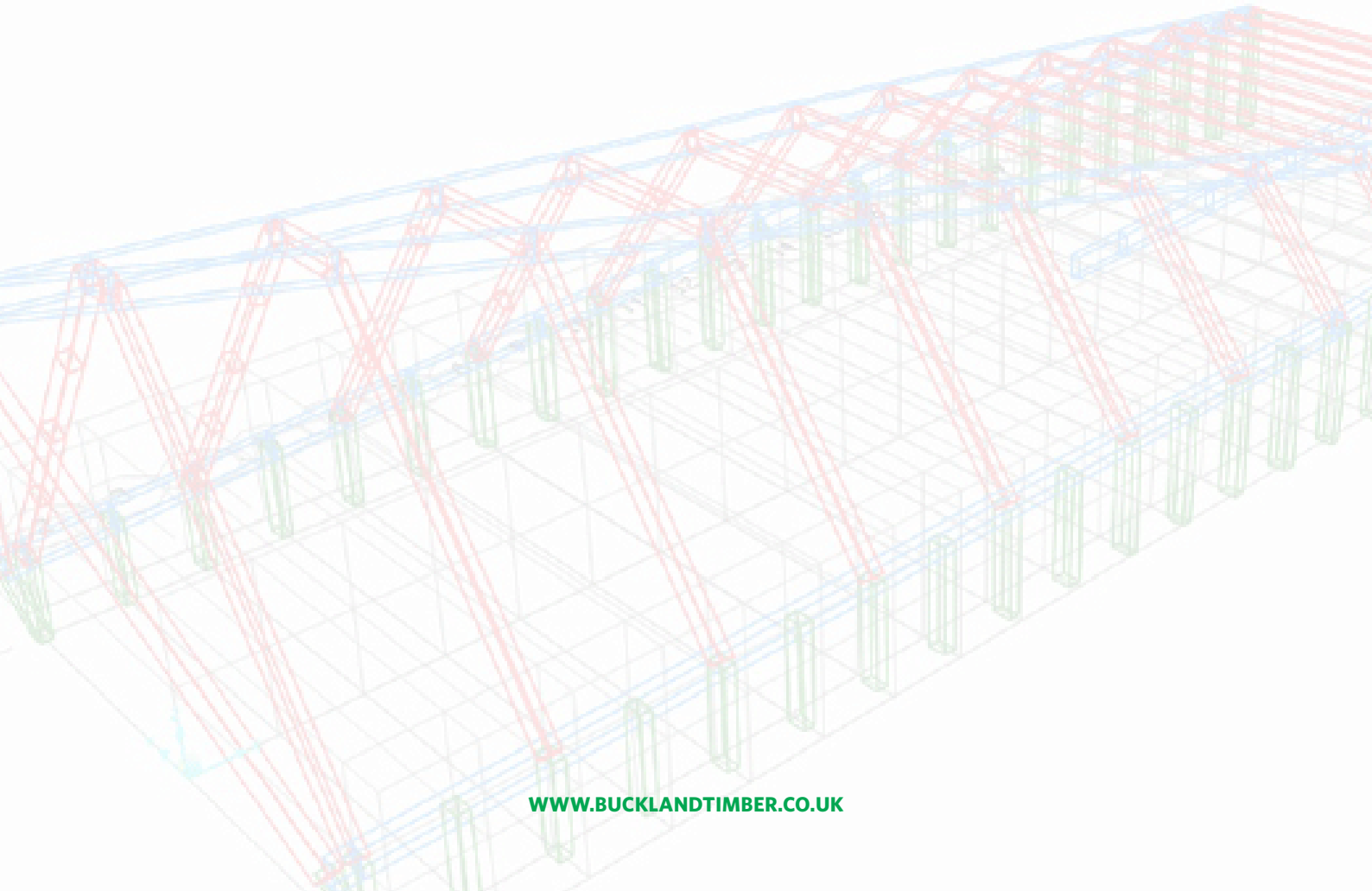
Buckland Timber
Glulam Design | Manufacture | Installation

TECHNICAL INFORMATION



WWW.BUCKLANDTIMBER.CO.UK

TECHNICAL INFORMATION

STRUCTURAL INTEGRITY

Structural Certification

Buckland Timber carry CE certification for the manufacture of structural glue laminated timber. We have detailed processes and procedures in place to ensure that all beams manufactured by us achieve the required standards. Any structural material supplied to the construction industry is required to have CE certification.

The Timber Research Development Association (TRADA) assess our manufacture and testing procedures to ensure we are conforming to our Declaration of Performance (DoP). The DoP provides information on the performance of our products and records the standards to which they are manufactured (BS EN 14080).

A copy of our declaration of performance is available on request.

