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ISSUE 1, 2024

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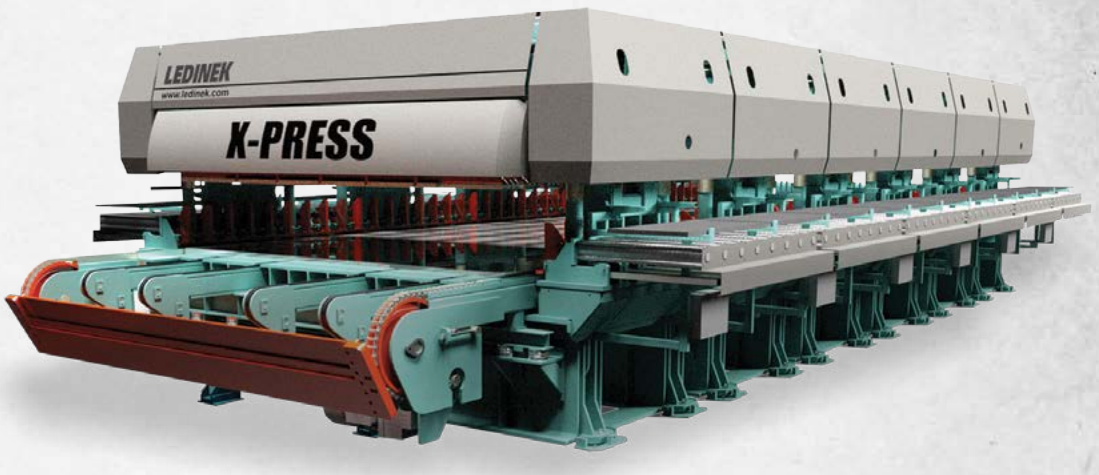
Cross Laminated Timber

Layers of wooden lamellas oriented perpendicular to the previous are glued together with structural adhesives. This innovative construction material finds primary applications in wall, roof, and floor systems due to its superior structural integrity and versatility.



INNOVATIVE POWERFUL DURABLE

LEDINEK

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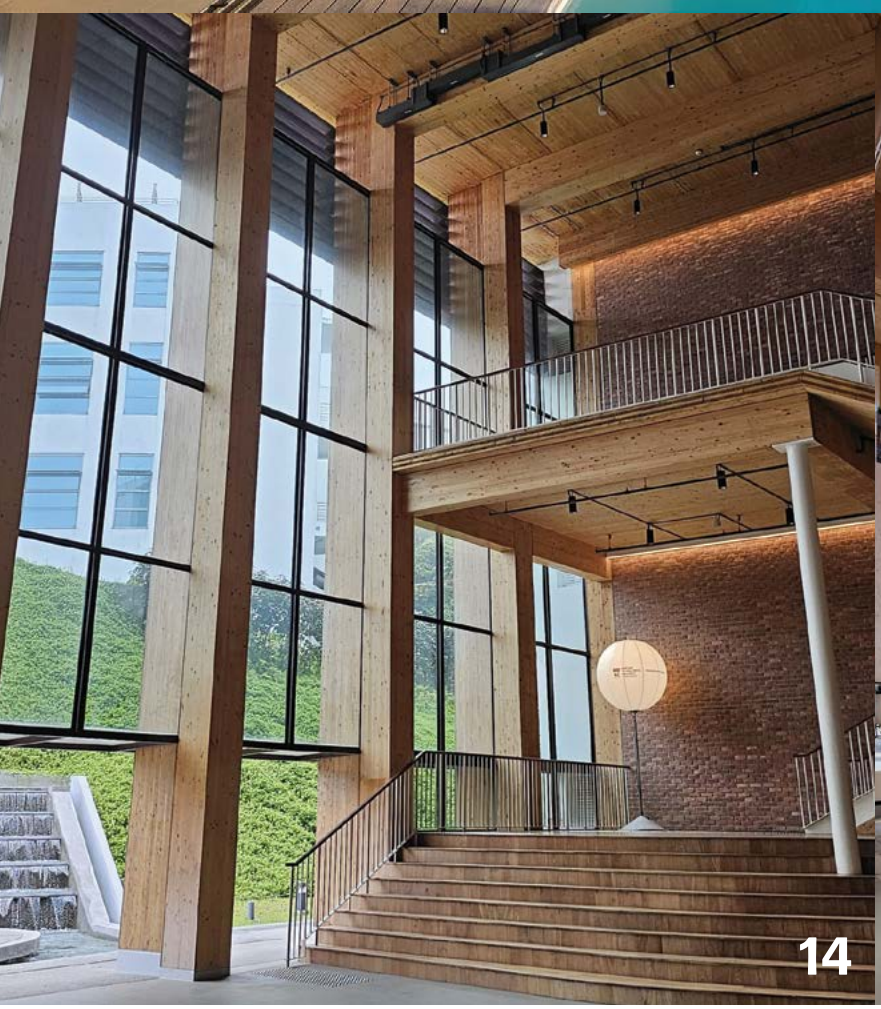

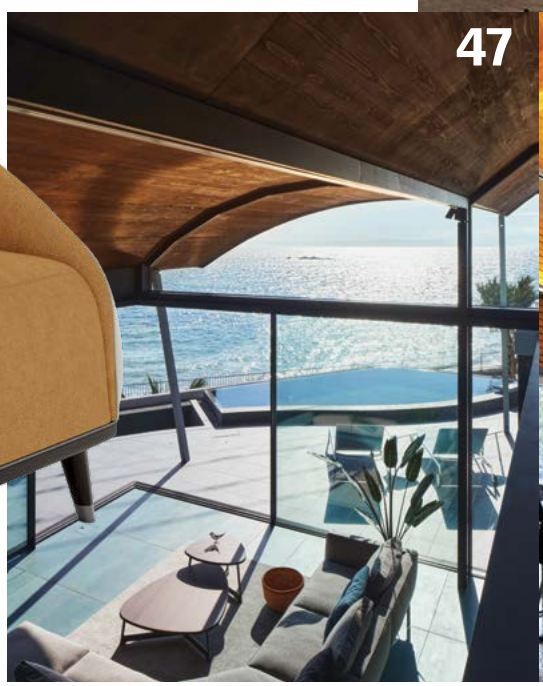

NEW DIRECTION

A belated Happy New Year to all!

In this issue, our design layout underwent a small revamp – sleeker fonts, while overall, still a clean and bold look – but more importantly, we have changed our editorial direction going forward.

In the past we focused a lot on the aesthetic and technical benefits of wood in construction and design. That ended up neglecting the manufacturing aspects of wood construction. At the heart of *Wood in Architecture* is the demystification of the wood construction process, especially for mass timber production. To be more specific, we want our readers to understand more thoroughly how, for example, a mass timber panel gets produced, what machines are needed, or how timber frames or beams and trusses are developed. Similarly for wood design, how a CNC machining centre can produce beautiful wooden art or luxury furniture, what kinds of colours or coatings are essential now, and more.

Of course, that does not mean we will stop focusing on the aesthetic and technical benefits. It is the best of both worlds; you can see that reflected in the revised columns.

Our Engineered Wood column now goes in-depth into the manufacturing aspects of mass timber or engineered wood production. Read more about an Indonesian cross-laminated timber (CLT) manufacturer, INCLT (p.24), or about a collaboration between Timberlink and Kallesoe on the former's newest combined CLT and glue-laminated timber (glulam) radiata pine facility in Australia (p.31).

Our Design column, likewise, highlights the manufacturing elements of designing with wood. We have an interview with SCM on how their machinery has enabled a beautiful art installation by renowned architectural firm Kengo Kuma (p.36), and another interview with Nippon South East Asia on the colour trends for 2024-2025 (p.40).

Our Big Picture column, arguably the magazine's flagship column since its inception, is here to stay, and it will continue exploring trends across different sectors of the construction industry. This issue focuses on healthcare – the wonderful, biophilic health benefits wood has on occupants in five featured wooden facilities (p.49).

The new direction and look are the result of months-long discussion,

not only internally but also with stakeholders. At the end of the day, the readers are still our priority, and we hope the focus on manufacturing gives newer insights into wood construction – especially mass timber, a market that, I believe, will revolutionise the construction industry in years to come.

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A SUCCESSFUL YEAR FOR LEDINEK

Having completed several projects in 2023, Ledinek outlined some of the investments they have made over the past year and reported how the wood construction market is doing now.

