Buckland Timber

Glulam Design | Manufacture | Installation

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Wood is universally beautiful to man - It is the most humanly intimate of all materials.

Architect: Frank Lloyd Wright

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INTRODUCTION

At Buckland Timber our structural engineers, project managers, carpenters and joiners specialise in the design, manufacture and installation of bespoke glulam structures - we are the largest manufacturer of glulam in the UK.

Currently most structural glulam timber used in the UK is imported from other European countries - mostly from Germany, Austria and Sweden. Whilst there are a number of independent British companies who have the capability of making small quantities of bespoke glulam. Buckland Timber is the only UK company capable of manufacturing glulam on a scale that makes our products competitive with imports.

Buckland Timber Ltd was established in 2012. The partnership was set up by Bill Blight, Ralph and Robin Nicholson, with the purpose of producing a UK grown (and manufactured) sustainable alternative to European imported glulam.

Bill Blight and Ralph Nicholson both own and manage forestry in the South-West. The impetus for establishing Buckland Timber was their desire to make better use of their own harvested, high quality timber and other 'high end' timber also found within the South West.

Our closely linked design and manufacturing services give us a unique capability to explore the options available for your prospective timber structure and ensures that our solutions are tailored to your specific needs. We are always glad to give free preliminary advice and discuss the details of any projects you may be considering – just email over your drawings or give us a call.

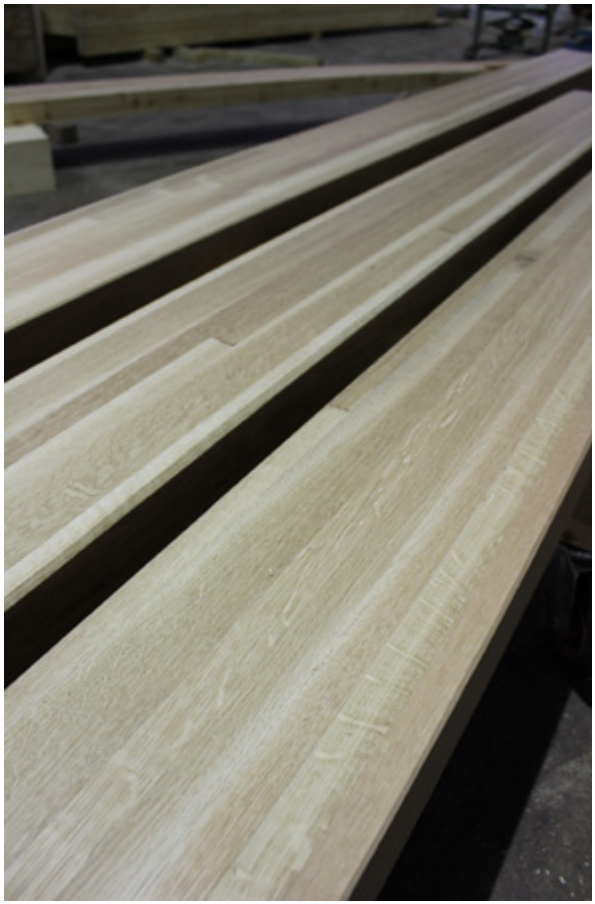
telephone: 01363 891 363
email: info@bucklandtimber.co.uk

Our future stock growing in Buckland Woods

Glulam in brief

Glued laminated timber (also abbreviated as glulam) is a structurally engineered wood product manufactured by bonding layers of timber together using durable, moisture-resistant structural adhesive. At a very basic level this means connecting a number of smaller layers of timber together to make a larger, single component. It is a way of manufacturing timber elements that cannot be easily sourced in solid timber due to their large size or unusual shape. The smaller layers can be dried much more effectively than large sections of sawn timber. This results in glulam being much more dimensionally stable than sawn timber.

Glulam is used for a wide range of purposes from joinery through to large span structural beams. Large glulam beams can often be seen in swimming pools or sports hall roof structures, more recently several large supermarkets have adopted glulam as both a decorative and structural component of their commercial spaces. Basically wherever a steel or concrete structure is utilised for a building, glulam could also be adopted as a more sustainable, and friendlier looking alternative.



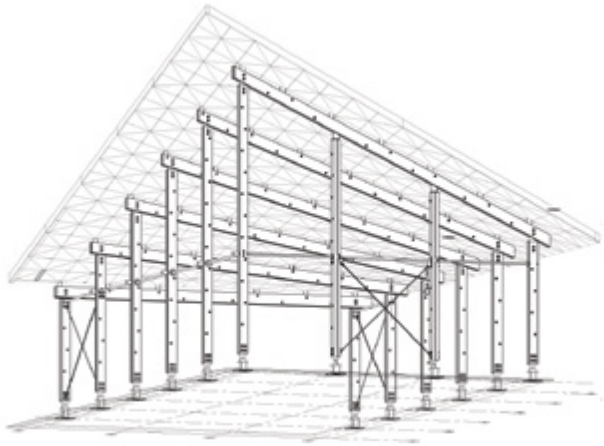
Glue laminated beams manufactured from Oak laminates

SERVICES

ENGINEERING DESIGN - ***from ridge beam to complex 3D***

Our design team work 'hand in hand' with our manufacturing staff giving us the unique capability to explore the options available for any timber structure, whilst ensuring that our design solutions are tailored specifically to our client's needs. A design may have the aesthetic qualities our clients demand yet may not have the inherent buildability they require. Being able to manufacture and comfortably install a project is as important as its structural integrity. As part of our design services our structural engineers produce calculations for Building Control, 3D drawings for approval and finally full fabrication drawings for manufacture and installation.

We are always glad to provide free preliminary advice and to discuss the details of any project – in the first instance simply email outline drawings, telephone or visit us. We are practiced in taking projects from concept to completion and are happy to come in at any stage of the design process – anywhere from a 'back of an envelope' sketch through to completed structural or architectural drawings. We recognise that often buildings are not designed 'in one hit' and that a level of development and change are often required to successfully meet a clients desires.



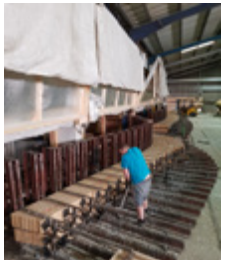
Above: **a double curved glulam roof structure - internally clad with over 700 individually shaped, CNC cut Birch faced plywood tiles. Engineering design, manufacture and installation - by Buckland Timber, including a prototype roof section and factory test fit of double curved roof panels.**

SERVICES

GLULAM MANUFACTURING - ***bespoke in-house capability***

The emphasis at Buckland Timber is to provide a flexible and fast manufacturing service, rather than a high volume commodity product. This allows us to make small runs of beams constructed from alternative timber species or to make bespoke curved or straight beams on short lead times.

Our finger jointing line is used to both grade and remove any defects in all the timber we use. Joining the timber in this way allows long lengths to be produced whilst maintaining the recognised strength grade. Once the timber is finger jointed and planed, glue is applied to the planks using a specialised application line. The glued laminates are stacked in mechanical clamps and pressure applied via screw jacks. The clamps are secured to the ground and can be configured to create whatever shape is required. It does not necessarily need to be a radius, free form and complex curves are also possible. Once positioned in the clamps the beams are cured overnight and finished using a four sided industrial sized planing machine. Fully cured beams are then cut to size and shaped - this can include routing pockets for jointing, drilling holes for bolts, or installing metal brackets, shoes or collars. The final finishing process is to sand and apply stain, varnish or fire retardant to the beam's surface. After the treatment has completely dried each beam is wrapped, labelled and safely stacked with fixing components (threaded bar, nut, washers etc) ready for collection or transportation to site.



Our factory in Crediton (mid Devon) occupies 2750 square metres. Our machinery includes an automated finger-jointing line, mechanical clamps and industrial planer. Our plant is big enough to produce standard size straight beams at competitive prices, but we also have the flexibility to produce curved and long span beams – up to 30m. The production capacity of our workshop is about 5000 cubic metres per year.

SERVICES

INSTALLATION AND LOGISTICS

We supply much of our glulam as part of prefabricated structures, with all of the carpentry work completed within our workshop. Buildings (whatever the scale) are supplied in kit form - all of the columns, trusses and bracing members are numbered and marked. Thereafter, collated 'on site' and installed in a predetermined sequence.

Any steelwork required can be supplied with the glulam and where specified can be fitted in our workshop. Steelwork can be supplied unfinished, painted, galvanised or even manufactured from stainless steel.

We have a number of expert installation teams and work throughout the UK. We have installed our work in the tip of Cornwall, London, the Home Counties, the Midlands, Wales through to Scotland and even the Scottish Isles. We have experience of working at an industrial scale down to a single room household extension. We have worked in most of the UKs major international airports as well as commercial settings and exhibition venues.

We visit site, compose method statements, risk assessments and have developed safe working systems for particularly difficult installations. Our staff are trained to work with cranes, scissor lifts, scaffolding and carry the CITB recognised CSCS cards.

Above: to ensure all the component parts of each project fit together correctly we often 'dry fit' a project within our workshop. The size of the workshop enables us to check and adjust (where necessary) every component part prior to it being disassembled and packed for delivery to site. Where speed of construction and tight schedules are an issue this pre check is an invaluable part of the installation process.

