Architectural Association
36 Bedford Square
London WC1B 3ES
www.aaschool.ac.uk
@AASchool

Contact:
Ryan Dillon
Head of Communications
communications@aaschool.ac.uk

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AA EMTECH AND HASSELL COLLABORATE ON THE *RE-EMERGE* PAVILION IN BEDFORD SQUARE

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The Architectural Association (AA) Emergent Technologies and Design (EmTech) postgraduate programme has collaborated with Hassell to create a new pavilion in Bedford Square titled *Re-Emerge*. The EmTech programme has a long history of designing and creating structures and pavilions; *Re-Emerge* represents its students' first opportunity since the onset of the Covid-19 pandemic to work closely together on the fabrication and assembly of a full-scale structure. The pavilion is open to the public on the corner of Bedford Square in London opposite the AA premises until 25 November 2021.

The *Re-Emerge* pavilion explores new design and construction technologies which repurpose materials that have completed their first life cycle into innovative structural formations. The project addresses themes of generative design, material computation, large-scale fabrication and assembly technologies, minimising the pavilion's ecological impact from the earliest phases of the design process onwards. For the collaboration, Hassell challenged EmTech students to keep the carbon footprint of the project as low as possible and therefore only use reclaimed timber. Xavier De Kestelier, Head of Design at Hassell, noted that "The students really took on the challenge with both hands and decided early on to build the pavilion out of timber from reclaimed wooden pallets."

Re-Emerge revives the tradition of building on Bedford Square as a collaboration between an academic programme at the AA and partners from the world of practice, to test ideas at scale and imagine new possibilities. Elif Erdine, Programme Head of the EmTech programme, comments: "This collaboration with Hassell provides a successful demonstration of how academia and practice can come together to discover novel solutions to complex spatial and material problems. With the support of our other sponsors, BuroHappold Engineering and One

Click LCA, EmTech and Hassell explored new design and construction technologies for repurposing timber.'

She added: "As designers, architects and engineers, we share the responsibility to maintain a mindful approach towards our environment while designing and building. Our mutual insight into how construction waste can be a useful resource has originated this research into repurposing timber for an outdoor structure that is lightweight, emphasising the project's ecological impact from the early phases of the design process."

Construction Waste is Useful

Wood is inherently the best biofabricated and biodegradable material; it is renewable, resilient and lasts for a long time. When a timber building is demolished after several decades, it does not produce useless waste but instead generates reclaimed wood that can be reused and repurposed in other applications after disassembly, becoming part of the circular economy.

Re-Emerge is created with Grade A reclaimed wood pallets, one of the most abundant reused timber elements in the Architecture, Engineering and Construction (AEC) industry yet one which generally ends up in landfill or burnt as fuel. Instead, in *Re-Emerge*, their structural and morphological capacities are explored and exploited. The reclaimed pallets used in the pavilion have been collected from various timber recycling facilities in and outside London. Xavier De Kestelier explains: "For the last couple of decades, architects have often focused on the performance of buildings and minimising operational carbon within them. But with the need to tackle climate change more urgently we also need to look at embodied carbon. *Re-Emerge* was a great way for the students to start embedding this approach in their design."

Complexity Arises from Simplicity

The structural system for *Re-Emerge* comprises diamond-shaped volumetric timber modules that are created by scoring and kerfing wood pallets. These diamond modules are organised into structural ribs which are then assembled with lap joints, thereby diminishing the need for secondary materials in the joinery system. The system can sustain loads in vertical and horizontal arrangements. Erdine explains: "In this project we aimed to explore how complexity can arise from simplicity. This was adopted by the variable aggregation of similar modules that are formed by scoring and steam-bending. A further ambition of the project was to diminish the need for secondary materials in the joinery system, and this decision has led us to work with lap joinery throughout the structure."

Conscious Fabrication and Installation

Life Cycle Assessment (LCA) of the reclaimed timber planks employed within *Re-Emerge* provided useful information which informed the pavilion's preliminary design phase. Analysis of most plywood types used for external construction versus solid timber planks demonstrated that CO2 emissions from plywood are significantly higher than solid planks during the preparation stage.

Milad Showkatbakhsh, studio master at EmTech, explains: "The employment of life cycle assessment (LCA) in our computational workflows as a design driver has enabled us to take into consideration CO2 emissions associated with not only the material itself, but also its origins and transportation to site."

Eleana Polychronaki, studio tutor at EmTech, comments: "There is also a dedicated *Re-Emerge* app for the visitors of the pavilion. The augmented reality (AR) app allows users to read more about the Life Cycle Assessment of *Re-Emerge* and find information on its design and fabrication processes, as well as various visualisation options, including a scaled AR projection of the pavilion. The app also tells the story of the reclaimed timber that is used for construction, where it came from, and what its first life cycle was."

Third Life

At the end of its second life-cycle, *Re-Emerge* will be disassembled. Part of the pavilion will be erected in the Hassell offices in London and part of it will be sent back to the timber recycling facilities where its materials were sourced. The ambition of *Re-Emerge* is to create a strong dialogue between the local timber industry and its by-products, and to demonstrate to the world that innovative timber architecture can be created with construction waste while maintaining a mindful approach towards our environment.

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EmTech Students 2020–22:

Amal Alshamsi, Jefry Babu, Nupur Gandhi, Amanpreet Kaur, Eleftherios Kourkopoulos, Yi Ju Lin, Clinton Glen Mendonca, Georges Junior Merheb, Pouyan Mohammadi, Ashwin Abraham Mukkaranath, Anna Sapountzaki, Naoki Tachikawa

EmTech Students 2021–23:

Baris Doga Çam, Zhaoheng Chen, Ghazal Enayati, Maxence Fromentin, Ziyue Gao, Yanan Guo, Luis Bosoms Hernandez, Helen Yael Johnson, Anastasiya Katliarskaya, Anna Maria Oldakowski, Brendan O'Rourke, Rodrigo Maron Rius, Manya Singhal, Yixiao Xu, Chu Zhang

Volunteers Across the AA:

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Hassell
Principal and Head of Design: Xavier De Kestelier
Computational Design Lead: Jonathan Irawan

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Link to download the app:

https://play.google.com/store/apps/details?id=com.ArchitecturalAssociation.REEMERGEEmTechXHassell

About the AA
The Architectural Association (AA) is the oldest independent school of architecture in the UK. The school was founded in 1847 as a student-centred collective that aspired to radically transform architectural education. Quite unlike any other institution operating today, the school offers a broad range of flexible, self-directed programmes, courses and curricula that empower students and staff to challenge the accepted methods within contemporary architectural education and professional practice. The school offers a Foundation Award in Architecture, a BA(Hons) and MArch (and AA Diploma) throughout its five-year course within the Experimental and Diploma Programmes, and nine Taught Postgraduate Programmes leading to MA, MSc, PG MArch, MFA and MPhil awards as well as the PhD Programme.

General Contact Information
AA School of Architecture
36 Bedford Square
London WC1B 3ES
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