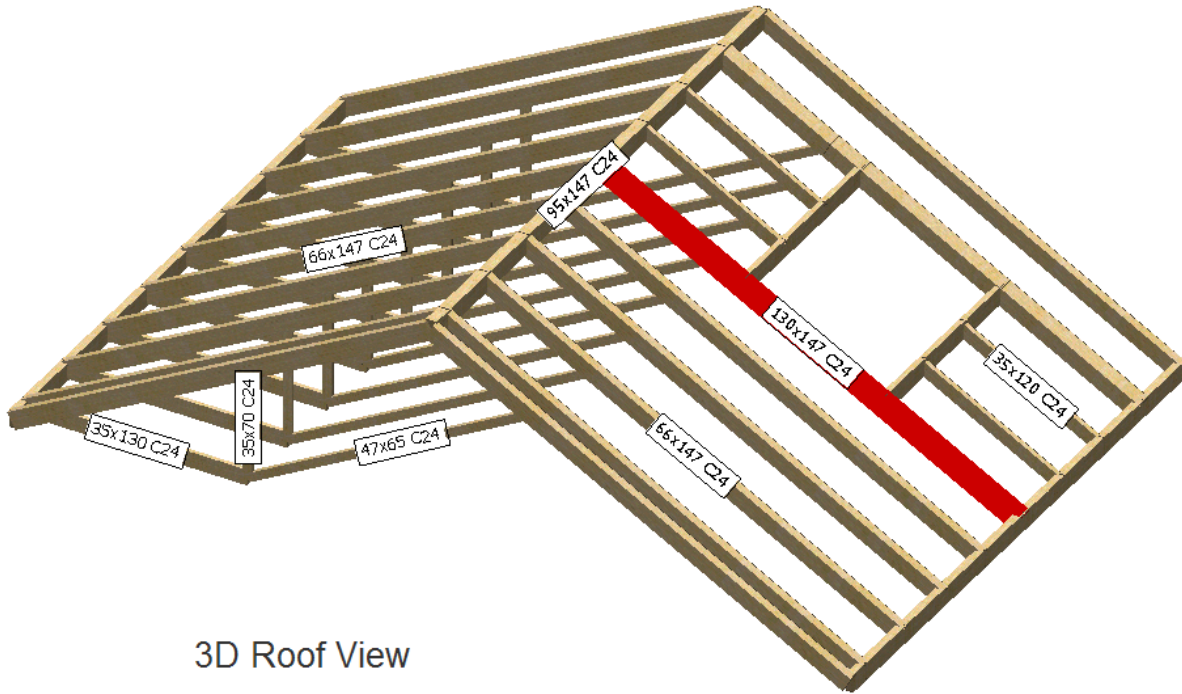
The following output is from the MasterKey Timber Design and MasterBeam Timber Beam Designer programs.

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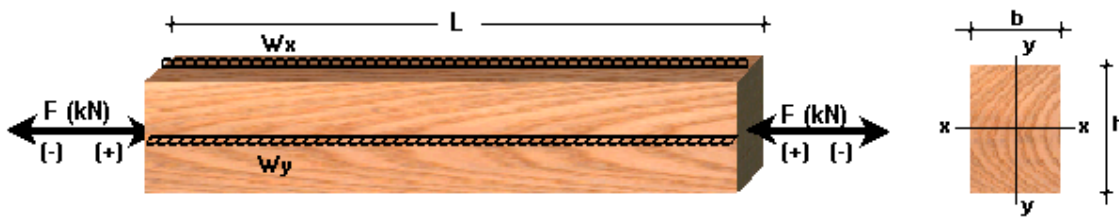
<p>MasterSeries Sample Output</p> <p>1 Circular Road Newtownabbey Co. Antrim, BT37 0RA Tel: (028) 9036 5950</p>	Job ref	: Job Ref
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MASTERFRAME + MASTERKEY TIMBER DESIGN



3D Roof View

AXIAL LOAD WITH MOMENT DESIGN TO BS 5268 : PART 2 Members 58, 70, 80 and 88 (N.17-N.58) @ Level 1



Summary Design Data

Design Cases Covered	1 D1 + 1 L1, 1 L1
Deflection Cases Covered	1 D1 + 1 L1, 1 L1
Section Size	b = 130, h 147 Regularized Section in Strength Class C24
Section Properties (cm ² ,cm ³ ,cm)	Area 191.1, Zx 468.2, Zy 414.1, rx 4.24, ry 3.75
Specification	Service class 1 : Internal use in continuously heated building Long Term loading, 2 pieces of softwood
Integrated Design	Critical Case 1
Member Details	F = 5.568 kN, Lx = 4.162 m, Ly = 4.162 m, Lex = 1.0 Lx, Ley = 1.0 Ly Bearing length B 75, Distance to Bearing 150 mm

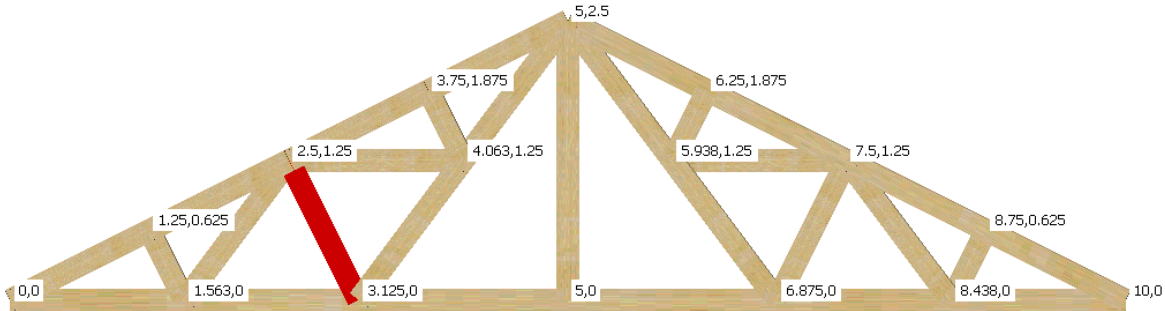
Grade and Admissible Stresses (Strength Class C24)

