Engineered Bamboo Ceiling Project

Architectural Case Study

Marvel Stadium

Stadium Square

Amphora Melbourne

Hachem Architects & Interiors | architect

house of bamboo

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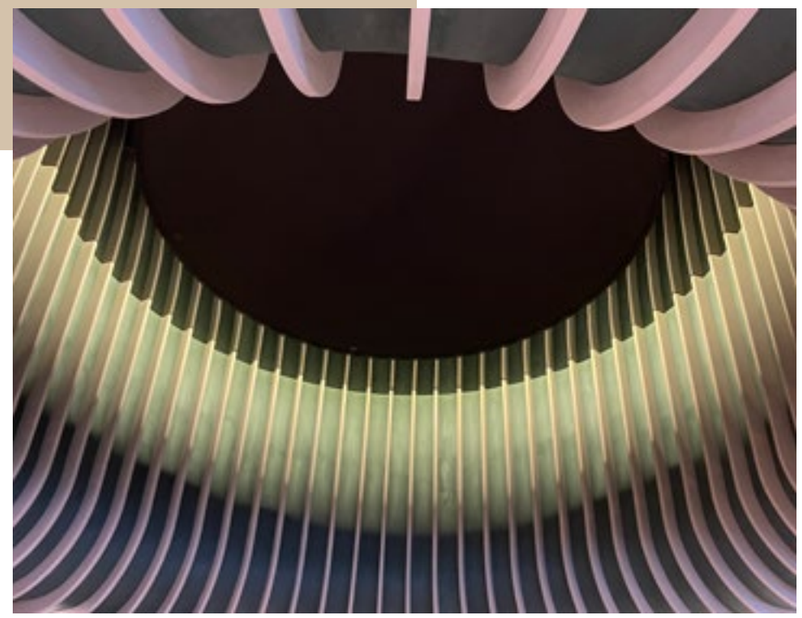
Introduction

The Amphora Melbourne at Marvel Stadium represents a landmark project, where custom-engineered bamboo beams were utilised to create an innovative ceiling feature. This initiative is part of a broader revitalisation effort of Melbourne's riverside, intended to elevate the city's architectural profile and promote sustainable building practices.

The project, guided by the visionary team at House of Bamboo, pivoted from traditional materials to engineered bamboo, setting a new standard in eco-conscious architecture.

Project Context and Vision

Located within the bustling precinct of Stadium Square at Marvel Stadium, the Amphora Melbourne is envisioned as a premium dining experience that seamlessly blends luxury with sustainability.



The decision to employ bamboo, a highly renewable resource, underscores a commitment to environmental stewardship while catering to the aesthetic and functional demands of a high-end restaurant environment.

This ceiling project was not just an architectural endeavour but a statement of purpose: to push the boundaries of traditional design and advocate for sustainability without compromising on style and luxury.

Design and Material Selection

The design phase was characterised by an extensive exploration of materials that could fulfil the project's stringent requirements for both luxury and sustainability.

The pivotal factor in selecting engineered bamboo was its adaptability in manufacturing processes, particularly its ability to be engineered to form the complex curves required by the design brief. This capability sets bamboo apart, as traditional hardwoods do not offer the same flexibility for intricate, custom-shaped constructions.

Additionally, bamboo's rapid growth rate and higher carbon absorption capacity offer a substantial reduction in ecological footprint.

The bamboo used was responsibly sourced and crafted into custom beams, ensuring they adhered to strict structural and visual specifications while perfectly aligning with the ambitious architectural vision.

