

B&K STRUCTURES

OPTIMISED HYBRID SOLUTIONS



www.bkstructures.co.uk

The Complete Service - from Concept to Completion

Through careful design detailing and value engineering, B & K Structures is able to offer the best possible construction solution, ensuring a smooth integration for follow-on trades delivering award winning, environmentally sustainable projects on time and to budget.

B & K Structures delivers innovative, economic and sustainable solutions across a wide range of sectors including:

- Education
- Leisure
- Residential
- Health
- Sport
- Commercial
- Retail Sectors
- Public Buildings

Masters of Material

B & K Structures has an outstanding, award winning portfolio covering all commercial sectors - offering a complete package of material services, across a wide range of structural products including:

- Glulam
 - Cross Laminated Timber
 - Timber Cassettes
 - Steel Frame
- (As part of hybrid structural solutions)

Structural Frame Specialists

As the UK's leading sustainable structural frame contractor, specialising in design and delivery of hybrid structures, B & K Structures offer a complete service from design to installation. Operating since 1974, the company is recognised for outstanding quality, innovative solutions and successful service to the construction industry, delivering a significant portfolio of quality projects.

Offering a complete package of material services, across a wide range of structural products including glulam, cross laminated timber, timber cassettes and steel frame, as part of their hybrid structural solutions - B & K Structures has an outstanding, award winning portfolio across a range of sectors.

As a provider of hybrid structural solutions, which are optimised in terms of cost, performance and sustainability, B & K Structures takes full advantage of offsite manufacturing techniques by exploiting Design for Manufacturer and Assembly (DfMA) protocols. DfMA is used as the foundation for concurrent engineering processes to simplify and fully optimise the structure wherever possible, to reduce manufacturing and assembly costs and to value engineer. This process helps to identify, calculate and eliminate waste or inefficiency in the building design.

Through careful design detailing and value engineering, B & K Structures is able to offer the best possible construction solution, ensuring a smooth integration for follow-on trades - delivering environmentally sustainable projects on time and to budget.

To ensure value engineering is integrated at every opportunity during the design and development path, B & K Structures have developed some innovative tools to support and quantify design decisions.





Pioneering Online Specifying Solution

B & K Structures constantly invest in research to develop technology to aide specification and design. Through our partnership with Binderholz, known as the X-LAM Alliance, we have developed the CLT Construction Specifier - a pioneering online specifying system to help validate and support early stage calculations.

Winner of the Timber in Construction Product of the Year Award and Highly Commended in the TTJ Innovation Awards, this open source online tool will enable construction professionals to meet prerequisites of the build and to deliver exacting thermal, fire and acoustic performance - therefore eliminating the gap between design expectations and as-built results, whilst eradicating the costly risk of over-engineering. This system is freely available to use, visit: www.xlam-alliance.com/technical.

Building Information Modelling

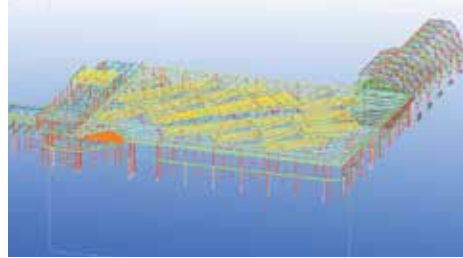
B & K Structures understand that Building Information Modelling (BIM) is not simply about producing drawings from 3D Models. BIM goes beyond the planning, design and construction phases to the whole life cycle analysis of the project. BIM can provide the end user with information from conceptual ideas to building design, cost management, construction management, facility operation and end user analysis without the need to keep duplicating the same information.

BIM embraces both new technology and a new philosophy of working. Traditional workflows are being replaced by all parties now sharing and working within a common information pool. The aim is to use technology with new working practices to improve the quality of the delivered projects through efficiency of communication within the design and construction process. BIM provides a single coordinated source of structured information to support all parties involved in the delivery process. It provides a common platform for all information defining a building together with its constituent parts and lifecycle activities.

Carbon Calculations

Our Carbon Calculator is an innovative digital resource which delivers carbon estimates to help our clients assess the most viable lowest carbon solution. Relevant information influencing the calculation is entered into the system - such as material volumes and transport factors. The Carbon Calculator produces carbon estimates to act as guidelines for different project scenarios - enabling professionals to gain early information about the environmental impact of their proposed development.

For B & K Structures, the BIM philosophy has changed the dynamic of the whole business. BIM has enhanced efficiencies, delivering well-coordinated and well-designed projects. This in turn gives rise to greater cost efficiency throughout the design, planning, manufacture construction and life cycle phases of a project.