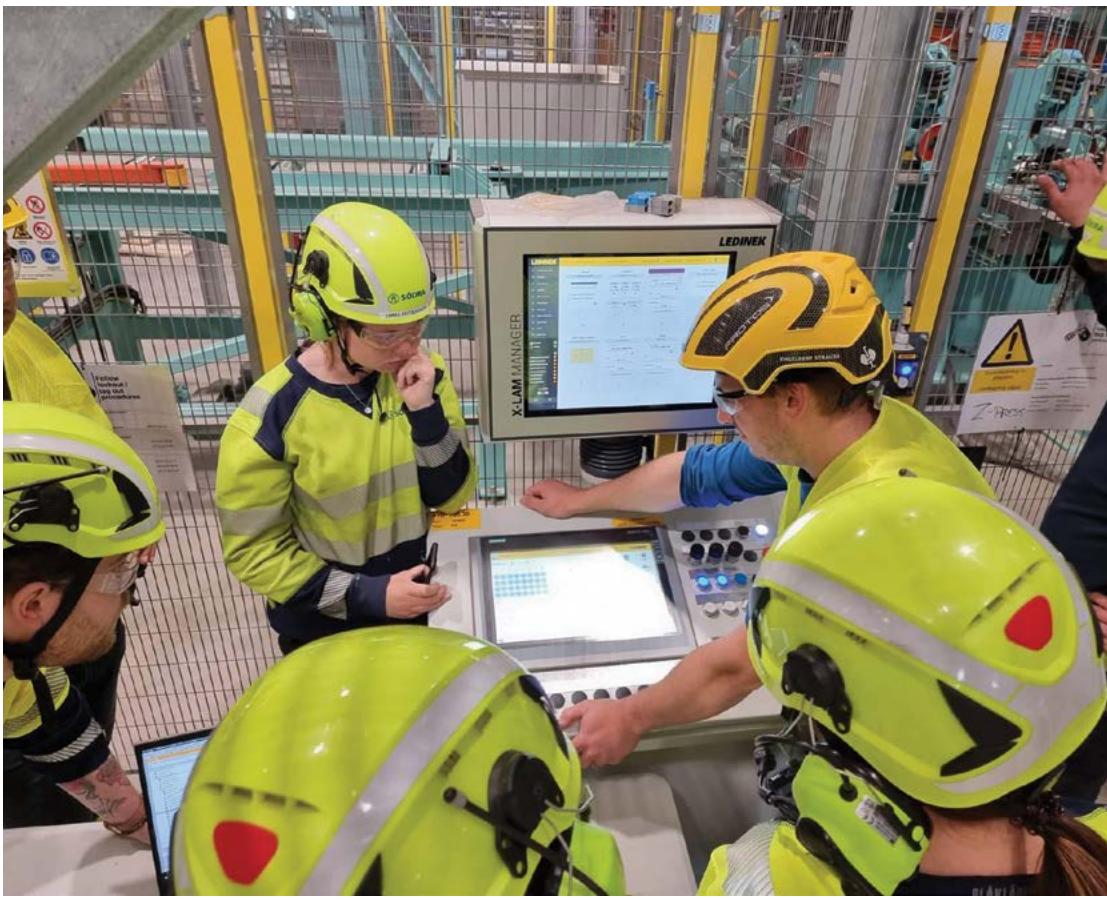


Image: Ledinek

The company has met all the technical needs of its customers in 2023, making progress in terms of both product and performance. For instance, Ledinek is building a new production complex next to existing halls, which will include office spaces and an automatic shelf warehouse, adding additional space for machine and plant assembly, and office areas.

The company is also investing in a biomass heating system and power generation from renewable sources, including a sustainable energy solution with a solar power plant.

Aiming at smaller production capacities and emerging markets, Ledinek has also developed a lighter version of its flagship X-Press, the XE-Press.

Currently, Ledinek is actively involved in the North American market, investing in its own machine portfolio to meet specific requirements for the construction of oversized glue-laminated timber (glulam) beams.

This includes the acquisition of new machining centres like the Mazak Integrex i-500S and a five-axis simultaneous machine Waldrich Coburg Taurus 30, and implementing a new measuring room for quality control. The company is also working on new automated solutions for curved beams production.

According to the machine and systems manufacturer, the construction industry is seeing an increase in the use of wood, particularly due to ecological and aesthetic considerations.

Advanced wood products like cross-laminated timber (CLT) and glulam not only enable the construction of sustainable structures but also contribute to design diversity, leading to unique and appealing architectural solutions.

These new approaches pose new challenges for machine manufacturers and system suppliers.

Ledinek has said that there has been an emphasis on nearly 4.0 production with a material that could hardly be more individual. “To further expand our leading position in this area, we will continue to invest significant energy in developing new solutions,” said Robert Mlinaric, sales manager at Ledinek.

Looking into the new year, Gregor Ledinek, CEO of Ledinek, expressed pride in concluding another successful year and looked forward to new challenges in the new year with additional engineering and production capacities. **WIA**

Source: Holzkurier

SINGAPORE TO BAN FORMALDEHYDE IN INTERIOR PAINTS FROM 1 JAN 2026

From 1 Jan 2026, Singapore's National Environment Agency (NEA) will require paints sold in Singapore intended for application on interior surfaces of buildings not to contain formaldehyde. This is in line with the nation's ongoing efforts to safeguard public health.

Short-term exposure to high levels of formaldehyde may cause health effects such as eye, nose, skin, and throat irritation. Long-term exposure may increase the risk of asthma and some forms of cancer.

From 1 Jan 2026, paint manufacturers and importers will have to submit test reports to NEA substantiating that the measured total in-can formaldehyde content in each interior paint product is below 0.01% weight by weight.

The test reports will have to be prepared by accredited laboratories. Industrial paints and paints used for outdoor applications sold in Singapore are excluded from this requirement, but will have to be labelled to inform users that they contain formaldehyde and are meant for industrial or outdoor use only.

NEA will carry out market surveillance and enforcement to ensure that the paints sold are compliant with the requirements. With the implementation of this control, all interior paint products containing formaldehyde will be phased out in Singapore.

To gather feedback, NEA had consulted the Singapore Paint Industry Association (SPIA), whose members comprise about 80% of the local paint industry.

Manufacturers and retailers shared with NEA that interior paints not containing formaldehyde are available in the Singapore market.

NEA further sought public feedback from individual SPIA members and non-SPIA paint companies between 22 Nov-13 Dec 2023. Based on the feedback received, the paint industry is generally supportive of the proposed measures, as claimed by the NEA.

Similar measures have been implemented in overseas markets, including China and the EU. **WIA**

COP28: SEVENTEEN COUNTRIES PLEDGE TO USE MORE SUSTAINABLY HARVESTED TIMBER FOR CONSTRUCTION PURPOSES

An announcement made at COP28 to increase the use of timber in construction purposes as a key decarbonisation strategy has been applauded by several organisations, including the International Sustainable Forestry Coalition (ISFC) and the Wood Processors and Manufacturers Association.

The announcement was made at a COP presidency event under the auspices of the Forests and Climate Leaders Partnership (FCLP) which is co-chaired by the US Special Presidential Climate Envoy, John Kerry and the Minister of Lands and Natural Resources for Ghana, Samuel Jinapor.

The announcement said:

"A coalition of 17 countries – Commonwealth of Australia, Canada, Republic of Congo, Republic of Costa Rica, Republic of Fiji, Republic of Finland, Republic of France, Federal Republic of Germany, Republic of Ghana, Japan, Republic of Kenya, Republic of Korea, Kingdom of Norway, Islamic Republic of Pakistan, Kingdom of Sweden, United Kingdom of Great Britain and Northern Ireland, United States of America – have endorsed the following statement:

"'Recognising that wood from sustainably managed forests provides climate solutions within the construction sector, we commit to, by 2030, advancing policies and approaches that support low carbon construction and increase the use of wood from sustainably managed forests in the built environment. Such policies and approaches will result in reduced GHG emissions, and an increase in stored carbon.'"

The convening chair of the ISFC, Dr David Brand, said: "The construction sector and the built environment account for more than a third of global emissions and it is critical that countries move quickly to lower carbon emissions and increase stored carbon by using far more timber in buildings.

Image: Josh Olalde/Unsplash

"We also need to replace plastics with fibre-based products and bring sustainably produced bio-based materials at scale into textiles and fuels and pharmaceutical production systems. We are pleased that the ISFC is specifically referenced in the supporting documentation for this announcement."

Mark Ross, CEO of the Wood Processors and Manufacturers Association, said: "Initiatives such as the 'Building for Climate Change' regulatory programme and 'Lowest Carbon Building Procurement Policy' are good starts, but more needs to be done by the [New Zealand] government such as recognition of the value gained in long-term carbon storage from the domestic manufacture of harvested wood products.