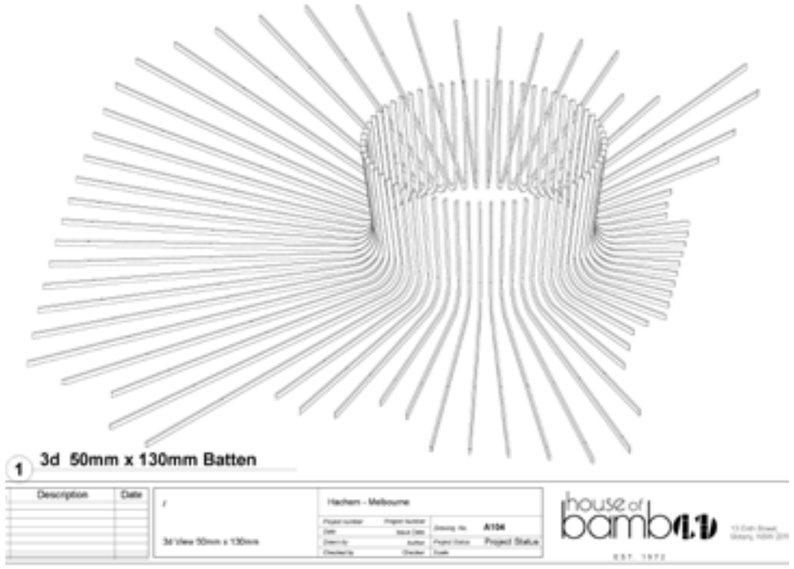
The engineering process was highly detailed, focusing on the creation of custom bamboo beams tailored to meet specific architectural requirements.

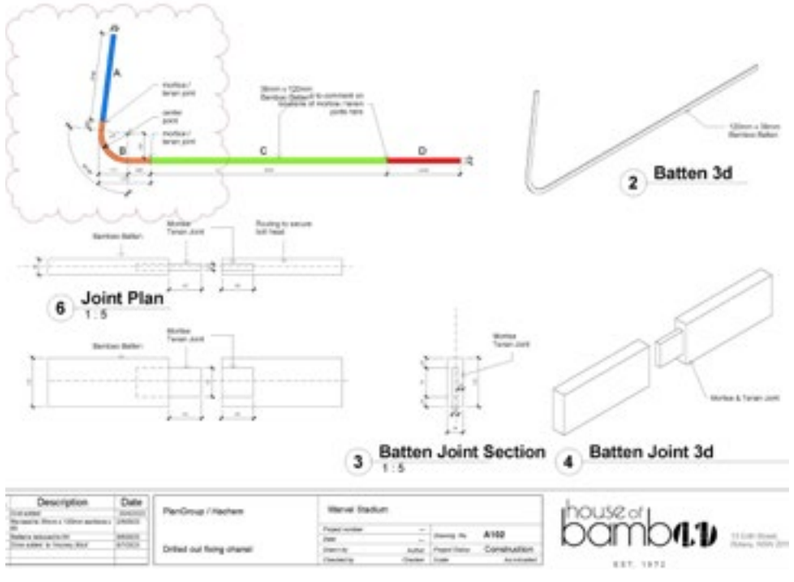
Central to achieving the desired aesthetic and functional objectives were the hand-formed curves of each beam, crafted meticulously using template jigs. This manual shaping process allowed each section of bamboo to be individually placed and layered, gradually building up to the required beam depth.

These beams were integral to the interior design, significantly enhancing the overall ambiance of the space.

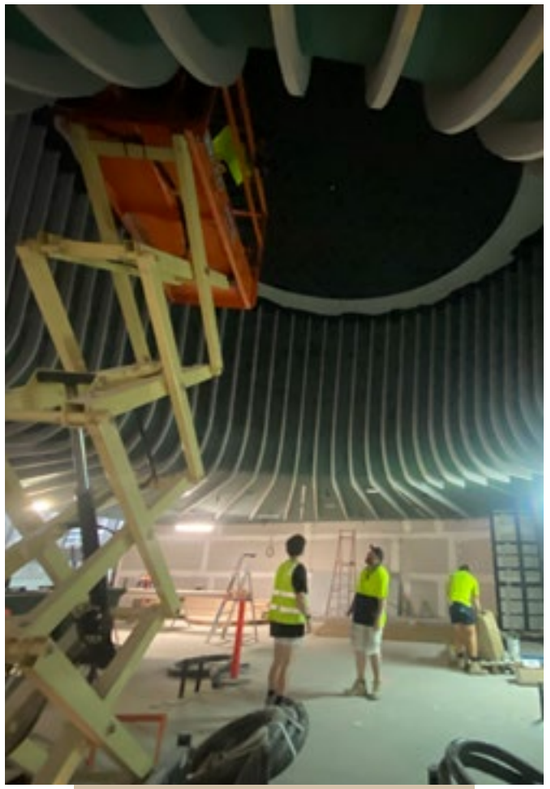
Precision crafting and advanced manufacturing techniques ensured that each beam fit seamlessly into the complex geometry of the restaurant's ceiling, highlighting the artisanal skill and technical precision involved in this project.