SERVICES

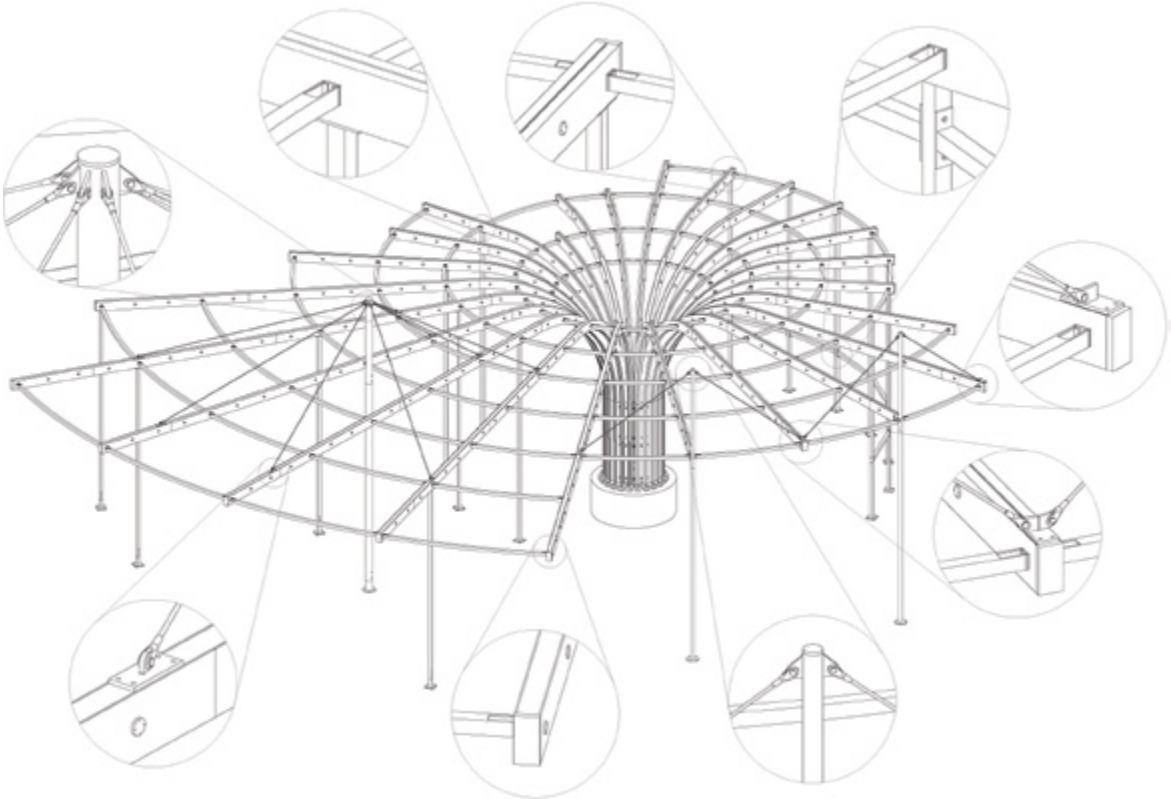
TECHNICAL TEAM

Robin Nicholson – is the Managing Director of Buckland Timber, a Chartered Structural Engineer with approaching two decades of experience in structural engineering and design - specifically with timber, along with his knowledge of building and traditional construction methods and materials.

Keith O Ceallaigh – is a graduate of Edinburgh Napier University. As our Technical Manager Keith has extensive knowledge of both the structural design of glulam buildings coupled with the technical aspects associated to glulam manufacture and logistics of installation.

Brent Dicks - is our Production Manager. Brent has a background in the design and manufacture of aerospace components, and provides a link between the design and manufacturing process. He plays a key role in informing the practical implementation of design in the workshop and during installation on site.

Antonio Savinelli - an Engineer graduate of the University of Naples (Italy). Antonio joined our technical team in 2018 and focuses on structural design - from simple projects to complex geometry needing three dimensional structural modelling.



SERVICES

GLULAM PRODUCTION

Left: the film crew from BBC's Grand Designs record our Glulam manufacturing process. The bracing frame is set to the specified curvature and our carpenters position layers of glued timber until they reach the required size. Once in place all of the timbers are clamped, covered and heated - curing the glue overnight.








SERVICES

GLULAM CANOPIES

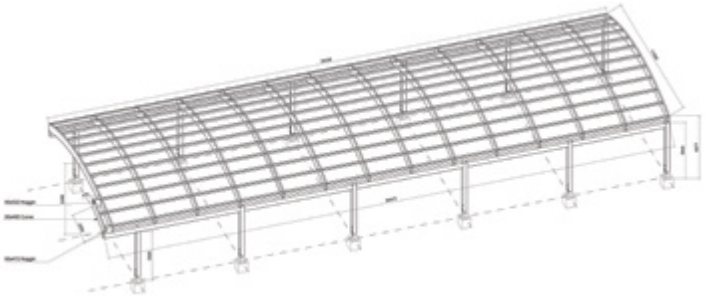
We design and manufacture a range of glulam canopy frames which are used to create outdoor covered spaces. These are usually supplied as frame only for installation and roofing by others. We can include an installation service or recommend one of our supply partners on request.

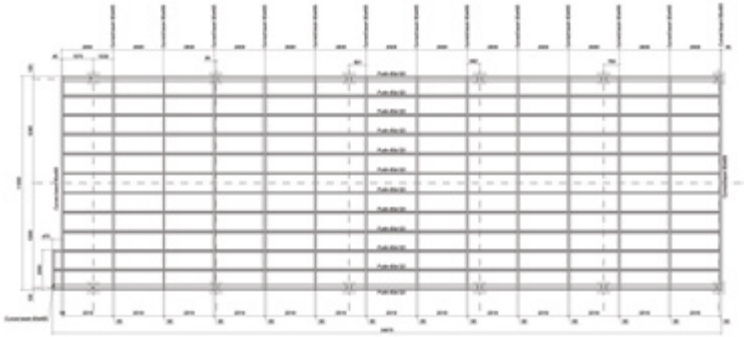
Canopies can be designed as wallmounted or freestanding, curved or straight. As standard these are manufactured from spruce glulam with a two coat stain applied, although other timber species are available on request. Roof material can be polycarbonate or tensile fabric.

Although the canopies are designed on standard principles, we are flexible with the design and can accommodate pretty much any plan layout or configuration with existing buildings.

Canopies can be as small as two metre square and up to a twelve metre span on similar design principles. Much larger spans are possible if required.

Note: many of the photos depicting canopies are supplied courtesy of Able Canopies. www.ablecanopies.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.

Sustainable Timber Sourcing

We ensure that all the timber we use comes from certified forests through an independently verified Chain of Custody.

Both FSC (Forest Stewardship Council) and PEFC (Programme for the Endorsement of Forest Certification) certification can be obtained from Buckland Timber on 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 GL24g	GL24h	GL24h	GL20h

The characteristic values for GL20h to GL32h glulam are listed in the table below (N/mm² 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/m³
							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}	ρ_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

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.

The table below provides a guide for standard sizes available in Spruce. Please note that wider beams can be manufactured by gluing multiple beams together.

	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

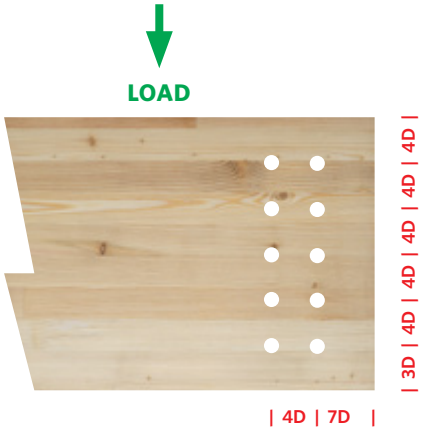
BOLT SPACING FOR BEAMS

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.

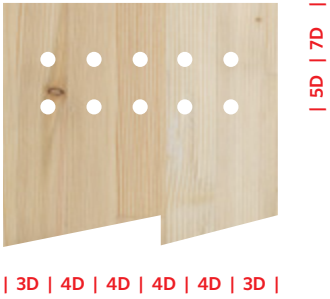
Please reference: Standards: BS EN 1995-1-1: 2004
D = bolt diameter

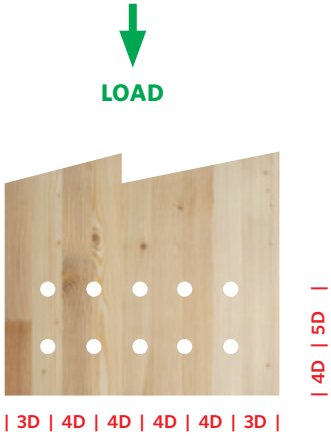
BEAMS WITH A LOADED EDGE PERPENDICULAR TO THE GRAIN

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.

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

ESTIMATED SECTION SIZE FOR GL24H IN MM												
	Example for floor beams						Example for Roof beams					
	Center to Center Spacing of Beams						Center to Center 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

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.