"As a country we have a lot to gain through supporting increased timber usage. It is essential that our new government now steps up and joins the global parties in committing to advancing policies and approaches that support low-carbon construction."

Launched in September 2023, the ISFC aims to advocate for the increasing the global provision of renewable materials in the context of a circular bioeconomy; supporting growth that is compatible with climate and nature recovery imperatives; embedding science-based principles in policy and incentives; and increasing benefits to rural and indigenous people.

New Zealand-based Wood Processors and Manufacturers Association focuses on promoting wood as the heart of a future zero-carbon economy. **WIA**

SURTECO INTRODUCES NEW DIGITAL PRINTING SYSTEM FOR MORE FLEXIBILITY

Surteco's new digital printing system can produce decor prints up to 225cm wide

Surface specialist Surteco is introducing a new process for full-width digital printing. This will enable customers to produce decorative surfaces for furniture and flooring in a more flexible and resource-efficient way in the future.

The system can be used to produce high-quality decor prints up to 225cm wide, with several decors on one roll and a repeat length of up to 6m. Unconventional structures and large colour spaces are also possible even with the smallest batch sizes.

Even dimensionally critical decor, as well as creative designs like fantasy decors, papers can be printed with the machine configuration.

"The system opens up completely new possibilities for our customers in terms of flexibility, quality and decor variety," summarised Robert Vancko, head of business unit surfaces.

Since the digital printing system was commissioned, numerous customer orders have reportedly been accepted, produced, and delivered. "The customers are satisfied with the quality and so are we. This enables us to fulfil demanding customer requests, both from existing customers and new customers," said Vancko.

Surteco has been able to develop the new digital printing process in recent years and bring it to market maturity with the help of funding. The funding was awarded in 2017 as a part of the Environmental Innovation Programme of Germany's Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMUV) and was administered by the Federal Environment Agency (UBA) in subsequent years.

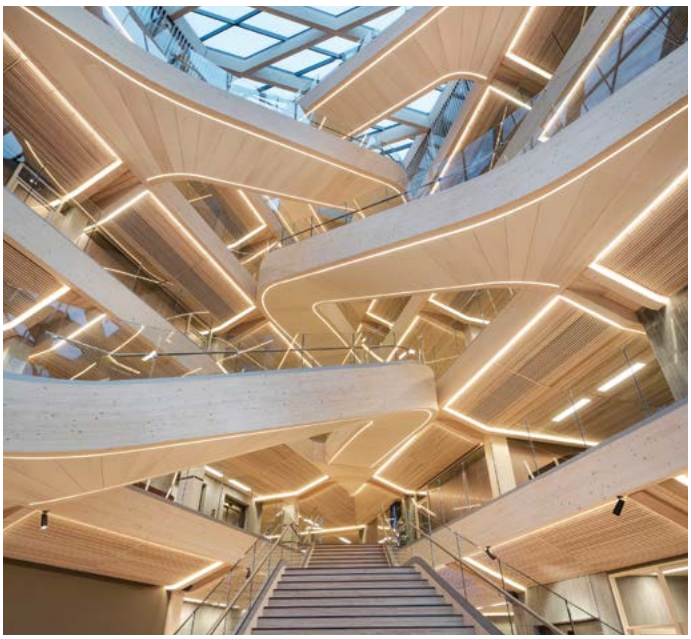
Since 1979, the Environmental Innovation Programme has supported companies in putting innovative and environmentally friendly processes into practice to combine ecological and economic requirements. **WIA**

HENKEL AND COVESTRO COLLABORATE FOR SUSTAINABILITY OF ENGINEERED WOOD ADHESIVES

German chemical companies Henkel and Covestro have joined forces to foster sustainability for adhesives in load-bearing timber construction.

Elements like cross-laminated timber (CLT) or glue-laminated timber (glulam), can be found in a variety of indoor and outdoor applications of buildings, from staircases to facades to structural elements.

For that purpose, materials manufacturer Covestro provides Henkel with polyurethane-based raw materials linked to bio-based feedstocks attributed via the mass balance approach. Henkel in turn uses the supplied products for its high-performance adhesive solutions.



Special adhesives are needed to make wooden constructions a reality, as in the Bjergsted Financial Park in Stavanger, Norway (Image: Sindre Ellingsen/ Henkel)

"Collaborations along the value chain with like-minded partners are key to enable a circular and climate neutral world. Materials play an important role in reducing the carbon footprint of buildings," said Dr Thomas Roemer, head of coatings and adhesives business entity at Covestro.

"With Henkel's new wood adhesive based on Covestro's ever more sustainable raw materials, we jointly contribute to the circular transformation of the construction industry."

By enabling timber construction, load-bearing adhesives already contribute to sustainability of building structures.

Since timber is a natural material, its properties inherently underlie bigger variations than most synthetically produced materials.

It is for example prone to deformation, inhibiting aesthetics as well as functionality, usually limiting its use in load-bearing or other demanding applications.

By increasing the use of alternative raw materials, the carbon footprint of such material can further be improved.

"This is another step towards an ever more sustainable and circular future. Thanks to our work with Covestro, we are able to supply two of our bestselling polyurethane adhesives now being manufactured using alternative raw materials," said Dr Claudia Meckel, head of product development engineered wood at Henkel.

"In addition, by using the mass balance approach, there is no change in product performance and all load-bearing certificates of the adhesives remain.

"With this, we provide our direct customers as well as architects and construction companies with a solution that contributes to their aim of reducing the impact of materials on the overall carbon footprint of buildings."

Henkel and Covestro both treat sustainability and fostering a circular economy with high priority. For Covestro, broadening its raw material base with bio-based or recycled solutions is key part of that endeavour.

Since such alternatives are blended with conventional raw materials in the manufacturing process, segregation and allocation are challenging.

To attribute the used alternative feedstock to a final product, the mass balance approach is therefore used. That is a chain-of-custody method allowing to mix traditional and alternative raw materials during production, but separating and allocating them to products in bookkeeping.

The soundness and compliance of this approach is certified externally by the internationally recognised ISCC PLUS scheme. For the wood adhesive, all involved sites and partners of Henkel and Covestro are reportedly certified according to this scheme. **WIA**

RAUTE SIGNS €20M CONTRACT OF VENEER PRODUCTION EQUIPMENT WITH AMBERBIRCH

Raute Corporation has signed a contract worth €20m with AmberBirch, a company based in Latvia, for the technology delivery of a birch veneer production plant expansion of 60,000m^3 per annum.

The order for Raute's technology includes all main production processes of veneer production: a log handling line, a veneer peeling line, and a veneer drying and grading line, visual and moisture analysers with an extensive service package, and the MillSIGHTS MIS-software.

Raute reported that these lines are of the latest, most automated R7-Series technologies. Engineering work for the plant is already ongoing.

The ordered machinery and equipment will be delivered between the end of 2024 and the beginning of 2025. They will be manufactured at Raute's production units in Lahti and Kajaani in Finland, and in the company's partnership network.

This new plant, which will be in full operation in 2025, will expand AmberBirch's veneer product assortment enabling the company to enter new market segments and better serve the needs of existing customers with a range of high-quality veneer products.

New production capacity also creates a competitive production platform on which new strategic product lines can be developed to take advantage of the growing opportunities in the EU engineered wood product market.

"Raute is our long-term technology partner, and its world leading veneer production technology is a critical part of the successful AmberBirch business model. With this new investment we enter the next stage of fruitful cooperation," said Karlis Kavass, board member at AmberStone Group.

"We are pleased to support AmberBirch in their important investment with our complete, one-stop-solution. We will provide our innovations and look forward to continuing our long-term partnership," said Mika Saariaho, CEO of Raute.

AmberStone Group holds investments in medical, hospitality, agriculture, construction, and wood processing sectors in Latvia and Estonia. AmberBirch is 100% owned subsidiary of AmberStone Group, operating a birch veneer plant in Jēkabpils region, Latvia. **WIA**

AIA SEMINAR AND TOUR IN SINGAPORE: A CONFLUENCE OF COMMUNITY AND SUSTAINABILITY

From left: Eric Ho (AIA Hong Kong), Chan Yimei (AIA Hong Kong), Assoc Prof Shinya Okuda (NUS), Deepu Mahboobani (managing principal, Wimberly Interior), John Chan (director, AHEC), Yew Kee Cheong (2024 president elect for AIA International), Kahn Yoon (director, M Moser), Silas Chiow (AIA International), Manon Sora Koestoer (AIA South East Asia), Vivian Tam (AHEC)

Architecture and design are disciplines which thrive on creative exchange and inter-disciplinary collaborations. Demonstrating their commitment to the industry, the American Institute of Architects (AIA) including AIA Hong Kong, International, and South East Asia joined forces with the American Hardwood Export Council (AHEC) to organise a series of events in November 2023.