Engineering and Customisation





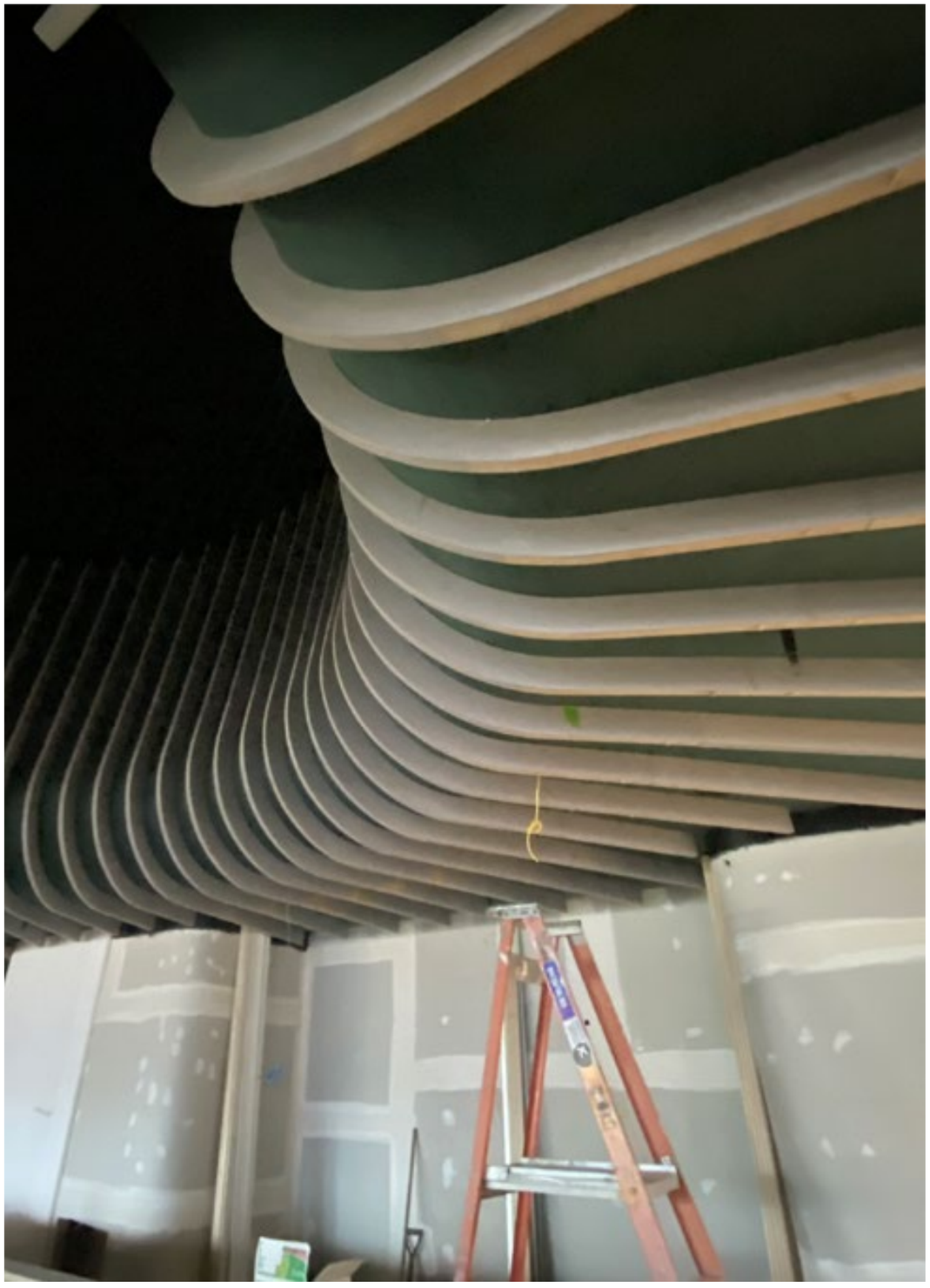
Collaborative Process



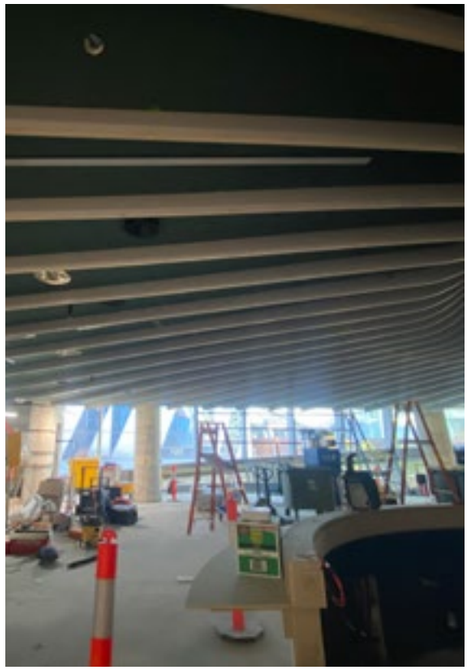
The success of this project hinged on the effective collaboration among various stakeholders.

House of Bamboo's technical team worked closely with HACHEM Architects to refine the design and ensure that the bamboo beams perfectly aligned with the architectural vision.

Regular coordination meetings with structural engineers, service consultants, and the construction team were crucial in addressing any challenges that arose during the integration of the bamboo ceiling with existing building structures.



Installation Dynamics



The installation of the bamboo beams was a methodically planned operation. A systematic numbering system was employed for the beams, ensuring each piece was installed in the correct sequence to maintain the integrity of the design.

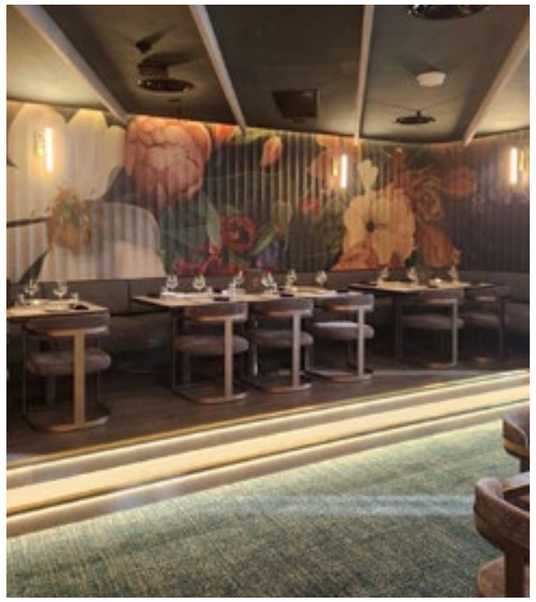
This approach minimised onsite adjustments and facilitated a smoother installation process, keeping the project on schedule and within budget.

Architectural Impact and Client Feedback

Upon completion, the bamboo ceiling dramatically transformed the interior space of Amphora Melbourne, adding warmth and a naturalistic touch that enriched the dining experience.

The client, represented by Zack Bok from HACHEM Architects, lauded the project with high praise for its innovative use of materials and the quality of the finished product, encapsulated in his response: “Thanks for a nice product.”

Sustainability and Performance



Post-installation, the project has been hailed as a paragon of sustainable design in commercial architecture. The bamboo beams have met the design brief impeccably, delivering a stunning visual impact that evokes a “WOW” effect.

This choice of material not only met aesthetic expectations but also stamped its authority environmentally. Bamboo’s role in carbon management is particularly noteworthy, as it significantly reduces the carbon footprint compared to traditional building materials, thereby asserting itself as an unsurpassed hero in the realm of sustainable design solutions.