$\sigma_{mx,adm} = K_2 \cdot K_3 \cdot K_{7x} \cdot K_8 \cdot \sigma_m$	1.00 x 1.00 x 1.08 x 1.00 x 7.50	8.11 N/mm ²
$\sigma_{my,adm} = K_2 \cdot K_3 \cdot K_{7y} \cdot K_8 \cdot \sigma_m$	1.00 x 1.00 x 1.10 x 1.00 x 7.50	8.22 N/mm ²
$\sigma_{c,adm} = K_2 \cdot K_3 \cdot K_8 \cdot \sigma_c$	1.00 x 1.00 x 1.00 x 7.90	7.90 N/mm ²

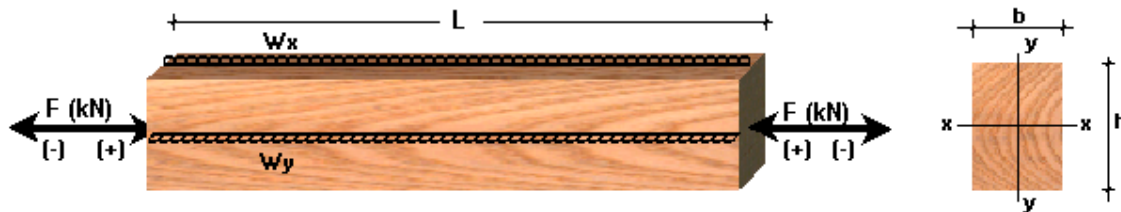
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Newtownabbey		Made By	:
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$\sigma_{c\perp,adm} = K_2 \cdot K_3 \cdot K_4 \cdot K_8 \cdot \sigma_{c\perp}$	1.00 x 1.00 x 1.14 x 1.00 x 1.90		2.17 N/mm ²
$\tau_{adm} = K_2 \cdot K_3 \cdot K_8 \cdot \tau$	1.00 x 1.00 x 1.00 x 0.70		0.70 N/mm ²
$E = K_2 \cdot K_9 \cdot E_{min}(\text{Compression})$	1.00 x 1.14 x 7200		8208 N/mm ²
$E = K_2 \cdot E_{mean}(\text{Deflection})$	1.00 x 10800		10800 N/mm ²
Compression Resistance			
$\lambda = \text{Max}(L_{ex}/r_x, L_{ey}/r_y)$	$\text{Max}(416/4.244, 416/3.753) \leq 180$	110.9	OK
$K_{12} = \text{fn}(\lambda, K_3, \sigma_c, E)$	110.90, 7.90, 8208	0.373	
$\sigma_{c,adm} = K_{12} \cdot \sigma_{c,adm}$	0.373 x 7.90	2.94 N/mm ²	
$\sigma_{c,a} = F/\text{Area}$	5.568 / 191.1 ≤ 2.94	0.29 N/mm ²	OK
Axial Load with Moments Check			
Critical Design Location	$X = 1.374$		
$\sigma_{mx,a} = M_x/Z_x$	2.320 / 468.2 ≤ 8.11	4.96 N/mm ²	OK
$\sigma_{mx,adm} = \sigma_{mx,adm} (1 - 1.5 K_{12} \cdot \sigma_{c,a} / \sigma_e)$	8.11 (1 - 1.5 x 0.373 x 0.29 / 6.59)	7.91 N/mm ²	
$\sigma_c / \sigma_{c,adm} + \sigma_{mx} / \sigma_{mx,adm}$	0.29 / 2.94 + 4.96 / 7.91	0.726	OK
Shear and Bearing Check			
Critical Design Location	$X = 3.079$		
$\tau_a = 1.5 F_v / \text{Area}$	1.5 x 3.411 / 191.1 ≤ 0.70	0.27 N/mm ²	OK
$\sigma_{c\perp,ax} = F_v x / (b \cdot B_x)$	3.411 / (130 x 75) ≤ 2.17	0.35 N/mm ²	OK
Deflection Check (Shear Deflection NOT Included)			
$\delta = \delta_m$	5.13 $\leq 0.003 L$	5.13 mm	OK

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MASTERFRAME + MASTERKEY TIMBER DESIGN



**AXIAL LOAD WITH MOMENT DESIGN TO BS 5268 : PART 2
Member 12 (N.3-N.10) @ Level 2**



Summary Design Data

Design Cases Covered	1 D1 + 1 L1, 1 L1, 1 D1 + 1 W1 + 1 W4, 1 D2 + 1 L2
Deflection Cases Covered	1 D1 + 1 L1, 1 L1, 1 D1 + 1 W1 + 1 W4, 1 D2 + 1 L2
Section Size	b = 72, h 194 Regularized Section in Strength Class C20
Section Properties (cm ² , cm ³ , cm)	Area 139.7, Zx 451.6, Zy 167.6, rx 5.6, ry 2.08
Specification	Service class 1 : Internal use in continuously heated building Long Term loading Critical Case 4
Integrated Design	F = 6.186 kN, Lx = 1.398 m, Ly = 1.398 m, Lex = 1.0 Lx, Ley = 1.0 Ly
Member Details	Bearing length B 75, Distance to Bearing 150 mm