Responsible Timber Sourcing

We are certified to supply FSC® (Forest Stewardship Council®) certified products sourced from responsibly managed forests. We are also certified to supply PEFC (Programme for the Endorsement of Forest Certification schemes) certified products from sustainably managed forests.

FSC
www.fsc.org
FSC® C116876
The mark of responsible forestry

FSC® certified products available upon request.

TECHNICAL INFORMATION

STRENGTH GRADES FOR GLULAM BEAMS

Buckland Timber manufacture GL24h glulams from imported timber and GL20h glulams from home grown UK timber. Other strength grades are available on request.

Buckland Timber - Structural Glulam Manufacturing				
Timber	Whitewood	Redwood Pine	Siberian Larch	British Larch
Scientific name	Picea abies	Pinus Sylvestris	Larix Sibirica	Larix Kaempferi
Durability	Slight	Slight	Moderate	Moderate
Strength Class	GL24h or GL24c	GL24h	GL24h	GL20h

The characteristic values for GL20h to GL32h glulam are listed in the table below (N/mm^2 unless noted otherwise).

Strength Class	Bending Strength	Tensile Strength Parallel to the grain	Tensile Strength Perpendicular to the grain	Compression Strength Parallel to the grain	Compression Strength Perpendicular to the grain	Shear Strength	Modules of Elasticity			Shear Modulus	Characteristic Density kg/m^3
							Mean Parallel to the grain	Fifth percentile Parallel to the grain	Mean Perpendicular to the grain		
	$f_{m,k}$	$f_{t,0,k}$	$f_{t,90,k}$	$f_{c,0,k}$	$f_{c,90,k}$	$f_{v,k}$	$E_{0,mean}$	$E_{0,05}$	$E_{90,mean}$	G_{mean}	P_k
GL20h	20	16	0.5	20	2.5	3.5	8400	700	300	650	370
GL24h	24	19.2		24			11500	9600			420
GL28h	28	22.3		28			12600	10500			460
GL30h	30	24		30			13600	11300			480
GL32h	32	25.5		32			14200	11800			490

TECHNICAL INFORMATION

VISUAL GRADES AND MANUFACTURING TOLERANCES

We offer our glulam in three different visual grades:

- Non-Visual – suitable for use when the glulam is not seen or when the visual appearance is not important.
- Standard Visual – suitable for most applications where the glulam is seen and is a feature of the structure. Example – swimming pools, canopies, large residential structures.
- Best Visual – suitable for glulam that will be viewed at close distance. Example – worktops or tabletops, stair treads, small scale residential structures.

	Non Visual	Standard Visual	Best Visual
Type of wood	• European Spruce • Fifths grade Pine	• European Spruce • Unsorted grade Pine • Douglas Fir • Siberian Larch	• European Spruce • Unsorted grade Pine • Douglas Fir • Siberian Larch
Lamella thickness	40mm to 45mm.	30mm to 45mm.	20mm to 45mm.
Surface	Planed and levelled.	Neatly planed on all sides, sanded where there are planer marks - visible from 2m away.	Sanded on all sides, finished with minimum 80 grit orbital sander.
Bevel	Bevelled / sharp-edged.	3mm to 4mm bevel.	3mm to 4mm bevel.
Knots	No requirements.	Loose knots, knot holes up to 35mm diameter allowed.	No loose knots or knot holes. Knot holes under 15mm diameter to have filler repair, larger to have infill timber repair.
Resin pockets	No requirements.	Permissible up to 50mm long and 5mm wide, otherwise repaired	Permissible up to 50mm long and 2mm wide, otherwise repaired.
Inbark	Permissible (no rot).	Not permissible.	Not permissible.
Discolouring	Permissible.	Blue stain and red stripe permissible up to 5% of the surface	Not permissible.
Insect infestation	Permissible subject to strength grading requirements.	Not permissible.	Not permissible.
Cracks	No requirements or crack depth maximum. One sixth of component width.	Top layer cracks up to 2mm wide permissible, radial shrinkage cracks up to 30cm in length permissible.	Cracks up to 2mm to be filled, over 2mm to have timber infill repair.
Flaws	Only severe damage is repaired.	Maximum three longitudinal / round wooden plugs behind each other, otherwise a wooden strip is used.	Repaired using strips of infill timber to match lamination.
Hit & Miss (planing)	Permissible.	Not permissible.	Not permissible.

TECHNICAL INFORMATION

CURVED BEAMS

Curved beams are made by clamping glued lamella around an arrangement of clamp frames which are bolted to the floor. Differing radii are achieved by adjusting the clamp layout and using different thicknesses of timber. The thinner the planks are, the easier they are to bend which allows tighter radii to be achieved.

As a rule of thumb, the thickness of plank required is the radius ÷ 200 i.e. a nine metre radius will require a plank thickness of 45mm, but a two metre radius will require a plank thickness of 10mm. The tighter the radius, the more expensive the beam is, due to the increased material wastage and labour costs.