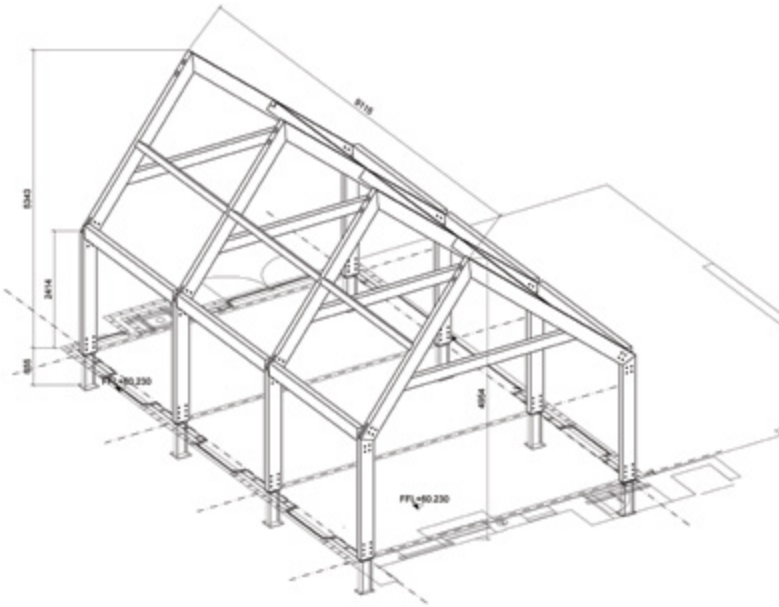
To do this we have considered a typical small project for us – a 9 x 5.7m house extension frame consisting of four portal frames. For the glulam options the materials used were 2.74 cubic metres of glulam and 255kg of steel brackets and fixings. The equivalent steel portal option we replaced the 115 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 SPECIES

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 organizations, 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.

It is always advisable to see samples of any timber species prior to placing an order.

Spruce - is the most cost effective and readily available timber for glulam manufacture. Also called Whitewood, Spruce is widely distributed throughout continental Europe and is a species of major economic importance. The large, fully grown trees usually have a straight trunk and grow to a height of about thirty meters, (the largest examples up to 55 metres). On average it is felled when its diameter measures around sixty centimetres. If left it can grow up to 1.5 meters.

Its colour ranges from a creamy white, light yellow to a reddish brown. The heartwood is not distinct from its sapwood. It is straight grained with thin and regular texture. The timber can emit sap even after being seasoned and machined. The wood is soft, easy to manipulate and work, low in weight and has a medium density. The strength properties are good, it is most commonly used in construction for both structural and internal joinery (skirting boards, architraves etc). It is an ideal choice for machining and structural application. Spruce wood from Central and Eastern Europe shows exceptional resonance qualities and is used for musical instruments like pianos, violins and guitars.

Siberian Larch - is usually fairly clear of knots and can provide a good option when something with a little more character than standard Spruce is required. It is classed as moderately durable and can be used in locations exposed to weather conditions (if suitably treated). It is a heavy and hard coniferous wood. The fairly thin sapwood is light-yellowish to reddish-yellow. The heartwood reddish-brown to glowing red when fresh, darkening to gold-brown. It has a clearly striped or grainy patterning. When exposed to natural light, Larch will eventually lose its natural colouring turning to a silver grey.

Siberian Larch is a frost resistant tree native to Western Russia. It is very slow grown with dense growth rings. It can be factory coated in SiOO:X, a breakthrough water based silicone technology, to provide a genuine silver lustre. The treatment creates a weathered appearance at an accelerated rate. Following application, regardless of protection and exposure, the timber takes on a consistent tone which provides a solution to differential weathering whilst strengthening the timber's surface and creating a water repellent layer.

Douglas Fir - originates in the North West of America. It was introduced 200 years ago into the UK and Europe as a fast growing sustainable timber primarily for use in construction. Properties of European Douglas Fir (mostly relating to the speed of growth and grain size) differ depending upon altitude and weather conditions - colder the climate, closer the grain.

The heartwood has a pinkish to dark red colour and is clearly discernible from the yellow sapwood. The sapwood has a thickness of between five and ten centimetres. The texture of the timber is medium, it has a fairly straight grain with the light and darker colours differing in terms of hardness. It can show some resin pockets (sometimes in large sizes). The timber has a medium density and good strength properties. Gluing and sawing properties are good, as well as nailing and screwing, but pre-drilling is necessary as there is a strong tendency for splitting.

As with Siberian Larch, Douglas Fir can provide a more characterful option to Spruce. It can be used externally (if suitably treated and maintained) with a recommendation to use sapwood free Douglas Fir.

Redwood (Pine) - or also called Scots pine, has a growth range larger than that of any other softwood. It can be found from Scotland to the Pacific Coast of Siberia, Norway, Mongolia and also in the Mediterranean region. The trees grow from ten to thirty meters tall, its largest sizes are up to forty meters in height. Scots pine from the Nordic countries is used for construction with large volumes of timber being produced in Scandinavia for housing. We often use Pine for our glulam as it is readily available in joinery (or 'unsorted') grade which is relatively knot free.

Pine has distinct yellowish white sapwood and reddish heartwood. Heartwood is clearly recognisable from sapwood. Slow grown Nordic pine is very easy to machine to a smooth surface. Knots are tightly fixed in the timber and normally limited in size. The big red knots are common and give a decorative character to the timber. The wood is soft, medium in weight and has a medium density. The strength properties are good. Sawing and machining is easy, gluing can at times be difficult depending on the percentage of resin in the wood. In the UK it is mostly used for construction and also for joinery, interior finishings and furniture.

European Oak - is an exceedingly strong, heavy and durable timber. It has an attractive light colour with a prominent grain. It is resistant to fungal attack, thanks to its dense constitution and long-living nature. Oak is slow growing, very dense with a tight grain. It has been harvested and used in a wide variety of applications from joinery, large construction timbers through to barrel making, bowls and small decorative household items.

Our use of Oak glulam is predominantly for small scale house extensions where a high quality is required. We usually use prime grade Oak boards for our glulam, meaning that although the material is a little more expensive, the finish and quality is guaranteed.

Please note: Oak glulam does not carry a CE strength certification grade as it is not included in the CE glulam standards. We recommend designing to GL24 grade for our Oak glulam beams. Oak is a natural material - it comes in a broad range of colours and tones. We cannot offer or guarantee uniformity throughout the wood, only the physical integrity of each component.

CASE STUDIES

The following pages list a range of commissions we have worked on since Buckland Timber was established. This is by no means the finite list of projects we have worked on but a valuable document of what we have produced. We have tried to compile the broadest range of projects here to help showcase the range of possibilities and different applications for glue laminated timber.

Harris + Hoole - Stanstead Airport, London

A complex glulam framework forms a dynamic lattice ceiling for the artisan coffee house at Stansted Airport. The framework spills out of the structure and offers a warm, natural, yet slightly futuristic space to relax.

In recent years the regularity of commissions where glulam plays an important part in a commercial interior, shop or restaurant has been on the increase.

Glulam is such a versatile construction material - it can be shaped, formed and manipulated into complex curved elements, joined with hidden or exposed fixings and finished in a wide variety of colours and textures. In its natural form, glulam offers a beautiful highlight to any interior whilst ensuring it still offers a recognised structural integrity.

Specification

• Project:	Harris + Hoole - Stanstead Airport, London.
• Commission:	Engineering design, manufacture and installation.
• Project:	Commercial coffee shop and café.
• Architect:	Path Design Ltd. www.pathdesign.co.uk
• Timber:	British grown Larch.
• Fixings:	Secret fixings - Simpson tie systems.
• Finish:	Satin varnish / treated with fire retardant.

This installation is one of a number carried out within the UK's international airports. We are very aware of the restrictions and challenges this kind of project demands. As well as airports we have experience in working in exhibition venues, hospitals, schools and universities.

The Jubilee Pool - Hillingdon, Middlesex

A single storey framework designed to enclose a school's existing swimming pool - protecting it from the elements, and making the pool a much more luxurious space for the pupils to use and enjoy.

It's very common to see glulam beams and timber frameworks adopted for the construction of swimming pools and leisure spaces. In this instance a private school commissioned Buckland Timber to manufacture and supply a glulam framework to enclose their existing outdoor swimming pool.

The completed structure affords a beautifully natural finish, making the space an ideal environment (free from the constraints of the UK weather) to relax all year round and spend time.

The combination of Spruce and Cedar, although different in tone and grain definition, when used together complement each other very well to form a very dramatic, naturally comfortable space.

Specification

- Project: Hillingdon Manor School.
- Commission: Engineering design, manufacture and installation.
- Architect: Mark Baldwin. www.plansdesigned.co.uk
- Project: New cover to an existing pool for a school.
- Commission: Engineering design, supply and installation of frame.
- Timber: Framework - glulam in Spruce. Internal cladding Cedar (supplied by others).
- Fixings: Concealed internal fixings / Stainless base shoe.
- Finish: The structural beams and purlins were prepared 'off site', sanded and varnished as part of the final interior finish.
- Cost (approx): £150 per square metre - for engineering design and manufacture.

Above: the primary roof and wall structure was constructed from Spruce glulam - once installed overclad in Cedar.

Household extension - Eastleigh, Southampton

A small, but beautifully formed, three metre square footprint houses a discrete glulam extension for an end of terrace property - inviting valuable natural light into the property and introducing broader views of the garden and external spaces.

With a little thought, consideration and detailing glulam can be an ideal solution even for the smallest of projects. In this instance a larch glulam, box framework made up the majority of the household extension. Window and door frames were inset into the framework, and a traditional roof structure applied above.