Grade and Admissible Stresses (Strength Class C20)

$\sigma_{mx,adm} = K_2 \cdot K_3 \cdot K_{7x} \cdot K_8 \cdot \sigma_m$	$1.00 \times 1.00 \times 1.05 \times 1.00 \times 6.30$	6.61 N/mm ²
$\sigma_{my,adm} = K_2 \cdot K_3 \cdot K_{7y} \cdot K_8 \cdot \sigma_m$	$1.00 \times 1.00 \times 1.17 \times 1.00 \times 6.30$	7.37 N/mm ²
$\sigma_{c,adm} = K_2 \cdot K_3 \cdot K_8 \cdot \sigma_c$	$1.00 \times 1.00 \times 1.00 \times 7.30$	7.30 N/mm ²
$\sigma_{c\perp,adm} = K_2 \cdot K_3 \cdot K_4 \cdot K_8 \cdot \sigma_{c\perp}$	$1.00 \times 1.00 \times 1.14 \times 1.00 \times 1.70$	1.94 N/mm ²
$\tau_{adm} = K_2 \cdot K_3 \cdot K_8 \cdot \tau$	$1.00 \times 1.00 \times 1.00 \times 0.60$	0.60 N/mm ²
$E = K_2 \cdot K_9 \cdot E_{min}(\text{Compression})$	$1.00 \times 1.00 \times 6250$	6250 N/mm ²
$E = K_2 \cdot E_{mean}(\text{Deflection})$	1.00×9400	9400 N/mm ²

Compression Resistance

$\lambda = \text{Max}(L_{ex}/r_x, L_{ey}/r_y)$	$\text{Max}(140/5.600, 140/2.078) \leq 180$	67.3	OK
$K_{12} = \text{fn}(\lambda, K_3 \cdot \sigma_c, E)$	67.26, 7.30, 6250	0.605	
$\sigma_{c,adm} = K_{12} \cdot \sigma_{c,adm}$	0.605×7.30	4.41 N/mm ²	
$\sigma_{c,a} = F/\text{Area}$	$6.186 / 139.7 \leq 4.41$	0.44 N/mm ²	OK

Axial Load with Moments Check

Critical Design Location	$X = 0.000$		
$\sigma_c / \sigma_{c,adm}$	$0.44/4.41$	0.100	OK

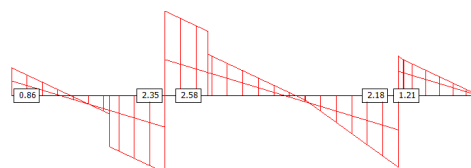
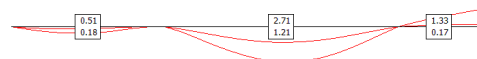
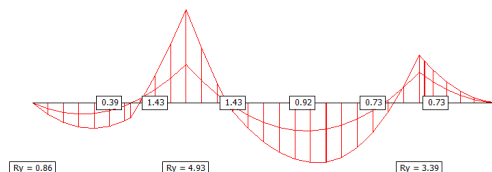
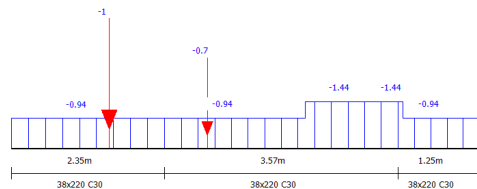
MasterSeries Sample Output

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MASTERBEAM TIMBER DESIGNER



SUMMARY OF INPUT DATA

Loading Cases and Load Combination

Load Group Labels

Load Group UT Unity Load Factor (All Cases)
 Load Group D1 Dead Load
 Load Group L1 Live Load

Load Case 001 : All Spans Loaded (Ultimate: 1.0D1+1.0L1)

Load Combination + 1.00 D1 + 1.00 L1

Load Case 002 : Live Only (Serviceability)

Load Combination + 1.00 L1

Load Case 003 : All Spans Loaded (Serviceability: 1.0D1+1.0L1)

Load Combination + 1.00 D1 + 1.00 L1

The Nodal Co-ordinates

Node	X (m)	Y (m)	Z (m)	Node	X (m)	Y (m)	Z (m)
1	0.000	0.000	0.000	2	2.350	0.000	0.000
3	5.920	0.000	0.000	4	7.170	0.000	0.000

Member Properties

Spans 1-3

M 38x220 C30 E 12.30E6 G .769E6 TG C30 10000
 A 83.6E-4 Ix 3372E-8 Iy 100.6E-8 J 402.4E-8

Member Loading

Span 1

D1 UDLW -000.038 (kN/m) D1 UDLY -000.300 (kN/m)
 L1 UDLY -000.600 (kN/m) D1 PY -001.000 1.500 (kN,m)

Span 2

D1 UDLW -000.038 (kN/m) D1 UDLY -000.300 (kN/m)
 L1 UDLY -000.600 (kN/m) D1 PY -000.700 0.650 (kN,m)
 D1 PDLY -000.710 2.150 3.570 (kN,m,m)

Span 3

D1 UDLW -000.038 (kN/m) D1 UDLY -000.300 (kN/m)
 L1 UDLY -000.600 (kN/m) D1 PDLY -000.040 0.000 0.080 (kN,m,m)