We can achieve a minimum radius of around one metre by standard production methods. This would use 5mm thick laminates. Any tighter radii are usually made by cutting the curved shape from jointed straight beams.

TECHNICAL INFORMATION

BEAM SIZES

The following tables provide a guide on the standard beam sizes available for the different species of timber we manufacture glulam from. There is no need real to be constrained by these sizes but they should be used as a guide to the most efficient use of the material. Larger widths and depths can be achieved to those shown in the tables - for constraints on large section sizes it is best to enquire with the specific details. Sizes that fall between the dimensions given in the tables would be made by machining beams down from the size listed above.

SPECIES: SPRUCE

	HEIGHT IN MILLIMETRES												
WIDTH	100mm	120mm	140mm	160mm	200mm	240mm	280mm	320mm	360mm	400mm	440mm	480mm	520mm
60mm		X	X	X	X	X							
80mm		X	X	X	X	X	X						
100mm	X	X	X	X	X	X	X	X					
120mm		X		X	X	X	X	X	X				
140mm			X	X	X	X	X	X	X	X	X		
160mm				X	X	X	X	X	X	X	X	X	
180mm					X	X	X	X	X	X	X		
200mm					X	X	X	X	X	X	X	X	X
220mm						X	X	X	X	X	X	X	
240mm						X	X	X	X	X	X	X	X

TECHNICAL INFORMATION

BEAM SIZES (CONTINUED)

Reduced sizes are entirely flexible when allowing for beams planed from a larger size. In general Douglas Fir and Larch beams will be manufactured from 30mm laminations, Spruce and Pine from 40mm to 45mm laminations.

SPECIES: REDWOOD

	HEIGHT IN MILLIMETRES												
WIDTH	90mm	135mm	180mm	225mm	270mm	315mm	360mm	405mm	450mm	495mm	540mm	585mm	630mm
90mm	X	X	X	X	X	X	X	X	X	X	X	X	X
115mm		X	X	X	X	X	X	X	X	X	X	X	X
140mm		X	X	X	X	X	X	X	X	X	X	X	X
160mm			X	X	X	X	X	X	X	X	X	X	X
180mm				X	X	X	X	X	X	X	X	X	X
235mm				X	X	X	X	X	X	X	X	X	X

SPECIES: SIBERIAN LARCH / UK LARCH / DOUGLAS FIR

	HEIGHT IN MILLIMETRES												
WIDTH	120mm	150mm	180mm	210mm	240mm	270mm	300mm	330mm	360mm	390mm	420mm	450mm	480mm
90mm	X	X	X	X	X	X	X	X	X	X	X	X	X
115mm		X	X	X	X	X	X	X	X	X	X	X	X
140mm		X	X	X	X	X	X	X	X	X	X	X	X
160mm		X	X	X	X	X	X	X	X	X	X	X	X
180mm			X	X	X	X	X	X	X	X	X	X	X

TECHNICAL INFORMATION

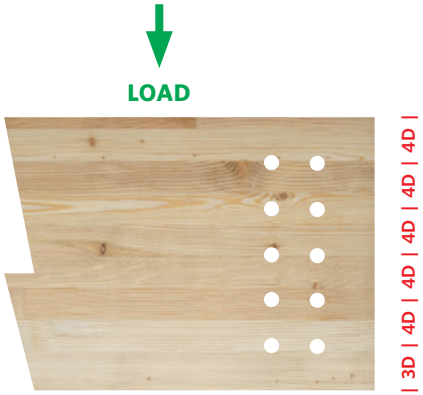
BOLT SPACING FOR BEAMS

The information listed below relating to bolt spacing is a simplified version of the rules set out in BS EN 1995. This is as an aid to preliminary design of connections. It applies to dowel type fasteners with a diameter larger than 6mm.

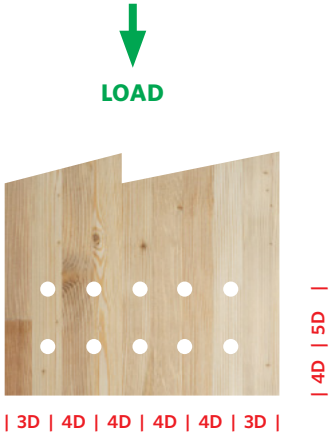
Please reference: Standards: BS EN 1995-1-1: 2004
D = bolt diameter

BEAMS WITH A LOADED EDGE PERPENDICULAR TO THE GRAIN

Above: the photograph shows the fixing detail for a roof beam and column - in this instance an integrated flitch beam is secured by stainless through bolts.



COLUMNS WITH A LOADED EDGE PARALLEL TO THE GRAIN



TECHNICAL INFORMATION

LOAD SPAN TABLE
FOR SIMPLY SUPPORTED BEAMS

Please note: This table is meant to provide beams sizes on a preliminary stage. Results given **do not** replace structural calculations.