Sustainability – The Most Essential Component

Sustainability is now a prerequisite - an essential component of any project but environmentally efficient structures do not necessarily have to be delivered at a premium. As clients and principal contractors move towards more sustainable solutions, B & K Structures have seen considerable interest in our hybrid designs. By understanding our client's commercial objectives, together with the aesthetic and sustainable requirements, we have developed optimised hybrid solutions to meet both performance and budgetary parameters.



The Complete Package

Coming up with the right structural solution is crucial and by providing systems that meet the design and construction brief in terms of cost and performance, B & K Structures can deliver innovative, economic and sustainable solutions across the education, leisure, residential, health, sport, commercial and retail sectors.

We have experience in:

- Project planning
- Working in multi-disciplinary teams to achieve the best outcome
- Optimum solutions for multiple product structures
- Connection detailing to satisfy structural and aesthetic requirements

Masters of Material

B & K Structures has proven experience in understanding complex engineering structures incorporating glulam, cross laminated timber and steel for commercial applications. This experience has enabled B & K Structures to offer a unique and innovative approach in combining engineered timber and structural steel hybrid solutions. Our product portfolio encompasses:

- Glulam
- Cross Laminated Timber
- Structural Insulated Panels
- Timber Cassettes – wall, floor and roof
- Structural Steel

A SNAPSHOT OF OUR WORK

Building 57 - University of East Anglia (UEA)



Structure: Steel, Glulam and CLT Hybrid

Building 57 is an outstanding combination of sustainable low-carbon ethos delivered with innovative construction methods – a truly optimised hybrid solution, creating a building with an exceptionally low carbon footprint.

The challenge for B & K Structures was to provide a structural solution which could deliver the environmental credentials specified by the client, along with providing a fast, quiet and clean build.

The most recent in a series of UEA buildings, each having a smaller ecological footprint than the previous one, the Julian Study Centre is the 57th building on the UEA's Norwich Campus.

Behind the exterior façade is an ambitious three storey structure that goes some way to answer the challenges faced by the modern construction industry. The optimised hybrid structure comprises, CLT, precast concrete and steelwork, with a glazed steel entrance and façades of pink render, terracotta tiles and zinc cladding.

The site itself presented challenges - it was very tight with poor access which required a detailed delivery schedule which was coordinated by B & K Structures. Creating unobstructed 13m long internal clear spans will provide future flexibility for UEA's requirements. This achievement was supported by complex 3D modelling which was undertaken to demonstrate the overall stability of Building 57.

Delivering a project which maximised embodied carbon by using a new combination of innovative and traditional construction materials was a great achievement for B & K Structures. This was a ground-breaking development resulting in an exceptional building which achieved a BREEAM rating of Excellent.



Structure: Glulam and CLT Hybrid

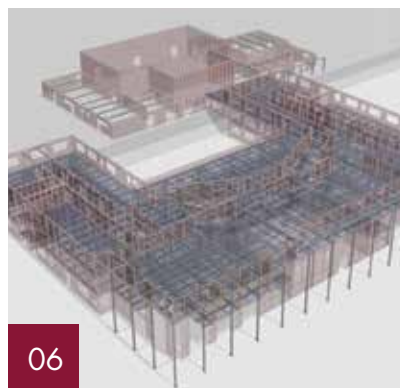
BSkyB Believe in Better is a new educational facility for graduates, apprentices and staff training with the capacity for youth training and experience days. Based at the Campus at Osterley, West London, the 3,000m² building is composed of a three storey linear building with an additional storey of restaurant and roof terrace and will provide an inviting multi-functional amenity for the staff and visitors.

B & K Structures brief was to complete the structure in time for the 25th anniversary celebrations of Sky. Speed and ease of construction have been the driving factors on this project, whilst not compromising on the quality of design and materials. Sky's own sustainability strategy shaped the building philosophy – keeping sustainability at the forefront was important - so the exposed engineered timber structure left no ambiguity as to the buildings construction. The structure has taken the form of a glulam frame with cross laminated timber providing core stability to walls and floors which have been largely left exposed.

Flexibility was also crucial to the project's success, as part of the brief was that the spaces should be adaptable over the long term. Vitally the project sits at the centre of Sky's Campus and therefore is testament to the company's values and ecological ethos.

The Building is designed to be intuitive, with a simple understanding of way finding and building function, as well as providing a wealth of extremely flexible spaces to respond to the varied and changing needs of the Sky users.

THE DESIGN AND CONSTRUCTION JOURNEY



Offsite manufacture of the hybrid structural solution, together with careful planning and BIM integration - makes for safe, accurate programming and sequencing.

01. The Brief

Overview of the project prerequisites - focusing on the objectives, highlighting both aspirational and practical considerations.

02. Build Concept

Early stage discussions - providing an architectural synopsis, conceptual philosophies and the identification of key drivers.

03. Practicality Review

Viability process – reviewing the overall project feasibility, site constraints, structural material choice, environmental impact, timescales and budgets.

