Re-Emerge Pavilion: A Sustainable Triumph of Parametric Design

Architectural Association (AA) Emergent Technologies & Design (EmTech) Post-Graduate Programme teamed up with Hassell in London to create a new pavilion called Re-Emerge in Bedford Square.

The pavilion was open to the public for a month in November 2021 and stood as a testament to the boundless possibilities of recycled materials and parametric design.

For this project, Hassell Studio set the challenge to keep the carbon footprint to an absolute minimum, exclusively utilizing reclaimed timber. This unique directive allowed the students to pioneer a mindful approach toward the environment.

This collaboration resulted in the Re-Emerge Pavilion winning an Architizer A+ Award in the Architecture & Collaboration Category.

FROM WASTE TO WONDER

The designers embarked on aligning recycled timber with the pavilion’s overall design concept. They devised a structural system comprising volumetric timber modules crafted from wood pallets that were scored and kerfed. By connecting two kerfed pallets, each with a 120° curvature, through lap joints, they created a stiff, brick-like ‘diamond’ module capable of sustaining loads in vertical and horizontal arrangements.

These diamonds were then organized into structural ribs, significantly reducing the need for secondary materials in the joinery system. Further timber planks were incorporated for additional structural support, resulting in a lightweight yet robust system that embraced the principles of ecological impact right from the early phases of the design process.

EMPOWERING SUSTAINABLE DESIGN THROUGH GRASSHOPPER

One of the critical enablers of the Re-Emerge Pavilion’s success was the employment of parametric design tools, with Grasshopper playing a pivotal role—a novel computational workflow integrated generative form-finding, material computation, structural performance, and life cycle assessment.

The students developed a custom C# component for spring-back behavior, connection locations, and kerfing patterns, while the Karamba plugin facilitated Finite Element Analysis (FEA) to ensure seamless load transfer through the network of ribs to the foundation. The OneClick LCA plugin for Grasshopper enabled the reclaimed timber plank’s Life Cycle Assessment (LCA), ensuring every design aspect adhered to sustainability goals.

Moreover, the Wallacei plugin empowered multi-objective optimization (MOO) algorithms, allowing designers to navigate conflicting design considerations easily.

OVERCOMING RECYCLED MATERIAL HURDLES

Despite its awe-inspiring success, the Re-Emerge Pavilion encountered its fair share of challenges. Dealing with varying dimensions of recycled timber planks, uncommon in traditional construction, demanded meticulous adaptation in the computational process.

A significant challenge emerged during construction when we experienced frequent snapping of timber planks, necessitating replacements of comparable dimensions. This unexpected hurdle required us to revisit the computational process, ensuring the structural integrity of the pavilion while accommodating the irregular material sizes.

Moreover, sourcing suitable recycled timber planks for structural use proved to be an intriguing challenge. Exploring timber recycling facilities throughout London, the team visually evaluated each piece, striving to ensure they met the stringent structural requirements of the pavilion. While this process led to revisions in the final design; it also highlighted the importance of careful consideration and

attention to detail when working with reclaimed materials.

THE PAVILION’S IMPACT

The Re-Emerge Pavilion transcended its role as a mere architectural structure by engaging the local community and promoting sustainability and recycling initiatives. Students at the AA School volunteered to participate in the pavilion’s construction, immersing themselves in themes of sustainability and upcycling. In conjunction with the opening of the Pavilion, a symposium was co-organized with Hassell, delving into sustainable wood construction, zero waste, and upcycling

of construction materials.

Distinguished speakers, including Xavier De Kestelier (Head of Design Hassell), Amin Taha (Architect & Founder Group Work), Hester Van Dijk (Designer & Founder Overterders W), Elif Erdine, and Milad Showkatbakhsh, took the stage, sparking an open discussion among AA students and igniting a profound sense of sustainability in the minds of the next generation of designers.

LESSONS FOR THE FUTURE

Beyond the project’s success and community engagement, the knowledge gained from the Re-Emerge Pavilion carries far-reaching implications for the future of parametric design and sustainable architecture. By optimizing material use and reducing waste during construction, parametric design tools can become the cornerstone of circular design principles.

Future developments may explore even more sophisticated optimizational algorithms, accoun

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sign and sustainability may usher in an era of responsive design, where structures adapt

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The Re-Emerge Pavilion is a testament to the transformative power of collaboration, sustainability, and design innovation. Its architects,

engineers, and designers have illuminated a path towards a future where structures resonate harmoniously with the environment.

As the architectural world embraces these learnings and pushes the boundaries of design, projects like Re-Emerge inspire us to envision a greener and more sustainable tomorrow.

Embark on an immersive virtual tour of the pavilion, powered by Matterport technology.