Banyan Wharf, Wenlock Road

Timber technology was the preferred core structural component for the build, due to Hackney’s commitment to creating more sustainable buildings. A complex hybrid cross laminated timber and steel structure was vital in creating the most efficient and sustainable structural solution for the building’s unique ‘twisted’ design - the first of its kind. The innovative ‘cross’ floor plates, which rotate on alternative floors, created complex geometry that did not lend itself to being built purely in timber, therefore a steel frame and concrete core were paired with the CLT. The steel frame was used to take the gravitational load of the structure, which was transferred on alternative levels as the floor plates twisted. The floor plates then act as a diaphragm to transfer stability forces from facades to the full height concrete core in the centre of the structure.

The twisting cruciform plan, described by Hawkins\Brown project architect, Alex Smith as more than a ‘mere architectural whimsy’ - ensures that all flats are corner units, allowing them to have at least dual and in many cases triple aspect views over the city or along the picturesque Wenlock Basin. The distinctive layout of the building creates spacious east and west facing terraces plus four courtyards with far reaching views. The application of the ‘cross’ floor plates generates daylight and ventilation into the building, which is located in a confined urban location.

The height and design of the build are not the only thing that set it apart from its peers, unlike previous towers constructed from cross laminated timber, Banyan Wharf’s walls do not comprise exclusively of CLT. Complete use of CLT was not a necessity for the structure and using stud partitioning for some internal walls has permitted future owners the option of reconfiguring their apartments in due course, if required.

Project Profile
Technology: CLT and Steel
Sector: Residential

Project summary

Ten storey Regal Homes residential development, Banyan Wharf - situated within the London borough of Hackney - has taken cross laminated timber (CLT) to new heights. Set to take the title of the tallest cross laminated timber residential building in Europe, Banyan Wharf is home to 50 one, two and three bedroom apartments – all sold off plan, prior to completion together with 1,190 square metres of commercial units.

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Architect
Hawkins\Brown Architects

Client
Regal Homes

Structural Frame Provider
X-LAM Alliance

Material
CLT and Steel
The benefits of cross laminated timber are numerous – from reduced loading on foundations and infrastructure services, to impressive thermal, acoustic and airtightness performance, but most importantly, a CLT construction solution provides cost and programme certainty. The CLT was manufactured offsite, allowing exceptional levels of accuracy and ensuring minimal defects. This improved construction and project delivery timescales, reduced costs and maximised efficiency on all levels. With cost and time certainly being a crucial factor for this project, the use of cross laminated timber eliminated any risks, as it was manufactured in controlled factory conditions.

Cross laminated timber wall and floor panels up to 200mm thick and weighing up to four tonnes, were delivered to the site with all openings pre-cut, allowing them to be lifted straight into position. The number of lifts required were also reduced as the prefabricated wall panels were produced up to 12m in length, therefore individual panels were able to span the entire length of the structure. This saw a reduction in the onsite lifting works which helped with the close proximity of the site to adjacent properties and site restrictions; however methodical delivery programmes still had to be sequenced to ensure just in time deliveries were maintained. As follow on trades started work on the lower floors whilst the structure for the upper storeys was in construction, meticulous planning was needed across all teams and throughout the supply chain, as there was only room for a single trailer or van delivery.

High levels of technical advancement, innovation and rigorous planning through a strict programme of works was required, as well as the use of BIM technology and CNC machines, to overcome the challenges that were presented to finish the build on time. Collaborative and integrated working methods were essential, with consistent communications between all teams. This close relationship across the team was vital, from the early design stages through to the construction phases, resulting in a collaborative and fully integrated team throughout the supply chain.

The project pushed many boundaries in terms of height, complexity and method of construction. There were concerns that pushing the boundaries on so many fronts would reduce the final performance (acoustics and thermal) of the individual units, it was therefore decided in the very early stages, to reduce that risk and construct one of the apartments on an accelerated programme, to eliminate these concerns. The test apartment was over performing so it was decided that the layout of internal lining could be adjusted to meet the criteria for the building.

Another area of concern was that previous timber developments had been subject to criticism due to being poorly insulated therefore Architects Hawkins Brown applied in-depth research to overcome this potential issue. The research carried out within the test apartment provided conclusive evidence to support the final insulation specification leading to an insulation layer being applied under the flooring to help retain warmth in the apartments.
The use of cross laminated timber in this build provided many reassurances in respect of health and safety standards. One of the most crucial factors of particular relevance to constructing a building at this height was cross laminated timber’s inherent fire resistance. The panels were designed to a specified fire resistance and remain structurally stable when subject to high temperatures. CLT was an ideal solution for this build as it is the only structural timber solution to fully comply with all Fire Resistance REI classes (loadbearing capacity, integrity and insulation) and performance requirements without the need for any costly add-ons, building ups or adaptions. Complying with fire regulations assisted with the achievement of the acoustic requirements.

Cross laminated timber is clean to use with little onsite waste, and it is made from readily available, renewable softwood which contributes positively to high BREEAM and Code Ratings. As Banyan Wharf is the first building of its height to be constructed from timber in Europe, it exploits sustainability factors that brick and mortar buildings are not able to provide. Timber is the number one renewable mainstream construction materials which produces greener buildings, delivering an unrivalled carbon offset for high volume construction projects. With sustainability a key factor for the build, the material sourced was delivered with PEFC Chain of Custody Certification ensured the project maintained a fully transparent Green Supply Chain.

Banyan Wharf features energy efficient double glazing, allowing for flexible ventilation in the summer months, together with a green roof to enhance insulation and assist with drainage. The ecologically designed canal garden, comprising locally sourced plants, ensures that the development will positively contribute to the local environment. Due to its impressive timber clad façade – offering enhanced sustainability, Banyan Wharf is set to become one of London’s most prolific residential projects.

As Banyan Wharf was delivered by a BOPAS Accredited structural frame provider, assurances are provided to the lending community that their structures will deliver a consistent performance over a determined durability of 60 years. As designers, manufacturers, and constructors involved in offsite manufactured systems, B & K Structures, the UK partners of the X-LAM Alliance, has been rigorously audited and approved by BOPAS to maintain the highest levels of quality assurance throughout the design and build process, ensuring their construction systems are approved for integrity, durability and performance.