04. Design & Engineering

Getting down to the detail - agreeing the main building form, arrival at the structural solution, defining the loadings and connection types.

05. Design Team Meeting

A collaborative process - involving all stakeholders in the delivery of the project, making collective decisions to define the best solutions for the entire project.

06. Creating the Model

Taking the vision to a virtual reality – involving the collective skills of the design and engineering teams to create a 3D representation of the structural frame.

07. Project Progress Meeting

Information share and focused discussion - communication is critical to any fluent process - effective status meetings lead to successful projects.

THE DESIGN AND CONSTRUCTION JOURNEY



08



09



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11



13



12

08. Fabrication & Manufacture

Working with preferred partners - our robust supply chain produces precision manufactured components to deliver the optimum structural solution.

09. Planning & Procedures

Ticking all the boxes - onsite and offsite programme review, careful planning, and delivery schedule assessments - final liaison between all contractors.

10. Start Onsite

Getting going - work commences, men and materials onsite, inductions finalised, plant arrives - practical preparations get underway.

11. Erection of Frame

Specialist teams of erectors work to stringent programme and sequencing to deliver the optimised structure.

12. Structural Delivered

Delivered on time and budget - the optimised hybrid structure is handed over to the main contractor, ready for the next stages of the development.

13. Final Completion

And finally... the collaboration of the design, engineering, manufacturing, and construction teams culminates in the building hand-over to the end client - a significant event for all involved.

A SNAPSHOT OF OUR WORK

Gloucester Gateway Services



Structure: Curved Glulam Beams, CLT and Steel Hybrid

Opened in early May 2014, on the Northbound M5 - Gloucester Gateway is miles away from the usual bland motorway service offering. Created in partnership with the Gloucestershire Gateway Trust - a social regeneration charity and the Westmorland family - Gloucester Gateway is a rare breed of motorway services, dedicated to regional food, farming and the local community.

The architectural remit was to merge the building with the surrounding rolling countryside and offer an aesthetically comfortable and relaxing internal environment that echoed the natural landscape. In just eight weeks, B & K Structures delivered the single storey curved glulam, steel and CLT structure, which features small mezzanine plant floors to either side of an open atrium serving area. In addition, a steel structure was constructed for a small petrol filling station which was completed in just two weeks.

The partners have a mutual desire to provide a stopping place which supports local businesses and food producers and which would be rooted in its locality. Not surprisingly, the feedback from users of Gloucester Gateway Services has been outstanding.

Notre Dame Catholic College



Structure: Glulam and Steel Hybrid

Following the demise of the Building for Schools for the Future Programme, Liverpool City Council initiated a £100m spend on eight schools in the City - Notre Dame College was the first school in this programme.

The new initiative addresses some of the key concerns surrounding the cost of building schools by embracing innovative construction methods which offer long term flexibility at a much lower build cost. The internal layout and arrangements were created through the use of modular units which can be moved, changed or replaced to meet the demands of a changing community. Notre Dame benefitted from this approach and it is now future proof and future ready.

Comprising a glulam and steel hybrid structure – with arched glulam rafters on a steel frame, braced with galvanised steel tension rods with a concrete hollow core floor - B & K Structures value engineered and delivered a full design and build package. The design of structure provides a light and open environment with large breakout areas. The exposed glulam structure provides an aesthetic view of the roof area without the need to create a ceiling.

Working with an outstanding team, B & K Structures delivered a successful project - on budget and ahead of time which 'stands out from the crowd' within the education sector, offering long term sustainable values for the pupils and local community.

A SNAPSHOT OF OUR WORK

Sheffield Moor Market



Structure: Glulam and Steel Hybrid

The entrance to the Sheffield Moor Market creates visual impact and is formed from a curved gridshell structure that offers aesthetic appeal both inside and outside the market area. Finalist in the Wood Awards, the hybrid structure encompassing glulam and steel frame was designed for the undercover market area with exposed tree columns and roof lights to gain natural daylight.

Working on the restricted inner city site presented challenges. To minimise deliveries and disruption to the area and to maximise speed of build, offsite construction methods were fully utilised. A detailed logistics plan had to be developed prior to the start of the contract design, as the restricted site had an impact on the length of the structural members.

The glulam beams, complete with resin embedded steel rods were manufactured offsite and brought to site for rapid connection. Embedded rod connections were used to enhance visual impact at the steel nodes. BIM techniques ensured the individual elements of the hybrid structure could be installed both accurately and efficiently.

The Moor Market opened to great acclaim and is now a valuable facility for traders providing space for some 200 stalls, with cafes and seating areas. It has quickly become a hub for the local community and tourists, providing an ideal venue to showcase local produce at the monthly Farmers Market.