21 NOV: SHARING NIGHT

At the National Museum of Singapore, industry leaders and AIA members shared their experiences under the theme of 'Renewable by Nature, Sustainable by Design'. The speakers discussed how environmentally responsible material choice is critical for each design brief.

Architect Kahn Yoon from M Moser opened with the brief from Sir James Dyson to design "an inspiring space, as ideas need inspiring spaces to grow, away from public scrutiny, designed by passionate people who believe in them". With this mandate, M Moser took on the project of redesigning decommissioned power station and National Monument, St James Power Station, into a space befitting of the global headquarters for Dyson.

Marking a departure from usual workplace design, minimal carpeting was used in flooring, with a mix of solid, engineered and veneered wood combined with black steel for an understated yet powerful design. Dyson's own graphics helped punctuate the space with punches of colour. An open atrium promoted the importance of cross-departmental collaboration. The atrium was also the location of the Dyson History Walk, allowing visitors to learn more about Dyson's designs, celebrating company successes and experiments including the Dyson electric car.

Deepu Mahboobani from Wimberly Interiors then took the floor to share examples of interior redesign from the company's portfolio. When designing hospitality spaces, the firm centres on key principles of experiential design, focusing on the senses of sight, touch and smell.

This approach was at the forefront when redesigning the Bentley Suite in St Regis New York, where the team worked to retain the original style and spirit but added a contemporary touch. The team visited the Bentley factory to draw inspiration from its vehicles. A chandelier echoed Bentley headlights, and a sideboard was a replica of the Bentley minibar.

Mahboobani shared how other projects, including a resort in the Greek island of Mykonos, incorporated timber to allow for a brand refresh while ensuring prudent use of client resources.

Associate professor Shinya Okuda from the National University of Singapore (NUS) rounded off the evening by sharing more about his work exploring sustainable materials which can withstand the challenging environmental conditions in South East Asia. Guided by a philosophy of 'Material = Structure = Influence on the space', he focuses on the use of tropical timbers native to the region where others might choose concrete.

He was commissioned by the Ministry of National Development (MND) in Singapore to explore and research mass timber construction for tropical areas.

Sports hall designed for multiple sports, finished with American maple flooring with CLT walls

With humidity in Singapore reaching an average of 80%, he conducted research and experimentation on how timber can still be a viable material choice. His works explored the potential use of timber in the biophilic rejuvenation of existing public housing spaces in Singapore, and a cross-laminated timber (CLT) building in Taichung.

22 NOV

The following day, AIA Hong Kong, International and South East Asia members had the opportunity to attend private tours led by the architects and designers across three sites. While each site served different purposes, they were united by the intent of promoting a sense of community while drawing attention to sustainability and nature.

The tour started with Pan Pacific Orchard, a newly opened luxury hotel designed by WOHA Architects and nestled in the heart of Singapore's Orchard Road. Marking a departure from the air-conditioned cocoons common in the high heat and humidity of Singapore, care was taken in the design to provide an oasis of greenery while reducing energy consumption.

The hotel has been designed to co-exist with nature based on the principles of biophilic design. There are three open sky terraces filled with natural vegetation which provide visual and physical voids in the 23-storey structure, allowing guest rooms sweeping views of greenery. The terraces, which each have a theme of 'Beach', 'Garden' or 'Cloud', also serve as social spaces. In addition, the design serves practical purposes of green building – with terraces and the water features serving as environmental buffers for the elements, aided by the use of fans to promote cross-ventilation and reducing the need for mechanical cooling.

Bukit Canberra was next on the agenda, a newly opened civic center designed by DP Architects. This 12-hectare site serves as a multi-purpose hub encompassing public service offices, a hawker centre, sports facilities, medical care facilities, and senior care centre, while preserving the historical Former Admiralty House.

With the myriad uses for the site, the theme 'Green' unified the various purposes with a large open green space that greeted visitors. The green space divides site between the ActiveSG sports halls and the hawker centre, and serves as visual relaxation when not in use for community events. DP Architects shared how the project has been a testbed for new timber technologies such as use of CLT in roofing and pillars in the multi-purpose hall.

The tour ended with a visit to the School of Design & Environment (SDE) at the National University of Singapore, led by Dr Erik G L'Heureux. Dr L'Heureux was involved in the renovations of SDE buildings 1 and 3. Dating back to the 1970s, the buildings demonstrate how existing buildings can be adapted and reused with good design, reducing new carbon expenditure without the need for new-build construction.

SDE 1 and 3 were designed to be net-zero energy buildings, with an estimate that it would be achieved in 25 years. Besides integrated photovoltaics in the roof, the building exterior was cladded with horizontal light shelfs to deflect heat and reflect natural sunlight into the deep floor plate, while reducing exterior building temperatures. Given air conditioning could account for up to 60% of energy usage in tropical countries, keeping the building cool in an environmentally sensitive way was a focus. Hybrid cooling was used throughout. With a relatively high set temperature of 28°C, multiple fans helped circulate the air within the interior space.

With SDE located in a university, communal spaces are especially important for students to work and play. Great consideration was given to how to provide a sense of community and collaboration. The floor plate was opened and a spiral staircase was added connecting all levels of the building, serving as a natural meeting point between students, faculty and visitors. It also served as an avenue for informal events held in the building foyer.

Material choice was again critical to the design. Fabric air-conditioning ducting replaced the usual galvanised metal given its lower carbon footprint.
Dr L'Heureux reflected on the need for careful specification: "As part of our carbon accounting process to calculate the carbon footprint of our build, we realised that our aluminium primarily came from two sources: Belgium and Asia. Even with longer shipping distances, the aluminium from Belgium had 1/8th the embodied carbon as the aluminum from Asia, largely reflecting the use of renewable energy in Belgium. As architects increasingly look towards sustainable design, there may come a point where we will need to specify the origin of each material used to minimise the carbon footprint of the material." **WIA**

THE EVOLUTION OF GREEN ARCHITECTURE: AN INTERVIEW WITH MARK THOMSON

Green or sustainable architecture has become a necessity in the wake of the climate crisis, but what exactly does it entail? **Sorelle Henricus** talks to **Mark Thomson**, founder of Eco Effective Solutions, to gain insights into how the construction industry can become greener.

By **Sorelle Henricus, PhD**

Gaia, NTU Business School building

Your experience in architecture and your advocacy for sustainable buildings are impressive. Could you share some key highlights and milestones that have shaped your career?

Mark Thomson: Almost everywhere I have lived has featured timber cladding, timber floors and timber structural systems, and, intuitively, I have referenced timber as a natural and low-carbon material throughout my professional career. Reflecting back, some key milestones stand out:

My passion for organic architecture was fuelled by a fascination with Frank Lloyd Wright's architecture, which led me to visit his buildings across the US in 1989 and to speak at the Frank Lloyd Wright School in Wisconsin and Hollyhock House. At the same time, during my early career in commercial interior design I grasped the importance of durability, detail, and cost in design decisions, but more importantly, I discovered the positive impact indoor planting could have on air quality.

As a company director I learnt the value of systems, quality and certification, and the value of accurate documentation for projects, winning business awards, including the prestigious Australian Quality Award. Designing collaboratively with Brisbane builder, Michael Leo (Guitar Buildings) and winning three architectural awards for my engineered timber family home in 2002 cemented my belief in the power of collaborating with builders and other consultants.

Some of the work I am proudest of are projects and business ventures advancing sustainable design. These include being president of the Australian Green Development Forum (AGDF), establishing eco-consulting business EcoLateral and working for all three tiers of the government. Founding Eco Effective Solutions in 2009, which continues today, has provided me with a platform to further pursue research, design, and education in the field of sustainable design. As adjunct professor at Queensland University of Technology (QUT), I had the opportunity to contribute to the foundation of the Centre for Subtropical Design where we established sub-tropical building principles, an essential tool to increase resilience to our changing climate.