Always reference:

Standards:
UNI EN 1991-1-1:2002
BS EN 1990-1-1:2002
BS EN 1995-1-1:2004 + A2:2014

Strength Class:
GL24 acc. to BS EN 14080:2013

Loading:
Dead Load

0.70 kN/m^2	Floor
0.50 kN/m^2	Roof

Live load

2.00 kN/m^2	Floor
0.60 kN/m^2	Roof

Service Class: 1

It is very important to recognise that the specification and spacing of any fixings are crucial to the structural integrity of any beam or column. The information provided on this page is published simply as a guide. Specification of fixings, materials and loadings needs to be carried out and calculated by a suitably qualified structural engineer.

LOAD SPAN TABLE FOR SIMPLY SUPPORTED BEAMS

TABLE SHOWING ALLOWABLE SPANS IN M FOR VARYING SECTION SIZES AND LOADS - Glue Laminated Timber - GL24h												
Section	Floor						Roof					
Size (mm)	Load Width or Beam Centres (m)						Load Width or Beam Centres (m)					
	2	2.5	3	3.5	4	4.5	2	2.5	3	3.5	4	4.5
100 x 160	2.58	2.40	2.25	2.14	2.04	1.97	3.01	2.79	2.63	2.49	2.39	2.30
100 x 200	3.22	3.00	2.81	2.67	2.56	2.46	3.76	3.49	3.29	3.12	2.99	2.87
100 x 240	3.86	3.60	3.37	3.21	3.07	2.95	4.51	4.19	3.95	3.75	3.58	3.44
100 x 280	4.51	4.20	3.93	3.74	3.58	3.44	5.26	4.89	4.60	4.37	4.18	4.02
100 x 320	5.15	4.80	4.49	4.27	4.09	3.93	6.01	5.59	5.25	4.98	4.78	4.60
120 x 200	3.42	3.18	2.99	2.84	2.72	2.61	4.00	3.71	3.49	3.30	3.17	3.05
120 x 240	4.11	3.81	3.59	3.40	3.26	3.14	4.80	4.45	4.19	3.96	3.81	3.66
120 x 280	4.80	4.44	4.19	3.95	3.80	3.66	5.60	5.19	4.89	4.62	4.44	4.27
120 x 320	5.48	5.07	4.79	4.52	4.35	4.18	6.40	5.93	5.59	5.28	5.08	4.88
120 x 360	6.17	5.70	5.39	5.08	4.89	4.71	7.20	6.67	6.29	5.94	5.72	5.49
140 x 200	3.60	3.35	3.15	2.99	2.86	2.75	4.21	3.91	3.68	3.49	3.34	3.21
140 x 240	4.32	4.02	3.77	3.58	3.44	3.30	5.05	4.69	4.41	4.18	4.01	3.86
140 x 280	5.04	4.69	4.39	4.17	3.99	3.85	5.89	5.47	5.14	4.87	4.68	4.50
140 x 320	5.76	5.36	5.03	4.78	4.57	4.40	6.73	6.25	5.88	5.57	5.35	5.14
140 x 360	6.48	6.03	5.66	5.38	5.15	4.95	7.57	7.03	6.62	6.27	6.02	5.79
140 x 400	7.20	6.70	6.29	5.98	5.73	5.50	8.41	7.81	7.35	6.97	6.69	6.43
140 x 440	7.92	7.37	6.92	6.57	6.30	6.05	9.25	8.59	8.10	7.68	7.36	7.08
160 x 200	3.76	3.50	3.29	3.13	2.99	2.88	4.40	4.08	3.85	3.64	3.49	3.36
160 x 240	4.52	4.20	3.95	3.75	3.59	3.45	5.28	4.90	4.62	4.38	4.19	4.03
160 x 280	5.28	4.90	4.61	4.37	4.18	4.02	6.16	5.72	5.39	5.11	4.88	4.69
160 x 320	6.04	5.60	5.26	4.97	4.78	4.60	7.04	6.54	6.16	5.84	5.58	5.37
160 x 360	6.80	6.30	5.92	5.59	5.38	5.17	7.92	7.36	6.93	6.57	6.28	6.04
160 x 400	7.56	7.00	6.58	6.21	5.98	5.75	8.80	8.18	7.70	7.31	6.98	6.71
160 x 440	8.32	7.70	7.25	6.84	6.59	6.32	9.68	9.00	8.47	8.04	7.67	7.39
160 x 480	9.08	8.40	7.90	7.45	7.17	6.89	10.56	9.81	9.24	8.76	8.37	8.05
180 x 240	4.70	4.37	4.11	3.90	3.73	3.59	5.50	5.10	4.80	4.54	4.36	4.19
180 x 280	5.48	5.09	4.80	4.55	4.35	4.19	6.40	5.95	5.60	5.31	5.09	4.89
180 x 320	6.26	5.81	5.48	5.19	4.98	4.79	7.32	6.80	6.40	6.07	5.82	5.59
180 x 360	7.06	6.53	6.17	5.82	5.60	5.39	8.24	7.65	7.20	6.82	6.54	6.28
180 x 400	7.84	7.25	6.85	6.46	6.22	5.99	9.15	8.50	8.00	7.59	7.27	6.99
180 x 440	8.62	7.97	7.54	7.11	6.85	6.59	10.08	9.35	8.80	8.33	8.00	7.67
180 x 480	9.40	8.69	8.23	7.76	7.47	7.17	10.97	10.20	9.60	9.11	8.73	8.39
180 x 520	10.18	9.50	8.91	8.49	8.10	7.78	11.88	11.05	10.40	9.88	9.45	9.09