Support Conditions

NODES 1-3

UT Rs 1 1 1 0 0 0

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ANALYSIS RESULTS

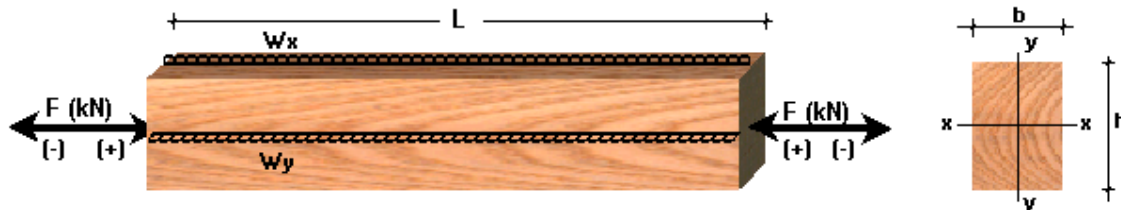
Nodal Deflections (003 : All Spans Loaded (Serviceability: 1.0D1+1.0L1))									
Node	Nodal Def. (mm and degrees)				Node	Nodal Def. (mm and degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\theta Z \curvearrowright$	δXY		$\delta X \rightarrow$	$\delta Y \uparrow$	$\theta Z \curvearrowright$	δXY
1	0.00	0.00	-0.04	0.00	2	0.00	0.00	-0.04	0.00
3	0.00	0.00	0.10	0.00	4	0.00	1.33	0.06	1.33

Member Forces (003 : All Spans Loaded (Serviceability: 1.0D1+1.0L1))							
Span No.	Axial Force (kN)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m)	Max Deflection (mm@m)
		End 1	End 2	End 1	End 2		
1	0.00C	0.86	-2.35	0.00	-1.43	0.39 @ 0.887	0.51 @ 1.007
2	0.00C	2.58	-2.18	-1.43	-0.73	0.92 @ 1.992	2.71 @ 1.879
3	0.00C	1.21	0.00	-0.73	0.00		1.33 @ 1.250

Support Reactions (003 : All Spans Loaded (Serviceability: 1.0D1+1.0L1))							
Node	Support Reactions (kN and kN.m)			Node	Support Reactions (kN and kN.m)		
	$R_x \rightarrow$ (kN)	$R_y \uparrow$ (kN)	$M_z \curvearrowright$ (kN.m)		$R_x \rightarrow$ (kN)	$R_y \uparrow$ (kN)	$M_z \curvearrowright$ (kN.m)
1	0.000	0.856	0.000	2	0.000	4.931	0.000
3	0.000	3.389	0.000	Total	0.000	9.175	0.000

MASTERKEY : TIMBER DESIGN

AXIAL LOAD WITH MOMENT DESIGN TO BS 5268 : PART 2 Span 2 : Axial with Moment Member



Summary Design Data

Design Cases Covered	1 D1 + 1 L1, 1 L1, 1 D1 + 1 L1
Deflection Cases Covered	1 D1 + 1 L1, 1 L1, 1 D1 + 1 L1
Section Size	b = 38, h 220 Regularized Section in Strength Class C30
Section Properties (cm ² , cm ³ , cm)	Area 83.6, Zx 306.5, Zy 52.9, rx 6.35, ry 1.1
Specification	Service class 1 : Internal use in continuously heated building Medium Term loading
Integrated Design	Critical Case 1 Bearing length B 75, Distance to Bearing 150 mm

Grade and Admissible Stresses (Strength Class C30)

$\sigma_{mx,adm} = K_2 \cdot K_3 \cdot K_{7x} \cdot K_8 \cdot \sigma_m$	$1.00 \times 1.25 \times 1.03 \times 1.00 \times 11.00$	14.23 N/mm ²
$\sigma_{my,adm} = K_2 \cdot K_3 \cdot K_{7y} \cdot K_8 \cdot \sigma_m$	$1.00 \times 1.25 \times 1.17 \times 1.00 \times 11.00$	16.09 N/mm ²
$\sigma_{c\perp,adm} = K_2 \cdot K_3 \cdot K_4 \cdot K_8 \cdot \sigma_{c\perp}$	$1.00 \times 1.25 \times 1.14 \times 1.00 \times 2.20$	3.14 N/mm ²
$\tau_{adm} = K_2 \cdot K_3 \cdot K_8 \cdot \tau$	$1.00 \times 1.25 \times 1.00 \times 1.20$	1.50 N/mm ²
$E = K_2 \cdot E_{mean}$	1.00×12300	12300 N/mm ²

Axial Load with Moments Check

Critical Design Location	X = 0.000		
$\sigma_{mx,a} = Mx/Zx$	$1.428 / 306.53 \leq 14.23$	4.66 N/mm ²	OK
$\sigma_{mx}/\sigma_{mx,adm}$	$4.66/14.23$	0.328	OK

Shear and Bearing Check

Critical Design Location	X = 0.000		
$\tau_a = 1.5 F_v / \text{Area}$	$1.5 \times 2.582 / 83.6 \leq 1.50$	0.46 N/mm ²	OK
$\sigma_{c\perp,ax} = Fvx / (b \cdot Bx)$	$2.582 / (38 \times 75) \leq 3.14$	0.91 N/mm ²	OK