Technical Specifications and Innovations

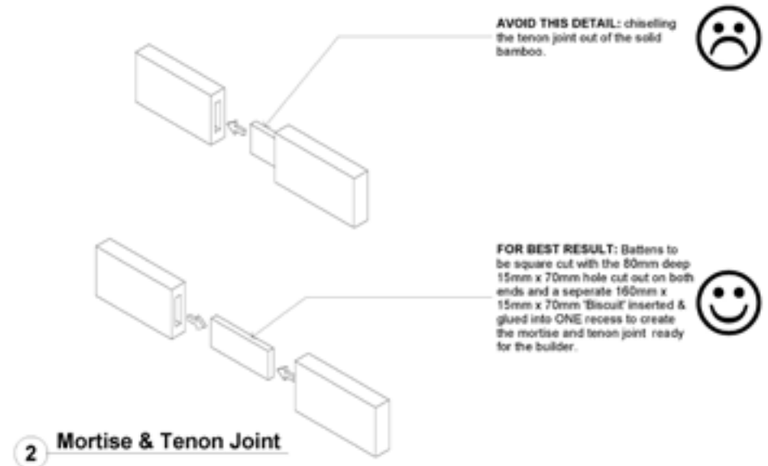
Length of Battens: The project utilised 494.81 metres of straight battens and 127.42 metres of curved battens, totaling 624 metres. To illustrate, this length is over double the height of the Eiffel Tower.

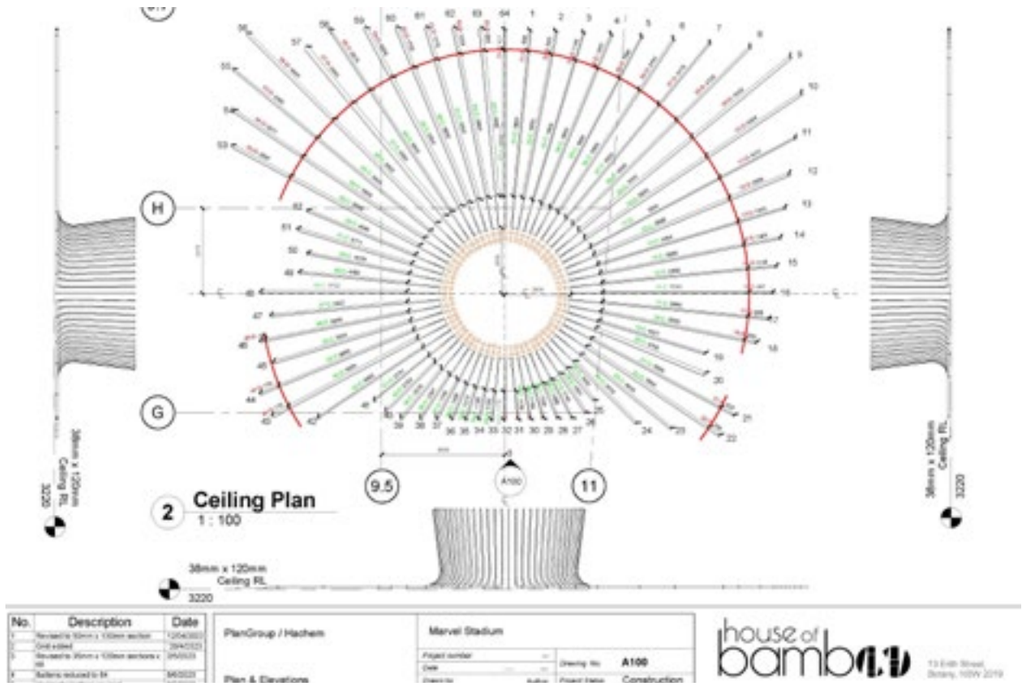
Weight: Initially, the design included battens that weighed a total of 3,394.56 kg. Through innovative re-engineering, the profile was adjusted to 120mm x 38mm cross sections, reducing the weight to 1,934.9 kg—a reduction equivalent to the weight of nine baby African elephants.

Finishes: The bamboo received a 3-layer WOCA oil finish after extensive testing of various finishes to align with the architect's vision.

Fixings: A custom ceiling suspension system was developed featuring hidden fixing techniques for a clean, uncluttered look.