BEAM SIZES FOR DIFFERING SPAN AND CENTRES

ESTIMATED SECTION SIZE FOR GL24H IN MM												
	Example for floor beams						Example for roof beams					
	Centre to Centre Spacing of Beams						Centre to Centre Spacing of Beams					
Span	2m	2.5m	3m	3.5m	4m	4.5m	2m	2.5m	3m	3.5m	4m	4.5m
3.5m	140 x 200	140 x 240	140 x 240	140 x 240	140 x 280	140 x 280	140 x 200	140 x 200	140 x 200	140 x 200	140 x 240	140 x 240
4m	140 x 240	140 x 240	140 x 280	140 x 280	140 x 320	140 x 320	140 x 200	140 x 240	140 x 240	140 x 240	140 x 280	140 x 280
4.5m	140 x 280	140 x 280	140 x 320	140 x 320	180 x 320	180 x 320	140 x 240	140 x 240	140 x 280	140 x 280	140 x 280	140 x 280
5m	140 x 320	140 x 320	140 x 320	140 x 360	180 x 360	180 x 360	140 x 240	140 x 280	140 x 280	140 x 320	140 x 320	140 x 320
5.5m	140 x 360	140 x 360	180 x 320	180 x 360	180 x 400	180 x 400	140 x 280	140 x 320	140 x 320	140 x 320	140 x 360	140 x 360
6m	180 x 360	140 x 360	180 x 360	180 x 400	180 x 400	180 x 400	140 x 320	140 x 320	140 x 360	140 x 360	140 x 400	140 x 400
6.5m	180 x 360	180 x 360	180 x 400	180 x 400	180 x 440	180 x 440	140 x 320	140 x 360	140 x 360	140 x 400	140 x 440	140 x 440
6.75m	180 x 360	180 x 400	180 x 400	180 x 440	180 x 480	180 x 480	140 x 320	140 x 360	140 x 400	140 x 400	140 x 440	140 x 440
7m	180 x 360	180 x 400	180 x 440	180 x 440	180 x 480	180 x 480	140 x 360	140 x 360	140 x 400	140 x 400	140 x 480	140 x 440
7.25m	180 x 400	180 x 400	180 x 440	180 x 480	180 x 520	180 x 520	140 x 360	140 x 400	140 x 400	140 x 440	140 x 480	140 x 480
7.5m	180 x 400	180 x 440	180 x 440	180 x 480	180 x 520	180 x 520	140 x 360	140 x 400	140 x 440	140 x 440	180 x 480	140 x 480
7.75m	180 x 440	180 x 440	180 x 480	180 x 480	180 x 520	180 x 520	140 x 400	140 x 400	140 x 440	140 x 480	180 x 480	180 x 480
8m	180 x 440	180 x 440	180 x 480	180 x 520	180 x 560	180 x 560	140 x 400	140 x 440	140 x 440	140 x 480	180 x 480	180 x 480
8.25m	180 x 440	180 x 480	180 x 480	180 x 520	180 x 560	180 x 560	140 x 400	140 x 440	140 x 480	140 x 480	180 x 480	180 x 480
8.5m	180 x 440	180 x 480	180 x 520	180 x 560	180 x 600	180 x 600	140 x 440	140 x 440	180 x 440	180 x 480	180 x 520	180 x 520
8.75m	180 x 480	180 x 480	180 x 520	180 x 560	180 x 600	180 x 600	140 x 440	140 x 480	180 x 440	180 x 480	180 x 520	180 x 520
9m	180 x 480	180 x 520	180 x 560	180 x 560	180 x 600	180 x 600	140 x 440	140 x 480	180 x 480	180 x 480	180 x 520	180 x 520
9.25m	180 x 480	180 x 520	180 x 560	180 x 600	240 x 560	240 x 560	180 x 440	180 x 440	180 x 480	180 x 520	180 x 560	180 x 560
9.5m	180 x 520	180 x 520	180 x 560	180 x 600	240 x 600	240 x 600	180 x 440	180 x 480	180 x 480	180 x 520	180 x 560	180 x 560
9.75m	180 x 520	180 x 560	240 x 520	240 x 560	240 x 600	240 x 600	180 x 440	180 x 480	180 x 520	180 x 520	180 x 560	180 x 560
10m	180 x 520	180 x 560	240 x 560	240 x 560	240 x 640	240 x 640	180 x 440	180 x 480	180 x 520	180 x 560	180 x 600	180 x 600
10.25m	240 x 480	240 x 520	240 x 560	240 x 600	240 x 640	240 x 640	180 x 480	180 x 520	180 x 520	180 x 560	180 x 600	180 x 600
10.5m	240 x 520	240 x 560	240 x 560	240 x 600	240 x 640	240 x 640	180 x 480	180 x 520	180 x 560	180 x 560	180 x 640	180 x 640
10.75m	240 x 520	240 x 560	240 x 600	240 x 600	240 x 680	240 x 680	180 x 480	180 x 520	180 x 560	180 x 600	180 x 640	180 x 640
11m	240 x 520	240 x 560	240 x 600	240 x 640	240 x 680	240 x 680	180 x 520	180 x 520	180 x 560	180 x 60	180 x 640	180 x 640
11.25m	240 x 520	240 x 560	240 x 600	240 x 640	240 x 720	240 x 720	180 x 520	180 x 560	180 x 600	180 x 600	180 x 680	180 x 680
11.5m	240 x 560	240 x 600	240 x 640	240 x 640	240 x 720	240 x 720	180 x 520	180 x 560	180 x 600	180 x 640	180 x 680	180 x 680
11.75m	240 x 560	240 x 600	240 x 640	240 x 680	240 x 720	240 x 720	180 x 520	180 x 560	180 x 600	180 x 640	180 x 680	180 x 680
12m	240 x 560	240 x 600	240 x 640	240 x 680	240 x 760	240 x 760	180 x 560	180 x 600	180 x 600	180 x 640	180 x 720	180 x 720
12.25m	240 x 600	240 x 640	240 x 680	240 x 720	240 x 760	240 x 760	180 x 560	180 x 600	180 x 640	180 x 680	180 x 720	180 x 720
12.5m	240 x 600	240 x 640	240 x 680	240 x 720	240 x 760	240 x 760	180 x 560	180 x 600	180 x 640	180 x 680	180 x 720	180 x 720
12.75m	240 x 600	240 x 640	240 x 680	240 x 720	240 x 800	240 x 800	180 x 560	180 x 600	180 x 640	180 x 680	180 x 760	180 x 760
13m	240 x 600	240 x 680	240 x 680	240 x 720	240 x 800	240 x 800	180 x 600	180 x 640	180 x 680	180 x 720	180 x 760	180 x 760