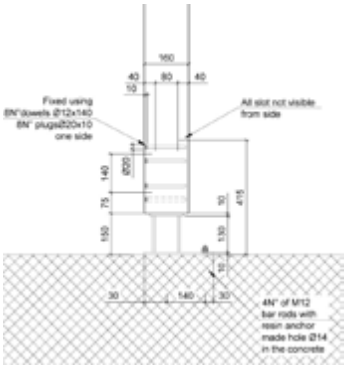
The resulting structure complements the traditional brickwork façade whilst adding a little personality, all of its own.

The 'off site' construction of the glulam components meant that 'on site' construction time could be scheduled and managed. This ensured that even in this cramped building site, the day the framework was required was the day that it arrived and was erected.

If your carbon footprint is a concern, this construction solution using locally grown Larch, was finished in our Crediton workshop with bespoke steel fixings manufactured in the same town - it resulted in possibly one of the smallest carbon footprints of any of our projects to date.

Specification

- Project: Private commission.
- Commission: Engineering design and supply of structural glulam frame.
- Timber: UK grown Larch.
- Finish: The structural beams and purlins were prepared (off site), sanded and varnished as part of the interior finish.
- Fixings: Concealed fixings, galvanised base shoe.
- Cost (approx): £400 per square metre - for engineering design and manufacture.



Images from top: Completed project, roofed and glazed ready for occupation. Construction drawings detailing the structure of the glulam posts and fixing instructions into the raft foundation.

Curved Oak Conservatory - Hampshire

A bespoke glulam oak framework, manufactured to receive curved double glazed units and finished with a dusting of white, transparent stain - showcasing the natural splendour of timber.

A large proportion of our commissions are for straight glulam beams, the sort you find specified for wall, floor or roof substructures. Yet, quite regularly we are contacted and asked if we can manufacture curved beams - and we can. For this specific commission the challenge was to manufacture a complex combination of curved (and profiled) Oak glulam beams.

The complex curved oak structural framework and integral window framing once positioned was to be fitted with curved double glazed units. The tolerances where very tight - there was to be no flexibility within either the radius of the curve or the sizing of the glass units, so it was essential that the completed project was manufactured, supplied and fitted with millimetre perfect tolerances. This was achieved by 'copy routing' each beam using CNC cut steel templates. The connection design for this project added to its complexity. Resin was used to enable 'moment connections' (resistant to over-turning) which passed through all the principal beams.

Specification

- Project: Private commission.
- Commission: Engineering design, manufacture and installation.
- Architects: David Kohn Architects - London. www davidkohn.co.uk
- Engineer: HRW - London. www.ehrw.co.uk
- Timescale: Six weeks engineering calculation / design. Twelve weeks fabrication. Two weeks on-site installation.
- Timber: European Oak.
- Fixings: Stainless steel tie system / resin anchors.
- Cost (approx): £2500 per square metre - for engineering design, manufacture and installation.

Clockwise from top:
> work in progress - on-site installation in progress.
> aligning the different elements which make up the bulkhead.
> a profiled cill beam, sculpted in readiness to receive the vertical window posts.
> dry-fit - assembling the complete project in the workshop

Saint John's School - Leatherhead, Surrey

At Saint John's School the roof structure is built to an industrial scale! But due to the material qualities of the glulam construction it is exposed, celebrated and has become part of the fabric and personality of the building.

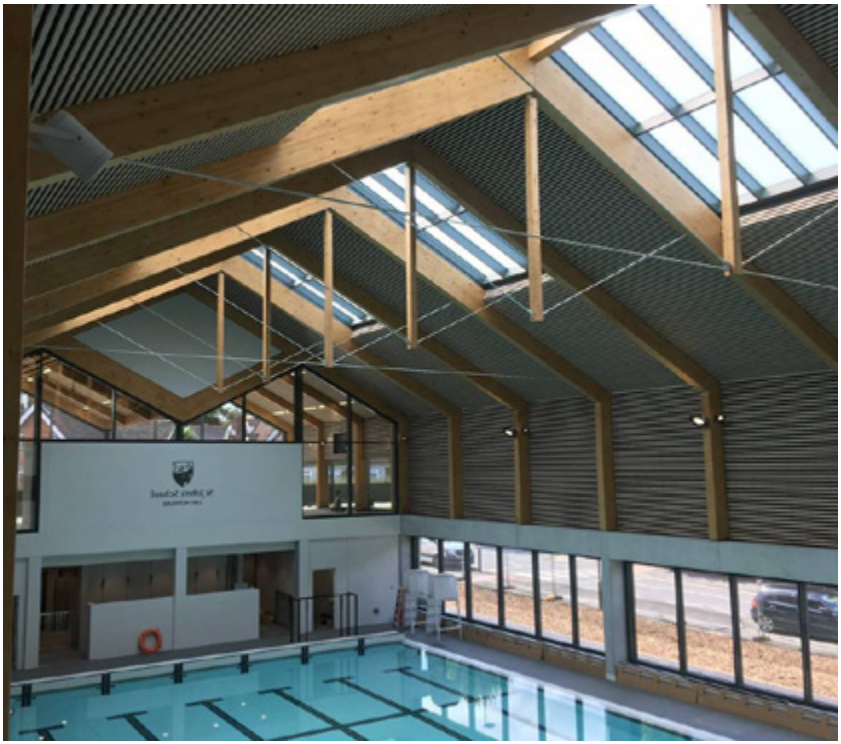
This is one of Buckland's largest single commissions to date. Our project at Saint John's School has a footprint of over 900 square meters and spans over three different buildings. Industrial sized glulam columns support straight glulam roof trusses interwoven with galvanised, diagonal bracing.

Throughout the project structural fixings were hidden beneath the face of the glulam beams. Steel dowels align post and rail, inset within the glulam structure, sited across galvanised steel plates.

The eaves joint in the mail pool hall required design detailing to resist a high bending moment. The joints were manufactured in the workshop, thereafter each portal was delivered to site in halves and jointed together with a simple apex connection.

Specification

- Project: Saint Jonh's School - Leatherhead.
- Commission: Engineering design, manufacture and supply of glulam frame.
- Architect: Faulkener Browns - Newcastle. www.faulknerbrowns.com
- Engineers: Elliot Wood - London. www.elliottwood.co.uk
- Contractor: Management & Construction Services Ltd. www.mcs-construction.co.uk
- Timber: Spruce.
- Finish: Steelwork epoxy painted to suit environment with high levels of moisture.
- Fixings: Concealed dowelled / flitch plate connections.
- Cost (approx): £200 per square metre - for engineering design, manufacture and installation.



Dalewood - Private Residence

This complex, interwoven glulam roof structure provides a visually dynamic piece of architectural design. The form is not just a visual one, it also provides the structural integrity needed for a huge five metre cantilever.

The roof structure changes in mass across the footprint of this project. Starting at its thickest in the centre, spanning out to its thinnest at the extremities. This provides a peculiar optical resonance, making the appearance of the structure constant, yet curving rather than diminishing. Each element of the Siberian Larch structure was selected and finished by hand. The larger intersecting roof beams were inter spliced with bracing struts. Due to the changing depth of each beam no two elements were the same size or shape. The project is composed of over 150 different bespoke beams.

The project is a result of a competition winning design by Tigg Coll Architects and transforms a 1930s bungalow into a light, spacious and barrier free home for two children, who both suffer from Duchenne Muscular Dystrophy (DMH). DMH is a generic disorder characterized by progressive muscle degeneration and weakness which will mean that the childrens needs will dramatically change over time.

Specification

- Project: Dalewood - Private residence.
- Commission: Engineering design, manufacture and installation.
- Architect: Tigg Coll. www.tiggcollarchitects.com
- Engineer: Engenuiti. www. engenuiti.com
- Timber: Framework - Siberian Larch. Roof covering - composite plywood.
- Finish: Sanded by hand and finished with white tinted Osmo oil.
- Fixings: Skew screwed concealed fixings.
- Cost (approx): £800 per square metre - for engineering design, manufacture and installation.

Above and left: 'work in progress' - the structure steadily comes into shape on site. The dynamic design of the roof structure brings an interesting quality to the otherwise minimal design - installation on site.

Below: architect's impression of the completed project - © Tigg Cole.

Westquay Shopping Centre - Southampton

Five pairs of three storey beams form an eye catching, sculptural partition which punctuates the space at Westquay Shopping Centre in Southampton. The Glulam beams support a huge semicircular collar, framing the balcony, bar and café areas.

For this commission Buckland were presented with a very conceptual sketch of a 'feature structure'. We took the initial concept and developed it into a buildable structure, whilst respecting the original architectural intent. All of the aspects of this projects were complex - from the manufacture of, very tight (840mm) radius ribs in one piece to the 'on site' installation (on the tightest of site footprints) using the dexterity of a spider crane.

Specification

- Project: Westquay Shopping Centre - Southampton.
- Commission: Engineering design, manufacture and installation.
- Project: Focal point / open partition.
- Architect: Scott Brownrigg - London. www.scottbrownrigg.com
- Timber: Siberian Larch.
- Fixings: Bespoke curved stainless tubing / Recessed, stainless bolts and curved circular hollow section radial ties.
- Finish: Clear satin, water based varnish.
- Cost (approx): Total project cost: £60,000 - for engineering design, manufacture and installation.

Oat Errish Farm - Blackdown Hills, Devon

Situated deep within the Blackdown Hills in Devon, Oat Errish Farm is a new build family home, built to meet the demands of National Planning Policy Framework (NPPF) Paragraph 55, and featured on Channel 4's Grand Designs as a great example of experimental architecture.