Quantity and Coordination: The design initially included 64 radial parts, later adjusted to 68 to accommodate site tolerances. The technical team participated in three key meetings with the builder and consultants to ensure full integration of the bamboo ceiling with the building's structure and services





Carbon Embodiment and Sustainable Impact of Bamboo in Architectural Design

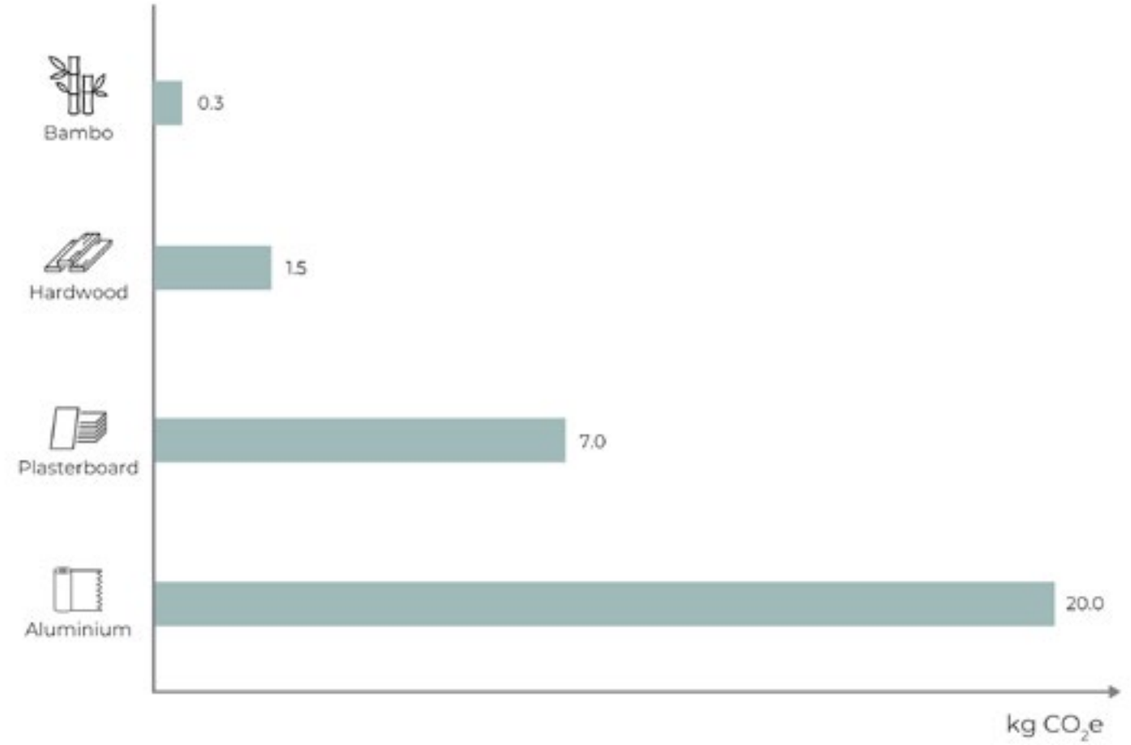
The sustainable use of materials in construction is increasingly critical, with architects and designers focusing finally on the carbon footprint of every material incorporated into their projects. Among these materials, bamboo stands out for its exceptional environmental benefits, particularly in terms of embodied carbon.

Embodied Carbon of Bamboo

Embodied carbon refers to the carbon dioxide emissions associated with the materials throughout their lifecycle, from production through disposal. Bamboo, with its combined growth, manufacturing and distribution processes, showcases particularly compelling embodied carbon figures.

Raw bamboo culms have a remarkably low range of embodied carbon when used as a building material, estimated at 16.7 to 47 kg CO_2e per cubic metre during the initial stages (A1-A3), and 14.5 kg CO_2e/m^3 for transport and disposal stages (A4-A5).
Compared to other construction materials like concrete or steel, bamboo's carbon footprint is significantly lower, reinforcing its podium position as a sustainable choice.