The exterior of Gaia

Delivering Green Star Faculty services for the Green Building Council of Australia (GBCA) from 2007-2017 broadened my international expertise including travelling to Singapore in 2018 to deliver EarthCheck sustainability training. I hold both EarthCheck and Green Star Accredited Design Professional qualifications. Joining Responsible Wood as an independent director in 2017 and becoming a board member of Micah Projects in 2018 has allowed me to contribute to sustainable forest management and social justice initiatives, highlighting the importance of addressing both environmental and social aspects of sustainability.

How has the landscape of sustainable building and design evolved throughout your career?
Thomson: Initially, sustainable building was about sustaining our societies' quality of life on this planet. Currently, it is about the challenge to our future existence resulting from unsustainable human impacts. I sincerely believe that sustainable buildings will assist in improving our lifestyles by encouraging us to be more attuned to our changing climate. Regenerating current building stocks, reducing our dependence on fossil fuels and building new positive developments is the way forward.

Could you give an example of some of the early building projects in the region that adopted sustainable practices that are still relevant today?
Thomson: Sustainable building practices just make common sense. Here are some lessons that stay relevant:

Building smart not large: Reducing building size and considering flexible or modular solutions can reduce construction energy use.

Choosing low-toxic materials: Specifying materials such as wood can facilitate the extension of a building's life with improved indoor air quality for a healthier environment.

Avoid high-embodied-energy materials: Materials such as steel, aluminium and engineered concrete can be reduced by the adoption of low-carbon alternative systems like timber, to reduce the cost of energy over a building's life.

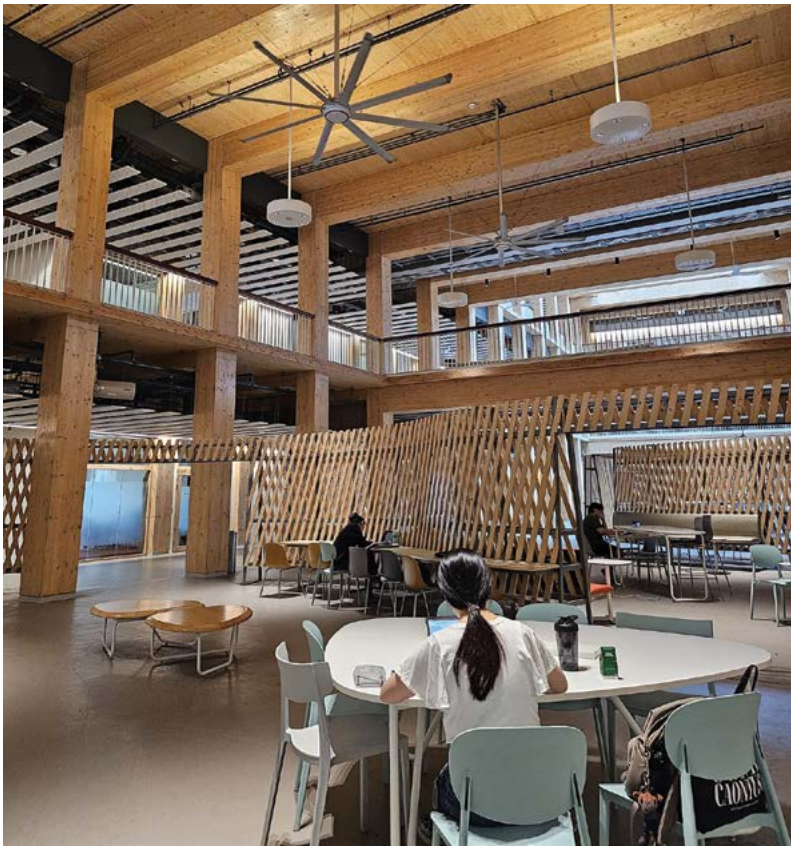
Minimise waste: Reducing building waste is another benefit of sustainable building, particularly when timber is used. Timber waste is typically more reusable than steel, aluminium or concrete waste and involves a lower carbon cost process for reusing or recycling, than most other materials.

Embracing the circular economy: Sustainable buildings using circular economy principles reduce carbon emissions by focusing on supply chains, which typically lower transport distances and costs.

Could you share more about some of the architectural features of a few of your favourite buildings in Singapore?
Thomson: Opened in 2005, the central Singapore National Library Building is one of Singapore's early bioclimatic designs. I first visited this building in 2014 and returning nine years later, I was impressed by how it is still loved by Singapore citizens and how its skygardens have influenced many other projects during Singapore's 'Garden City' evolution. Architect Ken Yeang incorporated 14 landscaped gardens in the complex. They collectively cultivated with 120 species of tropical plants. These green spaces help to regulate the daytime temperature in the building. The project received a Green Mark Platinum Award, evidence of its ecological design implementation and pioneering innovation.

Ken Yeang's second Singapore project, Soleris, near One-North MRT station, also achieved the Green Mark Platinum Rating for its ecological design approach. I have always wanted to understand this building after being intrigued by Yeung's approach to ecological

Inside Gaia



buildings. His design and building approach cleverly delivers innovative hydrology concepts, practising efficient energy solutions and constructed ecosystems. His work is worthy of further study due to his understanding of ecosystems and the reduction of building impact on local biodiversity. The Soleris spiral ramp with its deep overhangs and concentrations of shade plants is an important element in the ambient cooling of the building's facade, plus it enhances local biodiversity. The continuous soil in the spiral gardens allows for fluid movement of organisms and plant species, between all vegetated areas of the building. This unique ecological design concept contributes to the health of the local ecosystem via a net positive ecological impact.

My first visit to Nanyang Technological University (NTU) did not disappoint my architectural instincts and I hope to return with more time on my next visit to Singapore. The hilly campus has a wealth of architecturally designed buildings, each with different approaches to design, educational interpretation and sustainability objectives.

The first building I visited, named after the Greek Goddess of Earth 'Gaia', was the NTU University of Business School building, designed by Toyo Ito and Associates with local studio RSP Architects. It is the largest wooden building in Asia in relation to the volume of timber used, and uses timber certified by the Programme for the Endorsement of Forest Certification (PEFC) in addition to achieving PEFC project certification. Its two gently curving blocks have beams and columns built from glue-laminated timber (glulam) whilst floors and solar shading utilise cross-laminated timber (CLT). The Gaia building is the second mass timber building by Toyo Ito on the NTU campus. The timber elements are largely exposed, being visible inside and out. Large windows and skylights allow light to bounce around open areas, while terraces, air wells and multi-storey theatre spaces use timber to achieve a naturally warm interior ambience. The extensive use of vegetation inside and immediately adjacent to the building results in a powerful biophilic design solution. Japanese attention to joints and details produces a simple but refined building programme where users move smoothly via long colonnaded central walkways.

What are the main challenges you have encountered in promoting sustainable building practices within the construction industry?
Thomson: People often tell you what they think you want to hear, glossing over any contentious issues so it is important to follow up verbal advice

with written confirmation. If it is not written down on or presented on a company document, it is not likely to exist, hence beware of verbal representations which could be inaccurate. It can be helpful to deal directly with the correct people in the supply chain who are focused on technical details.

Understand the chain of custody concept, for timber to be considered sustainable, it needs to be sourced from sustainably managed forests and it is a critical and dependable method to ensure that sustainable forestry management has featured in the history of timber and wood products used for projects. It is important to ensure that project timing has adequate material sourcing time allowances. Sustainably managed timber is popular and is not likely to be "on the shelves", while often, unsustainable timber is.

In your experience, what incentives or policies have been effective in encouraging the adoption of sustainable construction methods and certified timber materials?
Thomson: Here is my list of what has been most helpful:

First, regulations and mandates such as procurement policies of councils, governments and authorities, citing the adoption of ecological sustainable development (ESD) principles; contractually mandated green building rating tools – an assurance that the project is contributing to environmental conservation and economic sustainability; and new legislations like the Illegal Timber Act and Modern Slavery Regulations that ensure ethical and responsible sourcing.

Second, market drivers such as the increase of ESG reporting, and the growing awareness of climate change by various not-for-profit groups as well as community awareness around the waste and the need to recycle.

Lastly, innovation: The emergence of a bioeconomy offering non-toxic, renewable materials, presents exciting alternatives to harmful chemicals. There needs to be an awareness of low-carbon materials and the need to use lower carbon solutions in building to meet community expectations as well.

How has Australia's early adoption of certified PEFC timber influenced its utilisation in building with timber across the APAC region, and what role do you foresee it playing in the continued growth of structural timber use in the years ahead?
Thomson: In hindsight, it has been very important.