Testimonials

MARKS & SPENCER - CHESHIRE OAKS

Ed Dixon, Sustainability Manager for main contractor, Simons Construction Ltd

"I worked closely with the team at B & K Structures on the delivery of M&S Cheshire Oaks, a multi award winning sustainable project which really set the bar thanks to their great work. B & K put in place a robust, documented system to manage the stringent environmental requirements of this scheme, responding to both Simons Group's company sustainability targets and the ultimate client's corporate social responsibility agenda. Their breadth of expertise in this field alongside the management and implementation of the complex structural roof form is a credit to their commitment as a company to providing outstanding environmental structural solutions. What particularly impressed the client was their dedication in sourcing every last piece of timber from sustainable sources, which ultimately resulted in the project achieving FSC® Project Certification (TT-PRO-003615) and an FSC® Outstanding Contribution Award."

BROCKHOLES WETLAND VISITOR CENTRE

Major Works Manager at Mansell, Steve Chapman

"The technical expertise from B & K Structures has been a great asset. They designed an innovative method to fix together the structural elements and provided us with 3D models to help overcome interface issues and any challenges of assembling the frame. Throughout the build process any queries were efficiently dealt with and they still went on to delivery ahead of schedule."



CHERRY HINTON JUNIOR SCHOOL

Phillip Burns, site contracts manager for Morgan Sindall

"We have built an excellent working relationship with the team. Their approach to this project has been outstanding. The work was delivered as per plan, on time and within budget and we look forward to working with them on the next development."



SCUNTHORPE SPORTS ACADEMY

Project Architect for S & P, Ron Wallwork

"This was the first such large free form geodesic timber structure to be constructed in the UK. In collaboration with AWA, we produced a series of "form finding" studies using Rhino parametric software, where Buro Happold gridded the shells and determined the complex forces acting on the structure. It was then down to B & K to convert all of the CAD details to CAM for the production process. This is a pioneering project where the main components had to satisfy a very demanding brief, it has gone very smoothly, with B & K Structures being able to develop and deliver the final structures."

Accreditations and Affiliations

Having the correct accreditations is fundamental to our client's success.

B & K Structures adopt and apply best practice sustainability principles through all aspects of our processes, from raw material procurement through to manufacture, offsite and onsite assembly.

B & K Structures have in place, a proven Quality Management System backed up by a highly skilled and experienced workforce to ensure the products continually satisfy our customer's requirements in respect of quality, cost, delivery, safety and reliability.

To achieve quality performance of our products and services, we are committed to operating and maintaining certified Quality Management System that complies with ISO 9001: 2008. To promote efficiency this is part of an Integrated Management System which also complies with ISO 14001: 2004 (Environmental) and OHSAS 18001 (Health & Safety).

We are proud to hold the following Certifications and Accreditations:



Our Policies

All of our Health and Safety, Environmental and Quality Policies are available for download, please visit: www.bkstructures.co.uk/about-us/policies

Supply Chain Reliability

- Offering only FSC® or PEFC certified timber materials ensures that we and our clients maintain a 'Green Supply Chain' - we also provide a legal and sustainable 'Full Chain of Custody'
- Sustainably managed forests also ensure fair treatment of forest and all workers involved the supply chain
- To ensure reliability, all new B & K Structures' suppliers are assessed prior to engagement through factory visits, credit checks and a process of due diligence
- To ensure on-going reliability following engagement, every supplier is monitored against key performance indicators that satisfy environmental, health and safety and management policies at all times. This enables B & K Structures to maintain excellent working relationships with reliable suppliers share our values and commitments.

The Developments in the Detail

The right structural solution is crucial - B & K Structures provide systems that meet the design and construction brief in terms of cost and performance through:

- Multi-disciplinary teams working together to achieve the best outcome
- Providing optimum solutions through hybrid product structures
- Connection detailing to satisfy structural and aesthetic requirements
- Expert project planning covering every aspect of the design and construction process

Structures that Deliver Cost and Performance Benefits

Optimised hybrid structures maximise innovative offsite construction techniques to:

- Deliver programme and cost certainty
- Enhance construction programmes
- Reduce weather dependency
- Deliver exceptional accuracy and minimal defects
- Minimise the impact on the environment
- Deliver exceptional airtightness, maximising energy efficiency
- Contribute to the acoustic and thermal performance
- Minimise on-site disruption & neighbour disturbance
- Improve onsite Health & Safety
- Reduce capital and lifecycle costs
- Deliver a faster return on investment
- Provide the ultimate sustainable solution

Experts in Delivering Optimised Hybrid Structures

B & K Structures can assist at every stage of your construction journey – from pre-tender design through to onsite delivery and everything in between.

For detailed up to date information, book a CPD session or to arrange a meeting please contact:

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