This was one of the most ambitious projects ever seen on Channel Four's Grand Designs. A commission by partners Stephen (*head of the Institution of Mechanical Engineers*) and wife Elizabeth (*a committed horticulturist*). Together they wanted to construct a home that reflected both their passions - a combination of engineering influenced by nature. Stephen and Elizabeth visited the factory some time before the project started. We provided initial structural advice on the scheme and costings that informed further detailed design.

Taking its original inspiration from an ammonite shell, the house spirals onto the landscape over two levels and combines natural materials with cutting edge technology.

Specification

- Project: Oat Errish Farm - Private residence.
- Architect: Sadler Brown Architecture. www.sadlerbrown.co.uk
- Commission: Engineering design, manufacture and supply.
- Project: Private residence.
- Commission: Design, supply of glulam framework.
- Timber: British grown Larch.
- Finish: The structural beams and purlins were prepared 'off site', sanded and varnished as part of the final interior finish. Sioo treatment externally.
- Cost (approx): £250 per square metre - for engineering design and manufacture.

Buckland Timber were commissioned to manufacture the curved ribs which construct and frame the complete experimental home. Spanning over two stories high the ribs structurally punctuate the project, bringing it to life whilst celebrating the material quality of the build.

Chris Beardshaw - Chelsea Flower Show, London

Along with our day-to-day structural commissions we are often approached to manufacture sculptural glulam components to highlight the interiors of restaurants, commercial settings and in this instance for the RHS Chelsea Flower Show.

To be awarded an RHS Gold Medal for your garden design at Chelsea Flower show you have to be superbly creative, very forward thinking and plan your design well in advance. For his 2019 Morgan Stanley Show Garden, Chris Beardshaw contacted us way back in 2018 to discuss the viability of glulam.

Whilst his flowers and plants were growing in readiness for their big day, we too were busy. We worked in secret to produce the 'built' elements of his garden design, bending and jointing glulam elements to form the framework of his garden structure.

The resulting pair of curved beams were over six meters long and when positioned vertically measure over two and half metres between the supporting arms.

Chelsea Flower Show is all about 'off site' construction, so Buckland's ability to form, finish and safely wrap the beams in readiness for the show was key in us being awarded the project. Our large-scale workshops affords us the space to form beams of an industrial scale and store them until sites across the country are ready for their collection or delivery.

Specification

- Project: RHS Chelsea Flower Show - 2019.
- Commission: Engineering design, manufacture and supply.
- Design: Christopher Beardshaw - www.chrisbeardshaw.com
- Timescale: Two weeks engineering design. Four weeks fabrication.
- Timber: Redwood.
- Fixings: Resin fixed anchor bolt system.

Top: watercolour impression of the garden design © Chris Beardshaw 2018

Royal Holloway University - Egham, Surrey

It's a difficult job for all universities to fulfil the social needs of the students and staff on any contemporary campus. The new Boiler House Café at Royal Holloway University offers modern café culture whilst celebrating the heritage of its surroundings.

The completed scheme showcases Buckland's ability to deliver a technically challenging project within a restrictive site with difficult access, on time and within budget. We worked closely with the architect and engineer to develop a detailed solution, successfully bringing this complex design proposal into fruition. Work was carried out safely and accurately throughout this project - with professionalism, attention to detail and care on the 'live' university campus, minimising any disruption to visitors, staff or students.

An indication of the complexity of this project is the fact that the 704 acoustic ceiling triangles, (which we manufactured, supplied and installed) were all individual! To make the hole pattern in the triangles aesthetically successful we set out unique hole spacing patterns for each triangle. Our drawing software provider developed a HSBCADS software extension (a bolt-on for 3D modelling) which enabled us to prepare the CNC files for manufacture.

Specification

- Project: Boiler House Café
- Commission: Engineering design, manufacture and installation.
- Client: Royal Holloway University. www.royalholloway.ac.uk ARJ Construction. www.arj.co.uk
- Architect: Cartwright Pickard. www.cartwrightpickard.com
- Engineer: Team 4 Consultants - www.team4consulting.com
- Timber: Douglas Fir.
- Fixings: Bespoke designed bracket system.
- Finish: Water based satin varnish, clear 'O' rated fire retardant lacquer to roof panels.

Sidmouth Donkey Sanctuary - Jurassic Coastline, Devon

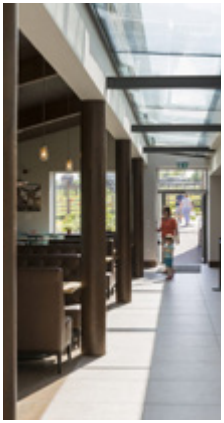
The newly built 200 seat visitor centre has helped the Donkey Sanctuary accommodate their increasing visitor numbers. The building cantilevers out providing a south facing terrace for guests to enjoy rolling valley views towards the picturesque coastline.

The LHC architectural team were asked by The Donkey Sanctuary to design a restaurant, visitor centre and shop at Slade House Farm, near Sidmouth. Buckland Timber were commissioned to manufacture and install the glulam structure which would frame the building, support the roof and provide the modern industrial aesthetic for visitors to the new space.

The main structure of the building was designed with a glulam framework, cedar shingle roof in a contemporary style, with adjacent restaurant section having a green sedum roof. Turned timber columns were manufactured and hollowed to clad the internal structural steel framework.

Specification

- Project: Visitor centre / Restaurant.
- Commission: Engineering design, manufacture and installation.
- Client: Sidmouth Donkey Sanctuary. www.thedonkeysanctuary.org.uk
- Architect: LHC Design. www.lhc.net
- Engineer: Clark Bond. www.clarkbond.com
- Timber: Interior - Spruce / Exterior - Douglas Fir.
- Fixings: Steel flitch plates, metal dowelled to posts.
- Finish: Walnut staining throughout.



RNLI Lifeboat Station - Penlee, Cornwall

A new replacement for Penlee Lifeboat Station, featured in the BBC's Saving Lives At Sea series, received Planning Permission in September 2017. Providing modern crew facilities in Newlyn Harbour, including a larger Crew/Operational Room, Training Room, Changing Room and adjacent Workshop.

There are two lifeboats stationed at Penlee, an all-weather Severn Class lifeboat and an Inshore Atlantic 85. It was proposed to demolish the existing building and to build an extended station on a larger footprint. The works are necessary to provide modern crew facilities in line with current standards.

Buckland Timber were contracted to carry out fabrication, design, supply and installation of the frame and T&G structural roof deck. A 50mm thick T&G roof deck is often a cost effective option as it forms the finished ceilings internally and also negates the need for secondary purlins. We have used T&G structural roof decks on many of our projects.

Specification

- Project: Engineering design, manufacture and installation.
- Commission: Glulam portal frame structure.
- Client: Symons Construction. www.symonsconstruction.co.uk
- Architect: Studio Four Architects. www.studiofourarchitects.com
- Engineer: Marbas. www.marbas.co.uk
- Timber: Douglas Fir.
- Fixings: Galvanised steel fixings.
- Finish: Clear 'O' rated fire retardant treatment to underside of roof deck. one coat, clear varnish to glulam framework.
- Cost (approx): £440 per square metre - for engineering design, manufacture and installation.

Dutch Barn Conversion - Pencuke Farm, Cornwall

For an eco holiday, Pencuke Farm offers a very interesting and forwarding thinking option - converting an existing Dutch barn for use as 'low tec' but 'high quality' eco holiday accommodation.

Sustainability is at the heart of the design, with all of the heating, hot water and electrical facilities being powered by solar power or (when the Sun is not out) through a biomass boiler - using renewable wood pellets to drive the system. The rooms are beautifully finished and comfortable with solar powered under floor heating.

Buckland carried out an initial site visit, discussed the scheme and joint options available with the client and carried out the structural design of the glulam prior to its manufacture and installation.

Specification

- Project: Residential building
- Commission: Engineering design, manufacture and installation.
- Client: Pencuke Farm. www.pencukefarm.co.uk
- Architect: TFQ Architects. www.tfqarchitects.co.uk
- Timber: European Redwood.
- Fixings: Counter bored bolts with form G washers, purlins connected using skew screws from top.
- Finish: Clear varnish.
- Cost (approx): £114 per square metre - for engineering design, manufacture and installation.

Hearne Community Centre - Kent

The new state of the art community centre serving the residents of Hearne opened in June 2018. Eight Gothic inspired glulam arches provide the structural framework of the building. Each arched pair rise up the two stories of the space and join the glulam ridge to provide a dynamic space for leisure, entertainment and relaxation.

A basic portal frame with a few added finishing and jointing details is at present very popular with a wide range of our clients. We have manufactured, delivered and installed a broad spectrum of public, private, civic and community buildings including places of worship. All adopting glulam portal frameworks, finished internally with exposed curvilinear arches.

Perhaps it is because of the fact that we can manufacture complete frameworks 'off site' and supply all of the materials required for installation in a single delivery. This tried and tested approach reduces the risk of 'on site' damage and helps to inform sustainable construction timetables.

Specification

- Project: Community Centre.
- Commission: Engineering design, manufacture and installation.
- Client: BEC Construction Ltd. www.bec-construction.co.uk
- Architect: Judge Architects Ltd.
- Engineer: AJ Locke Consulting.
- Timber: External - Larch / Internal - Spruce.
- Fixings: Bespoke steel joining plates.
- Finish: Water based satin varnish.
- Cost (approx): £225 per square metre - for engineering design, manufacture and installation.