In 1999 PEFC was formed as a European council, which became an international programme in 2003. Australia joined the alliance in 2002, at which time Responsible Wood was formed to continue developing and managing standards for timber and wood products sourced from sustainably managed products. As PEFC quickly grew into being a global authority on sustainable forest management, its certification offerings were preferred by small, non-industrial, government-managed and family forest owners. Australia's adoption of PEFC standards has aligned its previously established Australian Forestry Management standards to international standards, allowing greater APAC education and trading opportunities. Chain of custody adoption has increased, and certainty now exists for APAC building elements to be sourced from sustainably managed forests.

Australia is well placed to provide high-quality and competitive structural timber for low-carbon buildings to meet the increasing demand for green buildings. Buildings being designed now are embracing concepts such as biophilic design, circular economy, and regenerative building – buildings that are designed and operated to reverse ecological damage plus have a net-positive impact on the natural environment. Australia has a proud history of engineered structural timber use in commercial and residential buildings, and now it is adopting solutions such as CLT use and parametric design for future sustainable development work. Australian Projects have been successful at the World Architectural Festival over recent years, particularly since 2017 when PEFC initiated the Best Use of Certified Timber Award. **WIA**

A registered architect, researcher and educator, Mark Thomson is an industry-leading voice on best practice design and sustainability solutions for building design and construction. He leads the charge in developing innovative solutions to enhance living and working environments with a regenerative approach. His expertise in design, indoor environment quality and healthy building practices has resulted in multiple award-winning projects and independently certified building ratings.

EMBRACING SUSTAINABILITY IN LUXURY RESORT DESIGN: THE RITZ-CARLTON MALDIVES

Location: Maldives
Client: The Ritz-Carlton
Architects: Kerry Hill Architects
Mass timber specialist: Venturer Timberwork
Main contractor: Sanken Overseas
Timber engineer: Ronnie & Koh Consultants
PEFC-certified timber supplier: KLH Massivholz, Hasslacher, and Stora Enso
Text: PEFC
A PEFC-certified project

The Ritz-Carlton Maldives sits within the North Malé Atoll on the Fari Islands, a 50mins speedboat journey from Malé Airport. Inspired by the circular movements of the ocean, Singaporean architecture firm Kerry Hill was guided by a philosophy of nature-centric design while the natural beauty of the fragile ecosystem took centre stage in the vision. This commitment to nature is apparent in the guest experience that immerses visitors in natural luxury through both their surroundings and the materials used.

Constructed entirely out of materials certified by the Programme for the Endorsement of Forest Certification (PEFC), the engineered timber villas are built on an existing sandbank within a shallow reef at the edge of the north-east rim of North Male Atoll. The resort opted for prefabricated, easy-assembled materials, sourced selectively and imported in bulk, reducing cutting and use of heavy machinery. All timber used came from PEFC-sustainable forests in Europe, such as from Austria or Slovenia.

PEFC-certified materials were at the heart of the design, delivering predictable outcomes in terms of speed and cost while also delivering quality, beautiful sustainable architecture. The elements were crafted from sustainable European forests, ensuring a sustainable chain of custody certified by the PEFC.

Singaporean mass timber specialist Venturer Timberwork is said to be the "first mass timber resort builder" to achieve PEFC chain of custody certification. They engaged early on in the concept design phase with project owner Evan Kwee of Pontiac Land and advised the designers on creating practical timber-centric spaces. This allowed the project owners to obtain PEFC project certification and publicly demonstrate that their timber came from sustainably managed forests.

A spokesperson from Venturer said: "This is not Venturer Timberwork's first sustainability commitment. It has long been a leading user of cross-laminated timber (CLT) and glue-laminated timber (glulam) – which is from certified European sources – in several projects both in Singapore and in the region for some years now."

An earlier project in the Fari island, James Turrell Skyspace was its first PEFC-certified project on the island. The company is making sure all its projects are PEFC certified.

Going a step further, Venturer engaged Double Helix Tracking Technologies to map the timber supply chain and verify the flow of certified timber along it,

tracking it from PEFC-certified European forests to the island in the Indian Ocean. Sourcemap transparent tools show satellite imagery on the status of forests in Germany and Austria where the spruce and pine wood used for the timber originated.

"Using PEFC project certification and a sourcemap to illustrate the journey of the wood builds market confidence in timber over other construction materials," said Darren Thomas, CEO of Double Helix Tracking Technologies. "This is especially valuable for projects with a central environmental message like the Patine Maldives. Educated consumers seek reassurance that timber is coming from well-managed forest sources, and not causing harm through deforestation or illegal logging."

Villas bridge the marine environment and the land with CLT walls and roofs made of PEFC-certified wood, a majority of which was supplied by KLH Massivholz.

A KLH spokesperson commented: "KLH has been a dedicated partner of Venturer for many years, supplying PEFC-certified CLT for numerous sustainable projects. We are committed to sourcing our raw materials from responsibly managed forests and collaborating with our customers to create a greener future. For the Ritz-Carlton project in the Maldives, our focus on sustainability extended to minimising the construction impact on the reef ecosystem.

1 *PEFC-certified materials were at the heart of the design, delivering predictable outcomes in terms of speed and cost while also delivering quality, beautiful sustainable architecture*

2 *CLT walls and roofs made of PEFC-certified wood, a majority of which was supplied by KLH Massivholz and Stora Enso*

3 *Hasslacher also sourced for sustainably sourced wood for the villa beds*

The usage of mass timber is not only sustainable but also critical for the longevity of the buildings

Expertly prefabricated in Austria with a focus on top quality and precision, the KLH-CLT used for walls and roofs was assembled efficiently onsite, reducing heavy operations and most importantly, generating no waste or pollution."

Stora Enso, recognised for their large-format CLT components, furnished the materials for the hotel. These prefabricated elements were crafted at the production site in Ybbs, Austria, using spruce slats obtained from sustainably managed and PEFC-certified forests across Austria, Germany, Slovenia, and the Czech Republic.

"We supplied 781m^3 of PEFC-certified CLT elements from our mill in Ybbs, Austria. The remarkably lightweight material helped to reduce the carbon footprint of transportation from Hamburg to Male by the sea," said Hope Chuah, sales manager building solutions at Stora Enso.

"Given the unique location of this project, the usage of mass timber is not only sustainable but also critical for the longevity of the buildings. Salty climate and lack of skilled labour are only a few obstacles to be mentioned that can be tackled with timber as a construction material. The renewable, durable, and easily assembled CLT elements also helped to minimise the overall negative construction impact for the unique ecosystem of the Maldives," she added.

Timber Concept, a PEFC-certified supplier committed to sustainable practices, handled all aspects of the bedroom villas' timber: shop drawings, sourcing structural glulam from Hasslacher's facilities in Germany and Austria, and CLT panels from Stora Enso in Austria. They also ensured efficient logistics from the manufacturing facilities to Malé port. The smaller details were covered with PEFC-certified timber supplier Hasslacher sourcing the sustainably sourced wood for the villa beds.

"The Ritz-Carlton project greatly demonstrates that timber construction has many benefits over concrete or steel construction: Prefabricated timber construction is quick, light-weighted, and economical, and it is attractive and conserves our environment," said Markus Tiling, director at Timber Concept.

Leveraging technology and collaboration, the project exhibits how careful planning and sustainable practices can lead to luxurious, yet environmentally sound developments. This project also resonates as a model for future construction, symbolising a global shift towards environmentally responsible development. In a world increasingly aware of the need for ecological stewardship, the Ritz-Carlton Maldives' journey from certified forests to tranquil atolls can be an example of what the future of construction can and should look like. In Venturer's own words:

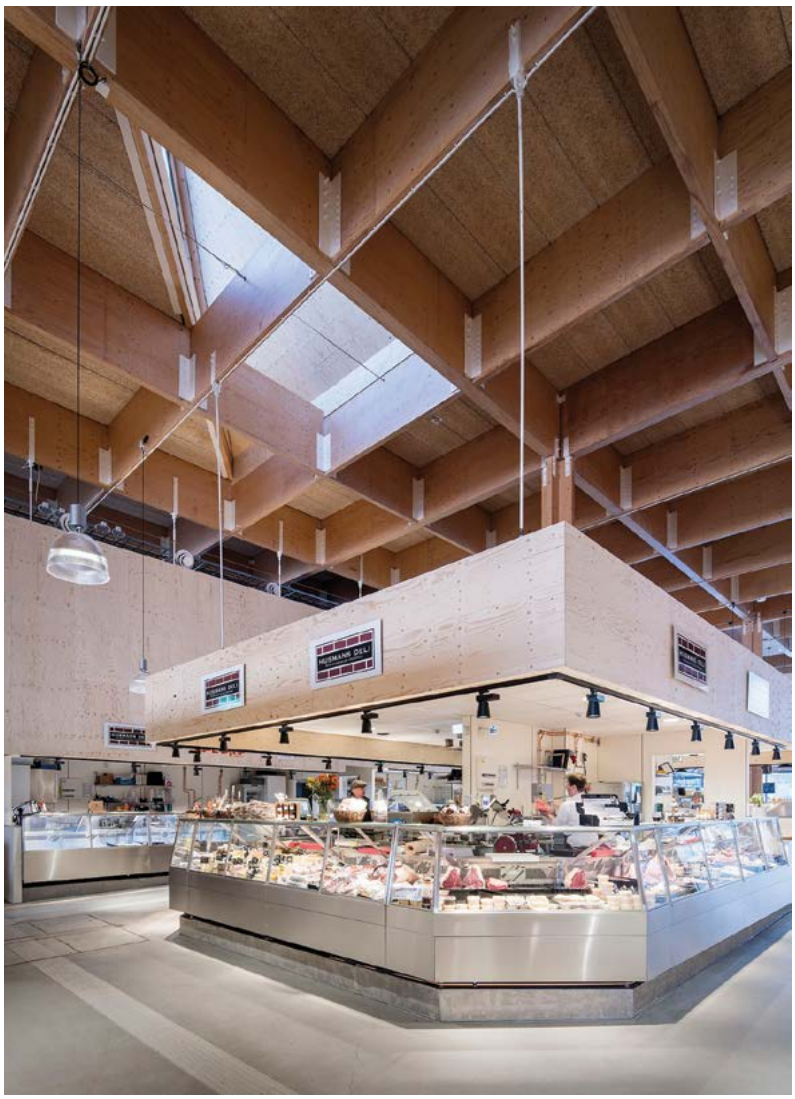
"The project was managed and executed by our core design and installation team from Singapore. Early engagement with the owner and architect was a critical factor to the project's success. This project was the largest resort at that time to use mass engineered timber and in many ways was a forerunner of the growing adoption of the technology in markets like the Red Sea.

"Today, Venturer has expanded its capabilities and manufacturing base and is pioneering the use of new audit processes to capture greenhouse gas metrics, treatments for durability and fire and the inclusion of regional content to supplement and make the uptake of mass timber more compelling." **WIA**

BUILDING SUSTAINABLY REQUIRES RETHINKING THE LOGIC OF HOW WE BUILD

The construction industry is under heavy pressure to change: Currently, the sector is material intensive and contributes to significant carbon emissions globally.* When building in a future-proof way, it is not enough to change the materials, but it is also imperative for designers, architects and engineers to rethink the logic of how they design and build. They should first consider reusing and renovating existing spaces, and only after that build with sustainability in mind.

Abandoning the take-make-waste economy and transitioning into a circular one will be crucial to allow everyone to thrive in the future. This calls for designing buildings in a way to adapt to the changing needs throughout their lifecycle, and sets new requirements for modern building materials: In addition to being durable, they need to be renewable, reusable and eventually recyclable.



Stockholm's temporary wooden market hall was designed from the outset to be dismantled and moved to a new location and use

SLOWING DOWN CARBON FLOWS IN FOREST-BASED BIO-CYCLES

The average lifespan of a building is often around 50-60 years.* However, as wooden buildings can also be in use for over 700 years, like Stålekleivloftet in Norway,* using wood as a building material has the potential to act as a long-time carbon storage.

On average, log trees grow in commercial Northern forests for 80 years, and during that time they sequester carbon. Once the logs are harvested, the stored carbon remains in them. The longer the wood products are being used and re-used before turning into bioenergy and biogenic CO2 at their end of lives, the longer the carbon is stored.* This means that slowing down the carbon flow plays a big role in mitigating climate change. The carbon stored in bio-based products can act as a temporary reservoir with positive climate effects.* Simply put, the service lifetime of wood products from sustainably managed forests should be extended, and the reuse of products to keep carbon stored longer should be encouraged.

The carbon benefits of wood construction can also be quantified as substitution impacts. It is estimated that one tonne

of carbon in wood construction products substituting a non-wood construction product on average displaces emissions of approximately 2.1 tonnes of carbon, or roughly 3.9 tonnes of CO2 equivalent (CO2e).*

Innovations have been developed to reuse wood products, but there is still a long way to go to re-engineer the entire lifecycle of a tree. A study done at Aalto University in Finland concluded that reusing structural components of timber can result in a significant reduction of the environmental burden and therefore contribute to the slowing down climate change.* So, while traditionally wood products have been viewed only for one-time use before being used for energy recovery,* the future of reusing timber for other purposes may be much brighter and longer, than thought.

KERTO LVL

Metsä Wood has developed wood-based solutions that help to accelerate the circularity of the construction industry. This is their philosophy: Valuable raw materials should be kept in the cycle for as long as possible, while maintaining its value and minimising waste and emissions.

”The construction industry needs to cut down both emissions and total raw material usage. Whether it is building new or renovating old properties, Metsä Wood can offer renewable circular solutions that at the same time increase the carbon storage of the building, decrease emissions compared to fossil-based products, and optimise wood-usage”, commented Rosa Zabihian, sustainability manager from Metsä Wood.

Metsä Wood’s Kerto laminated veneer lumber (LVL) beams are designed and manufactured to be


1


2

3

1 *Buildings made with Kerto LVL elements can be disassembled, and reused further for other purposes*
2 *Inside Port of Amsterdam*
3 *Port of Amsterdam, made with Kerto LVL*
4 *Little Finlandia, made with Metsä Wood's Kerto LVL wood*

a durable construction material that can be used for reportedly 100 years. When designed right, buildings made with Kerto LVL elements can be disassembled, and reused further for other purposes as the elements can be modified and reused, and the entire buildings can be moved to another location if necessary.

Already taking advantage of this technology is the Nautical Coordination Centre in Amsterdam focusing on circularity and is built entirely with Kerto LVL.* According to Metsä Wood, all materials used in the building are fully circular, and sustainability and long use life are at the core of the building. The Kerto LVL elements can be reused further for other purposes as the elements can be reused, and the entire buildings can be moved to another location if necessary. When planned ahead, using demountable construction components also enables the reuse of construction components and the reconstruction of buildings.

Dutch housing company Sustainer. home also uses Metsä Wood's Kerto LVL products for the building system of their modular wooden housings. Their products offer design flexibility and with 3D models, they are able to create scalable, sustainable and affordable buildings. The supporting structure of Sustainer. home's buildings is made with LVL, and it offers the same performance as solid wood construction, but with the effective use of materials of traditional timber frame construction. The building modules can also be demounted and used again for new purposes, if need be, with Kerto LVL being a durable material.

CIRCULAR ECONOMY SUPPORTS SUSTAINABILITY

The built environment uses almost half the materials extracted globally every year and is a contributor to greenhouse gas emissions. Most of the wood Metsä Group uses comes from family-owned Nordic forests, and all the used wood is traceable and comes from certified or controlled forests. When buildings are built with circularity in mind, it allows the same amount of wood to serve more purposes, to truly offer more, and be in use for longer periods of time.

Kerto LVL stores carbon 783kg $CO2e/m^3$, according to the company. Reuse and recycling ensure prolonged carbon storage; as long as Kerto LVL product is in use, carbon stays stored. Furthermore, Kerto LVL is efficient, as it is dense and durable. The sustainability of Kerto LVL raw material and production is documented in Kerto LVL's environmental product declaration.*

At the end of the day, extending the lifecycle of wood material is truly a climate action, as it slows down how carbon is released. The longer everybody can keep wood in circulation before it is used for energy, the more tools they have for combating climate change. Reuse slows down the carbon flows in forest-based bio-cycles and thus reinforces the positive climate impacts of wood construction. **WIA**

**References are available upon request*

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Images: Metsä Group

"INDONESIA IS GETTING READY FOR CLT"

Cross-laminated timber (CLT) manufacturers in South East Asia are few and far, since the uptake of mass timber is still slow in the region – which make manufacturers like INCLT a surprising welcome. Gijs van Seggelen, founder of INCLT, shares more about the company and why they set up a CLT manufacturing facility in Indonesia.

By **Yap Shi Quan**

Can you introduce yourself and INCLT?
Gijs van Seggelen: I am a Dutch entrepreneur with over 10 years of experience in the Indonesian wood and furniture industry. In 2019, I saw the immense potential of CLT as a sustainable and locally-sourced building material for Indonesia. Since then, I could not get the subject out of my mind and was moved to make it happen.