TECHNICAL INFORMATION

CLT - SPAN TABLES AND STRENGTH GRADES

Additional dead load to panel weight $G_{1.k}$ (kN / m²)	Live load q_k (kN / m²)	SINGLE SPAN BEAMS - Span length						
		3m	3.5m	4m	4.5m	5m	5.5m	6m
1.0	2.0	90mm	100mm	120mm	140mm	160mm	180mm	200mm
	3.0	90mm	120mm	120mm	140mm	160mm	180mm	200mm
	4.0	100mm	120mm	140mm	160mm	180mm	200mm	200mm
1.5	2.0	90mm	120mm	120mm	140mm	180mm	200mm	210mm
	3.0	100mm	120mm	140mm	160mm	180mm	200mm	210mm
	4.0	100mm	120mm	140mm	160mm	180mm	200mm	210mm
2.0	2.0	100mm	120mm	140mm	160mm	180mm	200mm	220mm
	3.0	100mm	120mm	140mm	160mm	180mm	200mm	220mm
	4.0	120mm	120mm	140mm	160mm	180mm	200mm	220mm

Please note:

The information listed on this page is for initial sizing only and should not be used a final design proof. The tables show varying CLT thickness in mm.

TECHNICAL INFORMATION

GLULAM - CARBON FOOTPRINT

With global warming and our carbon footprints becoming an ever greater concern for most people, glulam would appear to be a valuable low carbon option. Rather than just state that a glulam frame is more environmentally friendly than the steel equivalent, we have attempted to check and quantify this statement.