Griffon House - Sussex

For this project we were commissioned to manufacture a number of bespoke curved roof joists. They had to be exact in size, shape (radial curved) and finish. After all, for a successful Paragraph 79 house it is all about the detail.

Griffon House is located in Plumpton Green, a countryside village in the heart of East Sussex. This unique building was designed by award winning architect, Lap Chan of Morgan Carn Partnership, to blend with the rural setting of the site and to be highly sustainable. The form and features of the building have been inspired by a local folly and its former use as WWII airstrip.

Planning approval was granted by Lewes District Council under Paragraph 79 of the National Planning Policy Framework (NPPF). This is a government policy that in exceptional circumstances allows the construction of new dwellings in isolated rural locations so long as they are of truly outstanding design or innovative.

The building therefore needed to be designed and built to achieve Code Level five of the Code for Sustainable Homes. The house would need to achieve high insulation values, thermal mass and utilise renewable energy technologies. On top of this the building fabric would have to be flexible and robust enough to fulfil the curved design envisioned by the architect.

Specification

- Project: Thermo house.
- Commission: Engineering design, manufacture and supply.
- Client: Agilitee.
- Architect: Lap Chan - Morgan Carn Partnership www.morgancarn.com
- Timber: Spruce.
- Finish: Surface spread of flame treatment / water based satin varnish.
- Cost (approx): £50 per square metre - for engineering design and manufacture.

Cathedral Yard - Exeter

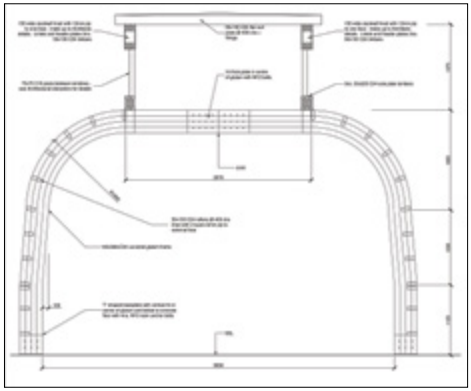
A fire in Exeter devastated two historic buildings, The Royal Clarence Hotel (1769) and 18 Cathedral Yard (1799). Both buildings had to be totally rebuilt including the reconstruction of a complex vaulted roof structure. Even though both buildings were listed, planners allowed the use of glulam in the reconstruction.

This was a conservation project using the strength and characteristics of glulam timber for the replacement of architectural heritage. Where normally 'like for like' would be used within the restoration of heritage structure - in this case, and due to the severity of the damage (the fact the building was raised to the ground with fire) the conservation officer supported the use of glulam to reinstate the barrel vaulted upper gallery roof to 18 Cathedral Yard, Exeter.

Even though the tight curves of the barrel vaulted roof structure appeared difficult to replicate, using the flexibility of Bucklands steel formwork system, they were quite simple to re-create.

Specification

- Project: 18 Cathedral Yard - Exeter.
- Commission: Engineering design, manufacture and install.
- Client: Classic Builders. www.classic-builders.co.uk
- Architect: Oxenham Consultants Inc. www.oxenham.com
- Timber: Spruce.
- Fixings: Concealed screws / galvanised brackets.
- Finish: Clear varnish.
- Cost (approx): £600 per square metre - engineering design, manufacture and installation.



Oakridge - Great Missenden

Architects Holland and Green specialise in high-end residential development and are practiced in the application of glulam structures to create very individual spaces.

At Oakridge Buckland designed three portal frames to provide structural stability and resist the high loads applied by the cantilevered steel roof structure. The steel plates where fully concealed with fixings plugged and sanded on site. Installation involved cranage over the existing house which was arranged, managed and supervised by Buckland Timber.

For some architects and designers it is very strange to consider proposing a building where the structural support is timber overlaid with steelwork - surely that's the wrong way around! But no, glulam has amazing structural capabilities and can be specified and manufactured to match steel. And of course, it looks much nicer and is more welcoming and warmer than steel!

Specification

- Project: Residential extension.
- Commission: Engineering design, manufacture and install.
- Client: Stuart Barr Construction. www.stuartbarr.co.uk
- Architect: Holland and Green Architectural Design. www.hollandgreen.co.uk
- Engineer: Beal Consulting Engineers. www.beal-uk.com
- Timber: Spruce.
- Fixings: Concealed steel dowels.
- Cost (approx): £313 per square metre - for engineering design, manufacture and installation.

Note: we also specified, detailed and fitted the steelwork throughout, although it was supplied by others.

Bunavoneader - Isle of Harris, Scotland

The Outer Hebrides is quiet, peaceful and remote an ideal place to site a building designed for rest and relaxation. This project site is located on the Isle of Harris, overlooking the beautiful Loch Shiphoirt to the south.

An experimental architectural design integrates glulam and green roofing to produce a wonderfully unique eco friendly structure. Set in a picturesque but at times challenging weathery environment, the finished building affords comfort and shelter, nestling discreetly into the Scottish hillside.

A basic framework of eight glulam curved beams sets the foundation to build this unique conjoined structure. Glulam ribs interconnect with the curved beams to form the structural frame which was then sheeted, roofed and turfed with vertical sides insulated and over clad.

Specification

- Project: Coastal retreat.
- Architect: nKm Architects - London. www.nkmarchitecture.com
- Contractor: O'Mac Construction.
- Timber: Spruce and UK grown Larch.
- Fixings: concealed galvanised steel flitch plates and steel dowels.
- Finish: Sioo treatment to external glulam.
- Cost (approx): £240 per square metre - for engineering design and manufacture.

Ugly House to Lovely House - Channel 4

Award winning architect Will Alsop designed a dramatically detailed, glulam barrel vaulted extension to bring an outdated bungalow in West Sussex back to life, propelling it into the future.

As well as working on large scale construction projects, Buckland Timber is regularly commissioned to help design, manufacture and install smaller bespoke buildings. One such project was for Channel 4's Ugly House to Lovely House television programme. Channel 4 contacted us to see if we could help manufacture the experimental elements for the transformation of this sixties bungalow.

Architect Will Alsop was famous for pushing the perimeters of design. With our help, the combination of shape, material and form resulted in a very successful, futuristic, architectural design solution. The installation process was complex and televised to add to the pressure, but ably carried out by Bill Bradley and his team of Ecoism Manufacturing Ltd.

Specification

- Project: Ugly House to Lovely House.
- Commission: Design and manufacture of roof structure.
- Architects: Alsop Architects - London. www.all.design/will-alsop
- Installation: Ecoism Manufacturing Ltd. www.ecoism.co.uk
- Timescale: Two weeks design. Three weeks fabrication. One week installation.
- Timber: European Redwood.
- Fixings: Stainless steel Macalloy tie system. Purlins secured with skew screw fixings.
- Cost (approx): £250 per square metre - for engineering design and manufacture.

Chanter's Pool - Ottery St Mary, Devon

A bespoke glulam framework houses a beautifully detailed bespoke, private swimming pool. Finished internally with exposed timber and large, eye catching cantilevered eaves details.

Sometimes juxtaposing historic and modern buildings can result in a very interesting architectural interplay. In this instance the commission was to work with an architect's proposal for a bespoke swimming pool and develop a glulam structure with effective structural (and aesthetic) sensibilities.

The initial structural design included a large proportion of expensive stainless steel connectors. With a little engineering scrutiny and some fine tuning, these were removed and integrated instead with a 60mm thick glulam tongue and groove roof structure (which meant no secondary joists or purlins were required to complete the structure). The underside of the glulam roof was incorporated as part of the internal timber aesthetic - alongside exposed vertical framework and roof beams.

Specification

- Project: Private commission.
- Commission: Engineering design and manufacture of bespoke structure.
- Design: MIME Architects - London and Bristol. www.mimearchitects.co.uk
- Commission: Design and supply of bespoke structure.
- Timescale: Two weeks design. Four weeks manufacture.
- Timber: Spruce glulam.
- Fixings: Structural T&G decking (60mm thick).
- Cost (approx): £120 per square metre - for engineering design and manufacture.

The external curtain walling is designed to shroud the structural glulam framework - colour coded to match the contemporary, black metal roof finish. The glulam roof extends beyond the curtain walling forming a generous walkway around the building's edge affording shelter from weather and shielding the pool from direct sunlight.

Mostyn Road - Wimbledon

"It was great working with Buckland Timber. They really understood the design intent ensuring that the finished building was beautifully crafted, and afforded the timeless look which exposed timber interiors impart". Marty McColl - UP Architects - London

Buckland Timber worked closely with Marty McColl of UP Architects to realise this vision for a simple and cost effective glulam framed extension structure.

This project was driven by a young family's need for more space after they decided they wanted to stay in the house they lived in rather than move to a bigger property. Buckland Timber coordinated the off-site construction of the glulam frame and roofing structure, transportation and on-site installation of the building's glulam framework.

Specification

- Project: Private commission.
- Commission: Engineering design, manufacture and supply.
- Architect: UP Architects - London
  www.uparchitects.co.uk
- Timescale: Two weeks design.
  Four weeks manufacture.
- Timber: Spruce.
- Fixings: Galvanised steel feet / Concealed screw fixings.
  Simpson aluminium hangers.
- Cost (approx): £360 per square metre - for engineering design, manufacture and installation.