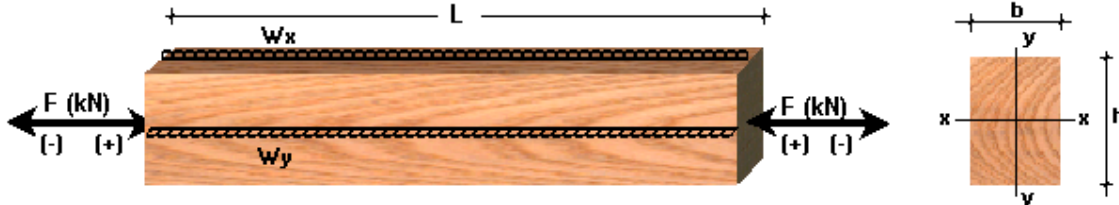
Deflection Check

$\delta = \delta_m + \delta_s$	$2.71 \leq 0.003 L$	2.71 mm	OK
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MASTERKEY : TIMBER DESIGN

**AXIAL LOAD WITH MOMENT DESIGN TO BS EN 1995-1-1:2004
Span 2 comparison : Axial with Moment Member**



Summary Design Data

Design Cases Covered	1.25 D1 + 1.5 L1
Deflection Cases Covered	1 L1, 1 D1 + 1 L1
Section Size	b = 38, h 220 Regularized Section in Strength Class C30
Section Properties (cm ² ,cm ³ ,cm)	Area 83.6, Wel,y 306.5, Wel,z 52.9, iy 6.35, iz 1.1
Specification	Service class 1 : Internal use in continuously heated building Medium Term loading
Integrated Design	Critical Case 1 Bearing length l 75, Distance to Bearing 150 mm

Grade and Admissible Stresses (Strength Class C30)

$f_{m,y,d} = K_{mod} \cdot K_{hy} \cdot f_{m,k} / \gamma_m$	$0.80 \times 1.00 \times 30.00 / 1.3$	18.46 N/mm ²	
$f_{m,z,d} = K_{mod} \cdot K_{hz} \cdot f_{m,k} / \gamma_m$	$0.80 \times 1.30 \times 30.00 / 1.3$	24.00 N/mm ²	
$f_{c,90,d} = K_{mod} \cdot K_{c,90} \cdot f_{c,90,k} / \gamma_m$	$0.80 \times 2.59 \times 2.70 / 1.3$	4.30 N/mm ²	
$f_{v,d} = K_{mod} \cdot f_{v,k} / \gamma_m$	$0.80 \times 3.00 / 1.3$	1.85 N/mm ²	
E_{mean}	Instantaneous Deflection	12000 N/mm ²	Deflection

Axial Load with Moments Check

Critical Design Location	$X = 0.000$		
$\sigma_{m,y,d} = M_y / W_{el,y}$	$1.933 / 306.53 \leq 18.46$	6.31 N/mm ²	OK
$U_{m,y} = \sigma_{m,y,d} / f_{m,y,d}$	$6.310 / 18.462$	0.342	OK
$U_{m,y}$	0.342	0.342	OK

Shear and Bearing Check

Critical Design Location	$X = 0.000$		
$\tau_a = 1.5 V_{y,Ed} / \text{Area}$	$1.5 \times 3.504 / 83.6 \leq 1.85$	0.63 N/mm ²	OK
$\sigma_{c,ax} = V_{y,Ed} / (b \cdot l_y)$	$3.504 / (38 \times 75) \leq 4.30$	1.23 N/mm ²	OK

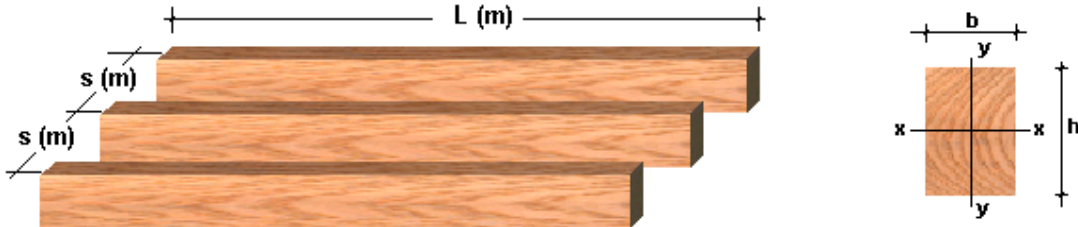
Deflection Check

$\delta = \delta_m + \delta_s$	$2.78 \leq 0.003 L$	2.78 mm	OK
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Element Design – MasterKey Timber Design

DOMESTIC FLOOR JOISTS DESIGN TO BS 5268 : PART 7.1



Summary Design Data

- Design Cases Covered
- Deflection Cases Covered
- Section Size
- Section Properties (cm²,cm⁴,cm³)
- Specification
- Joist data
- Joist loading

b = 47, h 195 Regularized Section in Strength Class C16
 Area 91.7, I_x 2904.2, Z 297.9
 Service class 1 : Internal use in continuously heated building, Load sharing
 Span 3.0 m, Spacing 0.6 m, Bearing length B 75, Distance to Bearing 150 mm
 Dead load 0.5 kN/m², Live load As per BS 5268 Part 7.1

Grade and Admissible Stresses (Strength Class C16)