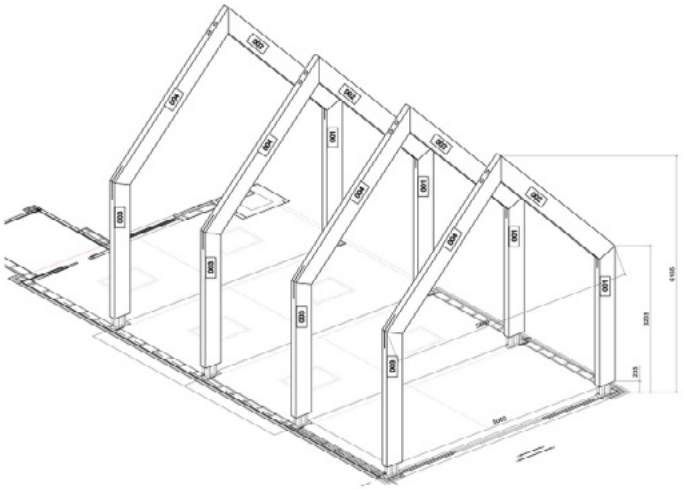
To do this we have considered a typical small project for us – a 9 x 5.7m house extension frame consisting of four portal frames. For the glulam options the materials used were 2.74 cubic metres of glulam and 255kg of steel brackets and fixings. The equivalent steel portal option we replaced the 115 x 270mm glulam beams with an equivalent steel of 102 x 203 (23 UB). The weight of steel to make the four portal frames would be 1640kg.

We have considered Cradle to Gate embodied equivalent carbon dioxide emissions for both materials – for steel a figure of 1.59 kg equivalent CO2 / kg steel [1] and for glulam a figure of 361 kg equivalent CO2 / cubic metre of glulam [2]. By this calculation the glulam option emits the equivalent of 1400kg of equivalent CO2 emissions. The steel frame omits 2600kg of equivalent carbon emissions. So a saving of 1200kg, the same as about 10% of the yearly emissions of the average UK inhabitant.

Note that this does not take into account the carbon held within the timber itself – as it is assumed this will be recycled or released back into the atmosphere at some point in the future, likewise the steel would most likely be recycled at some point in the future. If we take a more short term view, and look at the CO2 emissions benefit whilst the building remains in use, we can include an additional benefit of approximately 1000kg CO2 equivalent stored per cubic metre of timber – this would give a total benefit of choosing glulam over steel of 3950kg, the same as about forty percent of the yearly emissions of the average UK inhabitant.

This analysis comes with the caveat that we are not academics or experts in this field and have taken figures we were able to find from internet searches of academic papers. However, we think we are able to say that using a glulam frame instead of steel is better for the environment and that the impact is not insignificant.

Specifying glulam can help lower a project's carbon footprint and also positively contribute in relation to offsite construction. Wherever possible, Buckland Timber are happy to support the new RIBA 2030 Climate Challenge and join other companies positively impacting on the reduction of carbon in construction.



1. Life Cycle Assessment of Steel Produced in an Italian Integrated Steel Mill. *Pietro A. Renzulli, Bruno Notarnicola, Giuseppe Tassielli, Gabriella Arcese and Rosa Di Capua.*

2. Life-Cycle Analysis of Wood Products: Cradle to Grave LCI of Residential Wood Building Materials. *Maureen E. Puettmann, James B. Wilson*

TECHNICAL INFORMATION

CONNECTION TYPES

There are a wide range of both 'off the shelf' and bespoke connectors and structural joining solutions available - the ones we recommend and typically adopt are:

Slotted Plate / Steel Dowelled Connections

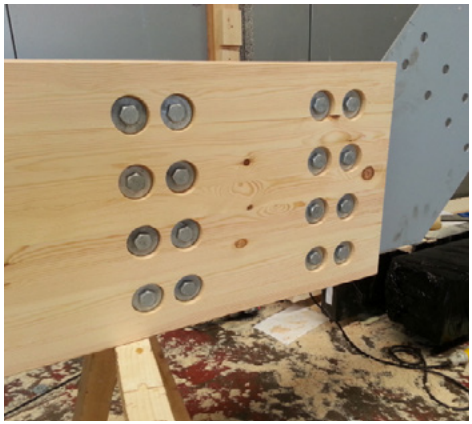
We use this type of connection when the steelwork can be fitted in our workshops. Steel dowels are driven through the glulam into holes within the steel plates that are drilled at the same diameter as the dowels. This means that there is very little potential for movement within the joint.

The dowels are concealed with timber plugs so that no steelwork is visible. Dowels are often the best solution for highly loaded joints such as portal eave connections, where the large number of connections needed may look visually overpowering if they were left exposed.

Slotted Plate / Bolted Connections

This method is often best when structural loads are relatively high and the project is to be supplied as a kit of parts, to be assembled on site. We usually use large form 'G' washers and counterbore the fixings so they finish flush with the surface of the glulam.

Where steel feet or internal plate reinforcement (flitch plates) are specified, slots are cut out, holes drilled and counter bored to receive bolts, nuts and washers. This provides the same structural integrity as steel dowels but visually provides a much more contemporary industrial aesthetic.