Below: it's interesting to see how close the original architect's digital rendition of the project is to the completed building © UP Architects.

Wellington Academy - Tidworth, Wiltshire

Buckland Timber were commissioned to manufacture and supply some very large glulam beams and large panels of Cross Laminated Timber (CLT). Once installed these oversized components became the focal point of the space - forming the ceiling of the two story atrium space.

Where public buildings (in this instance a college) are increasing in scale, the materials needed to construct them are too. For this commission some rather large glulam panels were craned into position supported by a number of huge joists. The completed installation resulted in a very dynamic space shrouded in glulam. The installation of the CLT panels in one day helps to illustrate the programme benefits that using CLT can achieve. In terms of 'off site' construction both CLT and glulam can have a positive impact on tight 'on site' construction programmes as well as impacting on storage on sites with restricted space for material storage.

Specification

- Project: Design supply and install three 900 x 480mm glulam beams and a 180mm thick structural deck with large circular openings.
- Client: Mi-Space (UK) Ltd www.midasgroup.co.uk
- Architect: Kendall Kingscott Ltd www.kendallkingscott.co.uk
- Engineer: Hydrock www.hydrock.com
- Timber: Spruce
- Fixings: Galvanised bolts with form G* washers (*larger diameter washers)
- Finish: Surface spread of flame treatment / varnish.
- Cost (approx): £300 per square metre - for engineering design, manufacture and installation.

A bespoke 'fall arrest system' was developed for this project to allow the uninterrupted installation of the glulam deck. The installer in the photograph is tethered to this (an anchored harness restricting length of travel - limited and adjusted to the edge of each section, as installed). This method allows the setting to not need guard rails, enabling a faster installation process.

Drum House - Wells, Somerset

An existing bungalow was demolished and the site remodelled to afford space for a new stylish building that makes the most of its dramatic views towards Wells Cathedral, Glastonbury Tor and the Somerset Levels.

Buckland Timber were commissioned to manufacture a glulam framework structure which would form the basic skeleton of the building. The framework included a set of double curved roof trusses which would form the focal point of the interior spaces and offer support for the roof whilst cantilevering over the eaves.

Siberian Larch was specified for the project because of its inherent structural integrity and for the beauty of its tight, colourful wood grain. When laminated to manufacture glulam the different visual range of wood tones work well to produce a stunning framework, punctuating both interior and exterior spaces.

Specification

- Project: Residential - new build.
- Commission: Engineering design, manufacture and supply of curved beams and posts.
- Client: Chivers & Co Ltd.
- Architect: Batterham Smith Architects. www.batterhamsmitharchitects.co.uk
- Timber: Siberian Larch.
- Cost (approx): £94 per square metre - for engineering design, manufacture and supply.

Indoor Riding Arena (Horse Manège) - Hemel Hepstead

Due to the scale and nature of activity, horse arenas demand clear, uninterrupted spaces to function. This is often achieved through the adoption of steel framed structures. It does provide the engineering integrity needed but doesn't have the warmth and natural luxury that timber affords. This completed project is industrial in scale but is softened by the natural warmth of the glulam structure - it successfully houses the curtain walling whilst internally providing a relaxing environment to enjoy.

The client required an enclosed light airy space for various horsing activities and to create a modern space connected to the landscape and the surrounding farm buildings. The timber frame is shaped to create a striking modern form with wall-to-wall glazing and covered with a metal panelled roof.

Buckland took the scheme proposed by Atelier Architects and developed the structural design through to fabrication drawings. We helped develop the details of the glasing junctions with the architects and All Glass Systems Ltd.

The completed 20 x 40m footprint of the structure sits within the curtilage of a listed farmhouse.

Specification

- Project: Horse Arena.
- Commission: Portal frames - Engineering design, manufacture and installation.
- Architect: Atelier Architecture & Design Ltd. www.atelier-architects.co.uk
- Engineer: Design 4 Structures Ltd. www.design4structures.com
- Timber: Spruce.
- Fixings: Galvanised counter bored bolts.
- Finish: Teknos Aquatop.
- Cost (approx): £175 per square metre - for engineering design, manufacture and installation.

Bournville Gardens - Birmingham

Bournville Gardens provides 212 spacious homes within a safe and welcoming retirement community. There was a close partnership between The ExtraCare Charitable Trust, with Bournville Village Trust and Birmingham City Council. Bournville Gardens opened in November 2015 on the site of the former Bournville College.

The open three storey high entrance lobby is shrouded by the underside of the curved roof structure, punctuated with the glulam purlins. Four huge bespoke glulam beams span the fifteen meter building to form its beautiful curved roof. Throughout the building, the exposed roof structure provides an interesting punctuation to the stark rectilinear floors, walls and the warmth of the wood grain brings a natural, relaxing aesthetic to the modern interior.

Specification

- Project: Retirement Apartments.
- Commission: Engineering design, manufacture and installation.
- Client: Birmingham City Council.
- Architect: Bournville Architects www.bournvillearchitects.co.uk
- Engineer: Ward Consulting Engineers. www.wardac.co.uk
- Timber: Spruce.
- Fixings: Housed Purlins screwed into pockets.
- Finish: Water based satin varnish.
- Cost (approx): £150 per square metre - for engineering design, manufacture and installation.

Cycle Shelter - Buckland Timber

A detailed blend of style and durability, our cycle shelters are available in standard capacities of up to six cycles, or with higher capacities available to order. The cycle shelters are modular in design, which makes installation and extension easy.

Designed and built for strength and durability, our shelters are constructed with five 90 x 120mm glulam purlin beams set across the 60 x 140mm framework, securely bolted to galvanised steel feet. They provide a modern and stylish solution to secure cycle storage whilst maintaining weather protection, storage and promoting cycling.

If you are considering a small scale project, our basic cycle shelter form can be remodelled to be suitable for a: garden portico, dry BBQ area or weather protected storage space. For further information, please contact us directly.

Specification

- Materials: This example is manufactured from UK grown Larch, but it is also available in Spruce or Douglas Fir - with a choice of either a poly-carbonate or waterproof fabric roof coverings.
- Finish: Stained, varnished or left natural options.

Knole House, Conservation Studio - Sevenoaks, Kent

The historic building reopens to the public after a twenty million pound renovation project. The listed property underwent major building work, including the creation of a new conservation studio and improvements to its galleries, enabling its art and furniture collections to be enjoyed by the visiting public.

New rooms were opened to the public for the first time and urgently needed conservation work was carried out to the fabric of the house as well as to its historic collection: paintings, textiles and furniture.

Buckland Timber were commissioned to manufacture and install the new roof structure forming the conservation studio - a light airy space used for the maintenance and preservation of the art, furniture and the textile collection of the house.

Specification

- Project: Glulam roof structure.
- Commission: Engineering design, manufacture and installation.
- Client: The National Trust. www.nationaltrust.org.uk
- Architect: Rodney Melville and Partners. www.rodneymelvilleandpartners.com
- Engineer: SFK Consulting. www.sfkconsulting.co.uk
- Timber: Spruce.
- Fixings: Bespoke stainless steel tie-bar system.
- Finish: Water based satin varnish.

Ebdon Court - Weston-Super-Mare, Somerset

A large residential space designed to provide a safe and comfortable retirement environment - with on-site support and spaces for recreation and leisure. The exposed glulam framework contrasts well with the curtain walling and brightly coloured powder coated window frames.

Our commission from Rydon Construction was to manufacture and install a bespoke glulam framework. Once in place the framework juxtaposes a natural element to the man made materials forming the structure.

Specification

- Project: Residential home for the elderly.
- Commission: Engineering design, manufacture and installation.
- Client: Rydon Construction. www.rydon.co.uk
- Architect: Quattro Design Architects. www.quattrodesign.com
- Engineer: Criddy Pritchers Davidson. www.criddypritchers.co.uk
- Timber: Larch.
- Fixings: Internal galvanised steel plate.
- Finish: Surface spread of flame treatment - Water based satin varnish.

Wedding Marquee - Buckland House, Devon

Dedicating time for Continual Professional Development (CPD) is an important factor in maintaining our knowledge of developments in materials, processes and methods. We also always make time to experiment with new applications in glulam technology. One project which was informed by our investigation is our glulam marquee.

We are currently researching the application of modular frameworks, specifically geodesic domes. In our workshop we are developing a combination of glulam components to form small, self supporting structures. Once completed we hope to be able to offer a 'self build' component pack. This will enable our customers to compose their own structures, modifying the detail, finish, position (and number) of window and door openings.

Specification

- Project: Glulam marquee.
- Commission: Design and manufacture a glulam marquee framework for a wedding.
- Client: Buckland family.
- Designer: Robin Nicholson. www.bucklandtimber.co.uk
- Timber: Spruce.
- Fixings: Demountable steel ridge junctions.
- Finish: Natural (left unfinished).

Mill House - Shalford Village, Surrey

The client's brief was to extend and remodel the house across the ground floor, providing a light filled kitchen / dining area that would open out to maximize the potential of their beautiful gardens.

OB Architecture's design was based on an original drawing of the house (circa 1836) that depicts a cluster of pitched roofs, which were removed over time as the property has been remodelled and developed. The footprint of the new extension is located directly over the original foundations of the previous structure and reinstates the historic courtyard.

The roof is constructed from an oak glulam framework and clad in a bronze standing seam sheeting. The roof design incorporates two triangular roof lights which help to bring light deep into the plan.