$\sigma_{m,adm} = K_2 \cdot K_3 \cdot K_7 \cdot K_8 \cdot \sigma_m$	1.00 x 1.00 x 1.05 x 1.10 x 5.30	6.11 N/mm ²
$\sigma_{c\perp,adm} = K_2 \cdot K_3 \cdot K_4 \cdot K_8 \cdot \sigma_{c\perp}$	1.00 x 1.00 x 1.14 x 1.10 x 1.70	2.13 N/mm ²
$\tau_{adm} = K_2 \cdot K_3 \cdot K_8 \cdot \tau$	1.00 x 1.00 x 1.10 x 0.60	0.66 N/mm ²
$E = K_2 \cdot E_{mean}$	1.00 x 8800	8800 N/mm ²

Design Loads

Density and Selfweight	Timber Density 370 kg/m ³ , F _j 0.03 kN/m	
$w = [\text{Max}(1.5, 3.6/L) + F_d] \cdot s + F_j$	$[\text{Max}(1.5, 3.6/3.0) + 0.50] \times 0.6 + 0.03$	1.23 kN/m

Bending Check

$M = w \cdot L^2 / 8$	$1.23 \times 3.0^2 / 8$	1.384 kN.m	
$\sigma_{m,a} = M / Z$	$1.384 / 297.86 \leq 6.11$	4.65 N/mm ²	OK

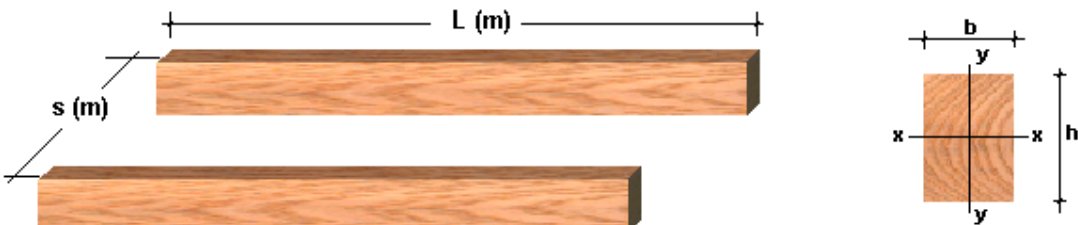
Shear and Bearing Check

$F_v = w \cdot L / 2$	$1.23 \times 3.0 / 2$	1.845 kN	
$\tau_a = 1.5 F_v / \text{Area}$	$1.5 \times 1.845 / 91.65 \leq 0.66$	0.30 N/mm ²	OK
$\sigma_{c\perp,a} = F_v / (b \cdot B)$	$1.845 / (47 \times 75) \leq 2.13$	0.52 N/mm ²	OK

Deflection Check

$\delta_m = 5 \cdot w \cdot L^4 / (384 \cdot E \cdot I_x)$	$5 \times 1.23 \times 3.0^4 / (384 \times 8800 \times 2904.2)$	5.08 mm	
$\delta_s = 12 \cdot w \cdot L^2 / (5 \cdot E \cdot \text{Area})$	$12 \times 1.23 \times 3.0^2 / (5 \times 8800 \times 91.7)$	0.33 mm	
$\delta = \delta_m + \delta_s$	$5.08 + 0.33 \leq 0.003 L$ or 14 mm	5.41 mm	OK

BEAM DESIGN TO BS 5268 : PART 2 TIMBER TRIMMER BEAMS AT 1.8M CENTRES



<h2 style="margin: 0;">MasterSeries Sample Output</h2> <p style="margin: 0;">1 Circular Road Newtownabbey Co. Antrim, BT37 0RA Tel: (028) 9036 5950</p>	Job ref	: Job Ref
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Summary Design Data

Design Cases Covered	
Deflection Cases Covered	
Section Size	b = 75, h 220 Regularized Section in Strength Class C24
Section Properties (cm ² ,cm ⁴ ,cm ³)	Area 165, Ix 6655, Z 605
Specification	Service class 1 : Internal use in continuously heated building Long Term loading, Use minimum modulus
Beam data	Span 3.0 m, Spacing 1.8 m, Bearing length B 75, Distance to Bearing 20 mm
Beam loading	Dead load 0.5 kN/m ² , Live load 1.5 kN/m ²

Grade and Admissible Stresses (Strength Class C24)

$\sigma_{m,adm} = K_2 \cdot K_3 \cdot K_7 \cdot K_8 \cdot \sigma_m$	$1.00 \times 1.00 \times 1.03 \times 1.00 \times 7.50$	7.76 N/mm ²
$\sigma_{c\perp,adm} = K_2 \cdot K_3 \cdot K_4 \cdot K_8 \cdot \sigma_{c\perp}$	$1.00 \times 1.00 \times 1.00 \times 1.00 \times 1.90$	1.90 N/mm ²
$\tau_{adm} = K_2 \cdot K_3 \cdot K_8 \cdot \tau$	$1.00 \times 1.00 \times 1.00 \times 0.70$	0.70 N/mm ²
$E = K_2 \cdot K_9 \cdot E_{min}$	$1.00 \times 1.00 \times 7200$	7200 N/mm ²

Design Loads

Density and Selfweight	Timber Density 420 kg/m ³ , Fj 0.07 kN/m	
$w = (F_d + F_l) \cdot s + F_j$	$(0.50 + 1.50) \times 1.8 + 0.07$	3.67 kN/m

Bending Check

$M = w \cdot L^2 / 8$	$3.67 \times 3.0^2 / 8$	4.129 kN.m	
$\sigma_{m,a} = M / Z$	$4.129 / 605 \leq 7.76$	6.82 N/mm ²	OK