Embodied Carbon of Materials

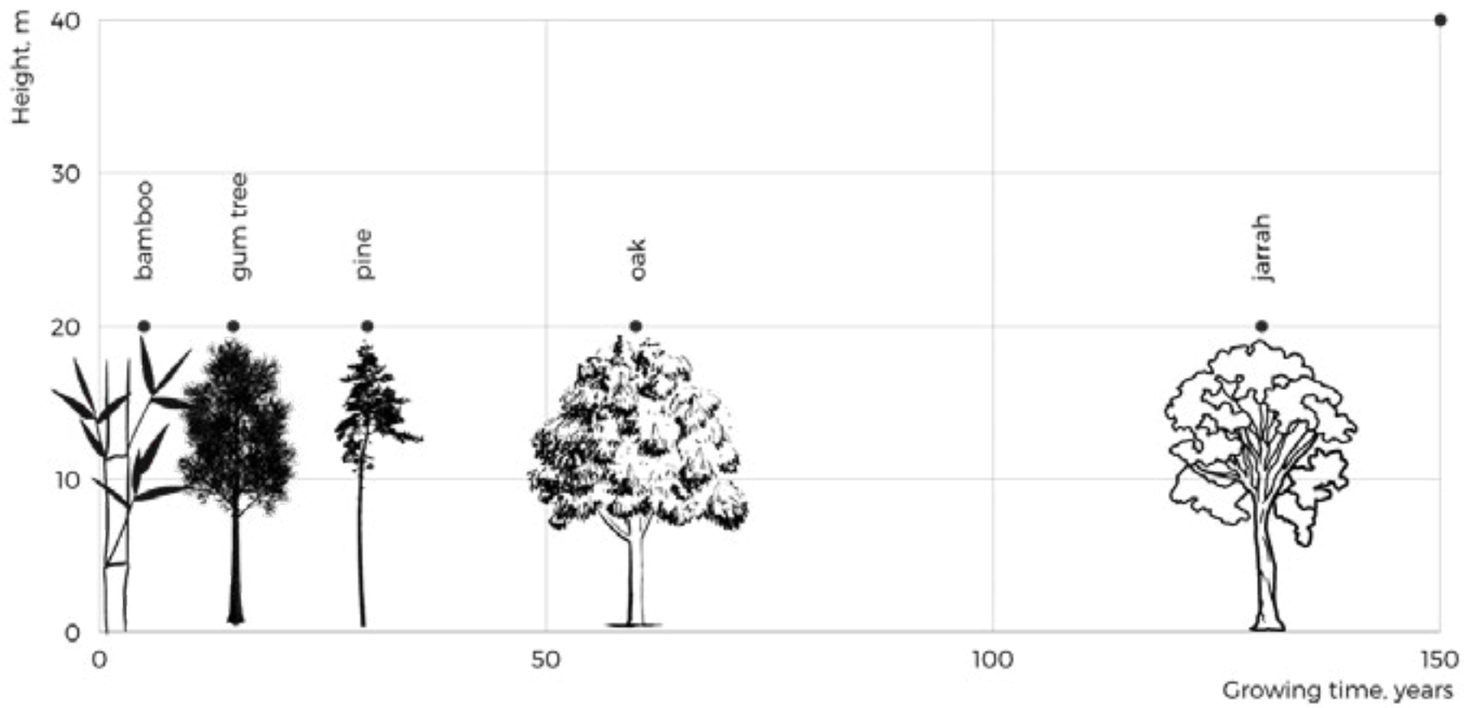


Note: CO_2 measures only carbon dioxide, whereas CO_2e includes all greenhouse gases.

Comparative Advantage

Bamboo's rapid growth cycle at 5-7 years ready to harvest allows for quicker regeneration and carbon absorption compared to all softwoods and hardwoods, which can take decades to reach sizes suitable for commercial logging.

The rapid turnover of bamboo not only ensures a sustainable supply of the material but also enhances its ability to act as a carbon sink more frequently over the same period.



The Amphora Melbourne ceiling project at Marvel Stadium exemplifies the seamless integration of modern architecture with sustainable practices, serving as a beacon for future projects aiming to harmonise luxury with environmental stewardship.

Incorporating engineered bamboo not only fulfilled the aesthetic demands of the Architect's design but also made a significant contribution toward sustainability goals. The project's innovative design and meticulous execution have not only achieved its functional and aesthetic objectives but have also underscored the pivotal role of sustainable materials in contemporary architecture.

Bamboo, with its low embodied carbon and turbo charged carbon-sequestering capabilities, stands as our next superhero in the ongoing global battle against climate change. This case study serves as an inspirational blueprint for future projects aiming to harmonise luxury with environmental responsibility.

Conclusion

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