MASS TIMBER DESIGN INNOVATIONS: TECHNICAL CHALLENGES & OPPORTUNITIES

In the first of three articles for the NLA - Tom Gibson and Hannah Constantine, Associate Directors at Haworth Tompkins, reflect on the growing role of mass timber in contemporary architecture.

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Mass timber has rapidly evolved from a niche structural system into a credible, scalable alternative to steel and concrete. Advances in engineered timber, digital fabrication, and fire engineering have expanded its application across sectors and building types. Beyond reducing embodied carbon, timber enables new architectural languages, combining structural performance with warmth, tactility, and precision while challenging conventional approaches to construction, assembly, and long-term adaptability.


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The American Repertory Theater at Harvard University demonstrates how mass timber can be applied to large, technically complex cultural buildings. The project features a superstructure built almost entirely from Black Spruce CLT and glulam, presenting challenges including fire safety, acoustics, insurance compliance and long-term maintenance. By exploiting an outdated ‘heavy timber Type IV’ code, originally developed for solid wood agricultural barns to streamline technical compliance for this relatively new form of engineered timber construction - in effect, looking to the past to move forward.


THE OLD VIC
BRARY

The Backstage building at The Old Vic in London demonstrates how mass timber can be applied in dense, culturally sensitive urban contexts. The building uses a European spruce glulam frame and solid timber floors, designed for low embodied carbon, future disassembly and an advanced fire strategy. Through compartmentalisation, selective exposure and careful calculation of char rates, the team achieved compliance while preserving the material's warmth, supporting a range of flexible performance and community areas demonstrating the material's versatility and ability to combine structural performance, safety, and user experience.

Our project for Pembroke College, Cambridge provides additional teaching, living and cultural spaces within both new and existing buildings. Mass timber is used in an interwoven and contextually sensitive way that sits comfortably alongside the historic fabric of the college. The centrepiece is a new foyer space with an expressed structural frame in European oak glulam with CLT decks, complemented by solid oak linings and joinery. Together these natural materials, combined with soft diffuse daylight, create a calm and tactile interior environment.

There is growing scientific evidence suggesting that environments incorporating natural materials such as timber can support wellbeing, encourage social interaction and foster improved learning outcomes. These qualities move beyond the purely quantitative environmental benefits of timber such as its low embodied carbon to highlight its broader contribution to the character and experience of buildings.