Shear and Bearing Check

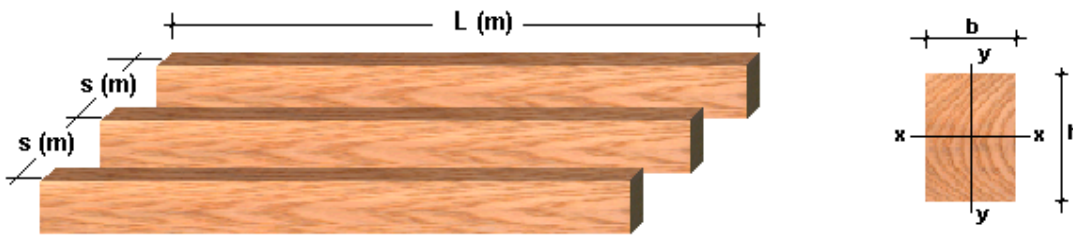
$F_v = w \cdot L / 2$	$3.67 \times 3.0 / 2$	5.505 kN	
$\tau_a = 1.5 F_v / \text{Area}$	$1.5 \times 5.505 / 165 \leq 0.70$	0.50 N/mm ²	OK
$\sigma_{c\perp,a} = F_v / (b \cdot B)$	$5.505 / (75 \times 75) \leq 1.90$	0.98 N/mm ²	OK

Deflection Check

$\delta_m = 5 \cdot w \cdot L^4 / (384 \cdot E \cdot I_x)$	$5 \times 3.67 \times 3.0^4 / (384 \times 7200 \times 6655)$	8.08 mm	
$\delta_s = 12 \cdot w \cdot L^2 / (5 \cdot E \cdot \text{Area})$	$12 \times 3.67 \times 3.0^2 / (5 \times 7200 \times 165)$	0.67 mm	
$\delta = \delta_m + \delta_s$	$8.08 + 0.67 \leq 0.003 L$	8.75 mm	OK

JOIST DESIGN TO BS 5268 : PART 2

TIMBER FLOOR JOISTS AT 0.6M CENTRES



Summary Design Data

Design Cases Covered	
Deflection Cases Covered	
Section Size	b = 50, h 170 Regularized Section in Strength Class C16
Section Properties (cm ² ,cm ⁴ ,cm ³)	Area 85, Ix 2047.1, Z 240.8
Specification	Service class 1 : Internal use in continuously heated building Medium Term loading, Load sharing
Joist data	Span 3.0 m, Spacing 0.6 m, Bearing length B 75, Distance to Bearing 150 mm
Joist loading	Dead load 0.5 kN/m ² , Live load 1.5 kN/m ²

Grade and Admissible Stresses (Strength Class C16)

$\sigma_{m,adm} = K_2 \cdot K_3 \cdot K_7 \cdot K_8 \cdot \sigma_m$	$1.00 \times 1.25 \times 1.06 \times 1.10 \times 5.30$	7.76 N/mm ²
$\sigma_{c\perp,adm} = K_2 \cdot K_3 \cdot K_4 \cdot K_8 \cdot \sigma_{c\perp}$	$1.00 \times 1.25 \times 1.14 \times 1.10 \times 1.70$	2.66 N/mm ²
$\tau_{adm} = K_2 \cdot K_3 \cdot K_8 \cdot \tau$	$1.00 \times 1.25 \times 1.10 \times 0.60$	0.83 N/mm ²
$E = K_2 \cdot E_{mean}$	1.00×8800	8800 N/mm ²

<p>MasterSeries Sample Output</p> <p>1 Circular Road Newtownabbey Co. Antrim, BT37 0RA Tel: (028) 9036 5950</p>	Job ref	: Job Ref
	Sheet	: Sheet Ref / 10 -
	Made By	:
	Date	: 15 Jun 2009 / Version 2007.17
	Checked	:
	Approved	:
Fax: (028) 9036 5102		

Design Loads

Density and Selfweight
 $w = (Fd+F_l).s+F_j$ Timber Density 370 kg/m³, F_j 0.03 kN/m
 (0.50 + 1.50) x 0.6 + 0.03 1.23 kN/m

Bending Check

$M=w.L^2/8$ 1.23 x 3.0² / 8 1.384 kN.m
 $\sigma_{m,a} = M/Z$ 1.384 / 240.83 ≤ 7.76 5.75 N/mm² OK

Shear and Bearing Check

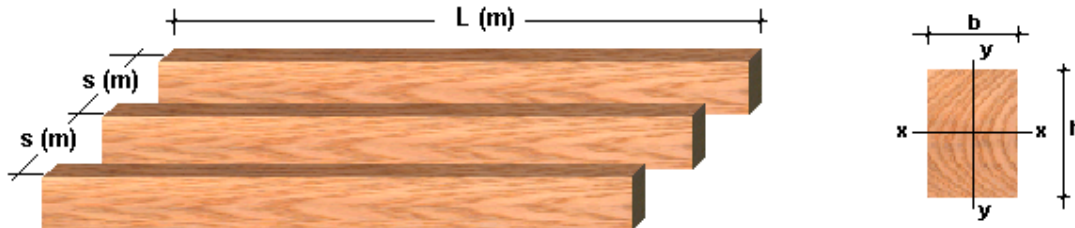
$F_v=w.L/2$ 1.23 x 3.0 / 2 1.845 kN
 $\tau_a = 1.5 F_v / \text{Area}$ 1.5 x 1.845 / 85 ≤ 0.83 0.33 N/mm² OK
 $\sigma_{c\perp a} = F_v / (b.B)$ 1.845 / (50 x 75) ≤ 2.66 0.49 N/mm² OK