Concealed Beam Hangers

We use a range of 'off the shelf' concealed beam hangers. These are fitted directly onto the beams in the factory and allow for an easy 'slot in' fit on site. When housed in the end of a beam they can be made invisible. If you desire no trace of fixings externally this is an ideal choice.

Resin Fixed / Anchor Joints and Bolts

These are another rapid and cost effective method of jointing glulam. By adopting a resin anchor fixing system, no external traces are visible and the joining process is less labour intensive. These are best specified for joints that can be assembled in the factory under controlled conditions.

Screwed Connections

One connection option can be designed using large structural wood screws. This is a good, cost effective and fast option for connections involving lower forces. Screwed connections can also be a good solution visually when there is a need to have no joist hangers or other steelwork visible.

Posts or beams can be counter bored, screwed into position and the holes plugged and sanded leaving very little external trace.

Joist Hangers

These are the most used and recognised method to join posts and rails. Where the structural timber work is not being left in an exposed state, these are a quick, cost effective and structurally robust method to support beams.

Above: skew screwed connection.
Right: joist hangers set out across curved glulam beams connecting the purlins.

Bespoke Steelwork

Every commission is unique and always needs a range of bespoke elements. Where steel is concerned, we work with specialist engineering companies that fabricate our bespoke steelwork. Where needed we can powder coat, plate (galvanised and chrome) and even spray finish our steel elements as specified.

TECHNICAL INFORMATION

TIMBER PROCUREMENT POLICY

There is now a legal requirement within the EU obliging all businesses trading in timber or timber-related products to use due diligence systems to ensure they are only using legally sourced timber.

The UK Government Timber Procurement Policy (TPP) is mandatory across the government estate, including central government departments, executive agencies and non-departmental public bodies. It is advisable across semi-autonomous organisations, such as schools, universities and local authorities.

It covers the purchase of all timber components, from perimeter fencing to scaffolding boards. These must be purchased with clearly documented evidence of legality and sustainability. Organisations (including Buckland Timber) must hold documentation that records it coming from both legal and sustainable sources. As about forty percent of United Kingdom timber imports are used in public sector contracts, government policy is a major influence on the sector.

Visit www.trada.co.uk for additional technical information.

More and more people recognize the need to use certified timber. In many cases, this is a legal requirement. For example, if you work as a contractor or subcontractor on public sector work, (such as NHS, National Trust, UK government or armed forces) you must ensure you comply with the procurement requirements, whether undertaking new build or maintenance work.

Attributes, Characteristic and Use

The embodied energy of timber is much lower than most alternate construction materials such as concrete and steel. With considered forest management, timber can be easily sustained and readily available worldwide. Being a very popular choice of building material, timber has great properties of strength, is lightweight, reliable, durable, and versatile. It has an incredible strength to weight ratio, twenty percent higher than structural steel and four to five times better than un-reinforced concrete when used in compression.

Glue laminated timber builds on the inherent strengths of timber whilst increasing the dimension, complexity of beam shape and size. Perhaps with this in mind glulam is becoming the 'go to' sustainable option for growing numbers of contemporary architects and designers.

It is sometimes quite easy to forget that timber is a natural product - it varies in colour texture and grain. Even a single plank of wood visually changes greatly across its length. It is a beautiful, natural product. Wood has been used in some of the largest construction projects in the world and adopted for use in the smallest utilitarian tools (toothpicks and matches). It is a sustainable, versatile material and its use and application has helped to shape history - from bridges and boats through to arrows and pencils! Its application affords an unmatchable natural resonance, and it continues to enhancing both the smallest of interior spaces and the largest exterior projects worldwide.

There are over 60,000 different species of trees on the planet. Some differ in such small ways that are hardly discernible to the naked eye whist others are worlds apart. Even with this huge variety to choose from we predominantly use only five different varieties: Oak, Larch, Douglas Fir, Spruce and Redwood. Their characteristics differ greatly but we have found this small combination can provide the widest possible option when used in the manufacture of glulam beams.

Acknowledgements

DESIGN: CARL MIDDLETON - WWW.CARLMIDDLETON.CO.UK

Commissions

At Buckland Timber we produce a huge range of glulam beams, structures, and even large sculptural components used in housing, commercial sites and retail spaces. Our work has been featured a number of times on television including Channel 4's Grand Designs and Ugly House to Lovely House, showcasing the best of contemporary architectural design.

Our clients and locations include

EDEXCEL Exhibition Centre - London
Royal Holloway University
Royal Horticultural Society
Pret-A-Manger - Heathrow Airport
Costa Coffee - Stanstead Airport
Chelsea Flower Show
Royal National Lifeboat Institute
Church of England
Wellinton Academy - Salisbury
St John's School - Leatherhead
St Albans Cathedral
Diocese of Westminster
Sir Robert McAlpine
Channel 4
Longleat Safari Park
Morgan Sindell
Kier

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