Specification

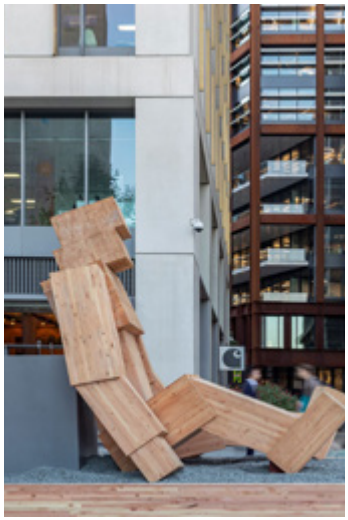
- Project: Private Residence.
- Commission: Manufacture and installation.
- Architect: OB Architecture Ltd. www.obarchitecture.co.uk
- Engineer: Momentum www.momentumengineering.co.uk
- Timber: Oak.
- Finish: White Tinted Osmo Oil.
- Cost (approx): £890 per square metre - for engineering design and manufacture.

Talk to Me - King's Cross, London

Multi-award-winning British designer, Steuart Padwick, showcased 'Talk To Me' a powerful and engaging two piece interactive installation situated along King's Boulevard in King's Cross. These large-scale works, standing over five metres high, were in support of the mental health anti-stigma campaign 'Time to Change'.

One of our more unusual commissions - two five metre tall, bespoke glulam giants. These housed a specially designed light and sound installation, displayed outside of Design Junction exhibition space - part of the London Design festival.

Certainly one of our most 'head turning' works, especially during its transportation from our workshop in Crediton to the installation in central London.



Specification

- Project: Time to Talk 2019.
- Commission: Bespoke glulam sculptures.
- Client: Time to Change. www.time-to-change.org.uk
- Designer: Steuart Padwick. www.steuartpadwick.co.uk
- Timber: Douglas Fir.
- Fixings: Internal resin anchors.
- Finish: Natural.

Rawlings - Bristol

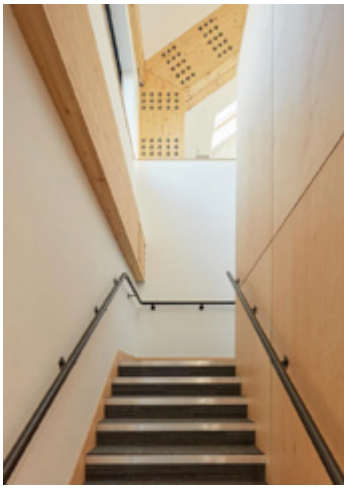
An exciting project to help construct a new headquarters for Rawlings - one of the oldest bottle supplier in the UK. The internal glulam frame was left exposed, celebrating the engineering details of this industrial architectural design.

The dramatic dark exterior hides a warm, industrially flavoured interior accommodating the head offices of one of Bristol's oldest manufacturing companies. The company was established in Bristol by William Rawlings in 1850, when glass was still being manufactured at two kilns in the city. Empty glass bottles were collected, washed and sold on to local wine merchants. An early example of entrepreneurial recycling!

Rawlings is the largest independent supplier to many of the UK's most popular brands. The Routley family are still the proud owners of Rawlings today.

Specification

- Project: Rawling's Head Office - Bristol.
- Commission: Engineering design, manufacture and installation.
- Client: Rawlings Bristol. www.rawlingsbristol.co.uk
- Engineer: Structural Solutions. www.structuralsolutions.co.uk
- Timber: Spruce.
- Fixings: Steel joining plates / galvanised through bolts.
- Finish: Water based satin varnish.
- Cost (approx): £290 per square metre - for engineering design, manufacture and installation.



Woody End - Teignmouth, Devon

Modern insulation interleaved within the structure of a roof can help open up loft spaces and create roomy interiors. This project in Teignmouth extended an existing property, creating a luxurious kitchen / dining space - punctuated with painted glulam King post trusses.

This commission was to manufacture and supply a pair of traditional kingpost trusses and associated ridge beams. A very simple project for us to fulfil and as the glulam was to be painted once installed on site there was no finishing for us to do in the workshop. Once in place the beams were painted as part of the interior decoration - primed, undercoated and finished in satinwood. Even though the beams were decorated, a white finish is often a good way to soften the impact of any exposed, large structural timbers.

We can supply a range of finishes with our glulam, from a nearly clear oil with a white tint, through to fully opaque white oil, stain, stained varnish and paint finishes.

Specification

- Project: Roof trusses for kitchen / diner.
- Commission: Design, manufacture, supply and installation.
- Engineer: Nichols Basker Partnership. www.nichollsbasker.co.uk
- Timber: Spruce
- Fixings: Painted / stained white.
- Cost (approx): £50 per square metre. For engineering design and manufacture.

Pret a Manger - Heathrow Airport, London

A set of flitched glulam beams stretch out from a single point to form a canopy, under which resides Heathrow Airport's Flagship Pret-a-Manger Café. The canopy provides spaces for rest, relaxation and sustenance for passengers travelling through London's busiest airport.

Heathrow is one of the UK's busiest airports, with over 23,000 passengers navigating the space each day! So, it's not too surprising to find that they need a few places to offer a little comfort, rest and sustenance between take-off and landings (Pret-a-Manger being one of them).

Buckand Timber were commissioned to produce the engineering details, manufacture each beam, schedule both 'off' and 'on-site' construction and navigate the strict 'air side' working policies to complete the installation process.

Over a three week period we worked through the night (the only time allowed for construction and maintenance to take place) to install the complex 'eye catching' meeting place.

Specification

- Project: Interior architecture.
- Commission: Engineering design, manufacture and installation.
- Architect: One Red Wall www.oneredwall.com
- Timber: Spruce.
- Fixings: Bespoke mild steel flitch beams and stainless 'pig nosed' bolts.
- Finish: Satin varnish / Treated with fire retardant.
- Cost (approx): £680 per square metre - for engineering design, manufacture and installation.

One constraint impacting on both the design and the installation was that the structure had to be transported to site via a 'goods lift' measuring approximately: 2m x 3.8m. The complete structure had to be modular in construction - a double flitch steel / timber sandwich allowed the elements to be assembled as a 'kit of parts'. The layering of materials also afforded space to accommodate services.

Copper Beaches - Indoor Riding Arena, Manchester

To achieve a visually outstanding, large scale construction project you've got to go a long way to beat the look and feel of glulam. The dynamics of this project resonate in a really successful way. Perhaps because of the size of the project and physical punctuation of glulam column and roof beams. These natural elements help frame the building visually, structurally and aesthetically.

This commission was for a single story equestrian building. By their nature, anything to do with horses has to be scaled up and where a number of horses would be trained and exercised in the same space the desired footprint would need to be huge.

The resulting building used all of the skills of Buckland Timbers staff team - the engineers designed and calculated the columns and beams, whilst the staff on the manufacturing side had to use almost all the formers to make the huge roof beams. Transport was coordinated allowing for an escorted lorry (due to the length of the roof beams) and once on site, an detailed installation process choreographed the errection of the framework.

Specification

- Project: Equestrian Arena.
- Commission: Engineering design, manufacture and installation.
- Client: Charles Britton Equestrian Construction www.charlesbritton.com
- Timber: European whitewood.
- Finish: Sadolin stain.
- Cost (approx): £95 per sq metre - for engineering design manufacture and installation.

Acknowledgements

A publication such as this would not be possible without the combined efforts of all of the contributors. We would like to thank all of the architects, designers and engineers and acknowledge their skills in the broad range of projects featured in this publication. We would like to express our sincere gratitude to everyone who has given permission for the projects to be published. Every effort has been made to contact the architects and designers for permission: however, any omission or incorrect listings should be notified to us- we will be pleased to amend any future editions of this publication.

Architects & Designers:

Able Canopies
Alsop Architects
AR Design Studio Ltd
Atelier Architecture
Mark Baldwin
Batterham Smith Architects
Bournville Architects
David Kohn Architects
Christopher Beardshaw
Cartwright Pickard
Faulkener Browns
Sadler Brown Architecture
Scott Brownrigg
Kyle Smart Associates
Studio Four Architects
Tigg Coll
Path Design Ltd
LHC Design
TFQ Architects
Judge Architects Ltd
Lap Chan - Morgan Carn Partnership
Oxenham Consultants Inc
Holland & Green Architectural Design
nKm Architects
MIME Architects
Marty McColl - UP Architects
Kendall Kingscott Ltd
Charles Adams Partnership Ltd
Steuart Padwick
One Red Wall

Engineers:

HRW - London
Elliot Wood
Engenuiti
Team 4 Consultants
Marbas
AJ Locke Consulting
Beal Consulting Engineers
Hydrock
Design 4 Structures Ltd
Ward Consulting Engineers
SLR Consulting
Structural Solutions

DESIGN / LAYOUT: CARL MIDDLETON

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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At Buckland Timber we have been making bespoke glulam beams for almost a decade - we are the largest manufacturer of glulam beams in the UK. Our work has been featured a number of times on TVs Grand Designs, been part of RIBA award winning architectural projects and helped win RHS Gold at Chelsea Flower Show.

Our team of structural engineers, designers and joiners allow us to support construction projects which range in scale from a small garden studio to a huge equestrian arena.
If you have a project where you are contemplating the use of glulam or you have never used glulam before get in contact, we are always happy to discuss projects at any stage and also welcome visitors to our workshop.

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