Deflection Check

$\delta_m = 5.w.L^4/(384.E.I_x)$ 5 x 1.23 x 3.0⁴ / (384 x 8800 x 2047.1) 7.20 mm
 $\delta_s = 12.w.L^2 / (5.E.Area)$ 12 x 1.23 x 3.0² / (5 x 8800 x 85) 0.36 mm
 $\delta = \delta_m + \delta_s$ 7.20 + 0.36 ≤ 0.003 L or 14 mm 7.56 mm OK

JOISTS FOR FLAT ROOFS WITH ACCESS TO BS 5268 : PART 7.2

JOISTS FOR FLAT ROOFS



Summary Design Data

Design Cases Covered
 Deflection Cases Covered
 Section Size b = 50, h 170 Regularized Section in Strength Class C16
 Section Properties (cm²,cm⁴,cm³) Area 85, I_x 2047.1, Z 240.8
 Specification Service class 2 : Covered and generally unheated, Load sharing
 Joist data Span 3.0 m, Spacing 0.6 m, Bearing length B 75, Distance to Bearing 150 mm
 Joist loading Dead load 0.5 kN/m², Live load As per BS 5268 Part 7.2

Grade and Admissible Stresses (Strength Class C16)

$\sigma_{m,adm} = K_2.K_3.K_7.K_8.\sigma_m$ 1.00 x 1.00 x 1.06 x 1.10 x 5.30 6.21 N/mm²
 $\sigma_{c\perp,adm} = K_2.K_3.K_4.K_8.\sigma_{c\perp}$ 1.00 x 1.00 x 1.14 x 1.10 x 1.70 2.13 N/mm²
 $\tau_{adm} = K_2.K_3.K_8.\tau$ 1.00 x 1.00 x 1.10 x 0.60 0.66 N/mm²
 $E = K_2.E_{mean}$ 1.00 x 8800 8800 N/mm²

Design Loads

Density and Selfweight Timber Density 370 kg/m³, F_j 0.03 kN/m
 $w_m = (1.5+Fd).s+F_j$ (1.5 + 0.50) x 0.6 + 0.03 1.23 kN/m Medium
 $w_s = 2 \times 1.8/L+Fd.s+F_j$ 2 x 1.8 / 3.0 + 0.50 x 0.6 + 0.03 1.53 kN/m Short
 $w_l = Fd.s+F_j$ 0.50 x 0.6 + 0.03 0.33 kN/m Long
 $w_d = 1.6 \times 1.8/L+Fd.s+F_j$ 1.6 x 1.8 / 3.0 + 0.50 x 0.6 + 0.03 1.29 kN/m Deflection

Bending Check

$w = \text{Max}(w_l, w_m/1.25, w_s/1.5)$ Max(0.33, 1.23 / 1.25, 1.53 / 1.5) 1.02 kN/m Long
 $M=w.L^2/8$ 1.02 x 3.0² / 8 1.148 kN.m
 $\sigma_{m,a} = M/Z$ 1.148 / 240.83 ≤ 6.21 4.76 N/mm² OK

Shear and Bearing Check

$F_v=w.L/2$ 1.02 x 3.0 / 2 1.530 kN
 $\tau_a = 1.5 F_v / \text{Area}$ 1.5 x 1.53 / 85 ≤ 0.66 0.27 N/mm² OK
 $\sigma_{c\perp a} = F_v / (b.B)$ 1.53 / (50 x 75) ≤ 2.13 0.41 N/mm² OK

<p>MasterSeries Sample Output</p> <p>1 Circular Road Newtownabbey Co. Antrim, BT37 0RA Tel: (028) 9036 5950</p>	Job ref	: Job Ref
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	Date	: 15 Jun 2009/ Version 2007.17
	Checked	:
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Deflection Check

$w = \text{Max}(w_m, w_d)$	$\text{Max}(1.23, 1.29)$	1.29 kN/m	
$\delta_m = 5 \cdot w \cdot L^4 / (384 \cdot E \cdot I_x)$	$5 \times 1.29 \times 3.0^4 / (384 \times 8800 \times 2047.1)$	7.55 mm	
$w = \text{Max}(w_m, w_s)$	$\text{Max}(1.23, 1.53)$	1.53 kN/m	
$\delta_s = 12 \cdot w \cdot L^2 / (5 \cdot E \cdot \text{Area})$	$12 \times 1.53 \times 3.0^2 / (5 \times 8800 \times 85)$	0.44 mm	
$\delta = \delta_m + \delta_s$	$7.55 + 0.44 \leq 0.003 L$ or 14 mm	7.99 mm	OK

TENSION MEMBER DESIGN TO BS 5268 : PART 2



Summary Design Data

Design Cases Covered	
Deflection Cases Covered	
Section Size	b = 50, h 97 Regularized Section in Strength Class C16
Section Properties (cm ²)	Area 48.5
Specification	Service class 1 : Internal use in continuously heated building Medium Term loading
Tensile Force	F = 20.0 kN

Grade and Admissible Stresses (Strength Class C16)

$\sigma_{t,adm} = K_2 \cdot K_3 \cdot K_8 \cdot K_{14} \cdot \sigma_t$	$1.00 \times 1.25 \times 1.00 \times 1.13 \times 3.20$	4.53 N/mm ²
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Tensile Resistance

$\sigma_{t,a} = F/\text{Area}$	$20.0 / 48.5 \leq 4.53$	4.12 N/mm ²	OK
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