CLT is becoming one of the main construction materials used in Europe. But it did not make sense why so many Asian projects rely on European CLT when Indonesia has the resources and potential to produce its own. That is exactly what started INCLT. We are kind of a pioneer in Indonesian CLT manufacturing.

INCLT is not just about building walls: We are about building a greener future. CLT offers a multitude of benefits in strength, durability, sustainability, faster construction times, energy efficiency, reusability, and less reliance on fossil fuels, resulting in a reduced carbon footprint compared to traditional building materials. I believe Indonesia really needs its own CLT.

At this stage our primary focus is on the hospitality sector, providing resorts and hotels with the opportunity to offer their guests a truly 'green' experience. However, our CLT solutions are also being used for shops, booths, offices, pavilion and private homes.

Why did you and your parent company, HUG, decide to establish a CLT manufacturing facility in Indonesia?
van Seggelen: I love living in Indonesia and I am proud of the developments that Indonesia had made in the last decade. Indonesia's robust economic

growth and increasing housing demand present a unique opportunity for sustainable building solutions. CLT's exceptional strength and resilience against earthquakes, prevalent in Indonesia's Ring-of-Fire region, make it an ideal material for safe and durable construction. Recognising this potential, INCLT sees an avenue to not only contribute to Indonesia's infrastructure needs but also promote environmentally friendly construction practices.

Traditional construction methods in Indonesia often struggle with the country's seismic activity threats. INCLT sees this as an opportunity to provide a safer and more sustainable alternative with the production of CLT. It has superior earthquake resistance and fire retardancy, coupled with its eco-friendly nature, make it a perfect fit for Indonesia's construction landscape, driving our decision to establish a manufacturing facility here.

We understood that entering a new market with an innovative product like CLT would not be easy. However, the potential impact on Indonesia's construction sector and our commitment to sustainable solutions fuelled our entrepreneurial spirit. We embraced the challenge and embarked on establishing the first commercial CLT manufacturing facility in the country.

Witnessing Indonesia's rapid growth and the vulnerability of its existing infrastructure, we knew CLT could play a significant role in building a safer and more sustainable future.

What made you decide to use acacia species to create CLT panels?
van Seggelen: We initially chose blue stain pinewood due to its density resembling European CLT wood species. Working with pinewood allowed us to create a unique production line and learn about all the process that come with producing CLT in Indonesia.


1

van Seggelen in the middle with his team surrounding him

Along the way we aimed for quality improvements. Early tests exceeded European standards with our smart pressing process and the higher density of Indonesian pinewood. We were on the right track, but still many improvements were pending: While pinewood performed well, it was not the most sustainable option in Indonesia. We tried several species to find the perfect match in availability, strength-to-weight ratio and visibility. Sengon wood did not have the strength but came with a good weight; mahogany gave issues while pressing; teak was great but too expensive; meranti wood was good, but too diverse to work with.

And so we tried acacia wood, to good results on the adhesives and look. Acacia boasts even higher density than pinewood, making it heavier and less flexible but significantly stronger. This potentially allows using less wood used for equal strength. Additionally, acacia excels in resisting rain and termites, addressing common concerns about CLT in Indonesia. So far, no termite presence has been observed in our pinewood and acacia CLT panels.

Regarding fire safety, CLT compares favourably to brick and concrete. It reminds me of a saying: "A firefighter once remarked they prefer extinguishing wood over stone, as wood cracks before breaking, unlike stone collapsing." Extensive fire testing on the acacia CLT panels at Ministry of Public Works and Housing (PUPR) Bandung, in collaboration with ITB University, revealed outstanding resilience. The acacia CLT endured beyond initial estimations, showcasing charred but still intact panels with functional glue bonds. Strength testing is a continuous process. At universities like the Universitas Gadjah Mada (UGM) in Yogyakarta, but also the Universitas Sebelas Maret (UNS) in Solo, we

are able to collaborate and find out if INCLT panels are compliant with European standards. I prefer to keep the European standards as long as Indonesia does not have their own, and because the birthplace of CLT is in East Europe.

While our panels exhibit slightly lower modulus of elasticity (MoE) than European pine CLT, they consistently surpass the required modulus of rupture (MoR). By transitioning from pinewood to acacia, we optimised both performance and sustainability, creating structurally strong and durable CLT panels that meet or exceed European standards. We remain dedicated to ongoing testing and quality improvements.

What kinds of challenges do you face as a CLT manufacturer in South East Asia, and what would you have done differently had you known about them?
van Seggelen: The biggest challenge was 'just' to produce CLT, mainly manually with the available machinery. I have literally put in blood, sweat and tears to get the results that were good enough for my standards. While the dream would be to have a US$20m production line, the reality of manual machinery pushed us to deeply understand every aspect of our CLT production. One key challenge is weather: Both rainy and dry seasons impact wood characteristics and glue reactions, demanding constant vigilance. We have learnt to adapt and refine our processes accordingly, ensuring consistently high product quality.

Looking back, securing a larger initial budget would have allowed for faster progress. However, the slower pace also proved beneficial, allowing us to focus on every step of production and gain invaluable practical knowledge.

Another big challenge in Indonesia is finding experienced CLT related people, tools and hardware, as there are none. Working together with the universities allowed us to prepare a new generation of architects, civil engineers and woodworkers with the focus on CLT.

Overall, we are proud of what we have achieved so far. We remain focused on continuous improvement and are excited to collaborate with forward-thinking partners as Indonesia embraces the future of sustainable construction. I would also like to thank CLT producers all over the world that have supported us with their knowledge and support. The demand for CLT in the world is big, therefore the competition is friendly between CLT producers. I was able to visit several producers, test facilities and users in Europe, and was always welcomed kindly.

But my biggest frustration would be misconceptions about CLT in Indonesia. Some still view it as unsafe, weak, or easily bendable, even after clear explanations and presentations. Fortunately, the tide is turning. Over the past year, we have seen an increasing number of informed inquiries and genuine interest from companies familiar with CLT's advantages. This shift tells us Indonesia is getting ready for CLT, even while recognising the journey ahead, such as establishing a dedicated building code, is difficult.

INCLT is currently working with several organisations on "an Indonesian CLT building code". Can you elaborate on this, and how discussions have been like thus far?
van Seggelen: Our passion for CLT extends beyond production, driving us towards the development of an Indonesian Building Code for this material. This goal is fuelled by several factors such as government officials who closely monitor our progress and actively encourage standardisation, recognising the potential of CLT for

CLT has superior earthquake resistance and fire retardancy, coupled with its eco-friendly nature, making it a perfect fit for Indonesia's construction landscape

sustainable construction; and for sure by the universities as UGM, UNS and the Institut Teknologi Bandung (ITB) that actively participate in R&D, providing valuable technical expertise.

Another important player is the PUPR who actively pushes for collaboration on the building code, recognising the need for clear regulations to guide CLT adoption. However, challenges remain. As a commercial producer, our resources and capacity are limited. We need increased government support and collaboration to expedite the process on the building code. I believe all will come in the near future as the focus on sustainability and innovation within projects like the new Indonesian capital, Nusantara (IKN) could serve as a catalyst, accelerating the development and adoption of a CLT building code.

What is the market demand for mass timber elements like CLT or glue-laminated timber (glulam) like in Indonesia, and more broadly, South East Asia?
van Seggelen: The upcoming realisation of IKN presents a unique opportunity to show the demand for CLT, even if it is not possible to calculate it in numbers at this stage. But it shows that the market for mass timber elements like CLT and glulam in Indonesia is significant and rapidly growing.

But also, the resort and hotel development sector is a huge market. Upcoming places in Labuan Bajo and established tourist destinations like Bali are experiencing a boom in resort and hotel construction, creating demand for sustainable and durable building materials such as CLT. Green tourism is growing, thus driving demand for eco-friendly building materials. And this aligns perfectly with INCLT. Next to that are needs for subsidised housing. CLT's potential for earthquake-resistant construction makes it a promising solution for affordable housing, particularly in earthquake-prone areas where brick houses are vulnerable.

Providing specific numbers for market demand is challenging as the product is very new for Indonesia, but indicators paint a clear picture of a booming market with growth potential. Instead of focusing on large-scale projects like IKN, we are exploring alternative distribution channels like supplying standardised CLT and glulam panels to the building and retail market. This means tapping into the existing demand from smaller construction projects and individual consumers.

At INCLT we plan to expand production capacity by 15 times with a new facility to meet the growing demand. This expansion will position INCLT as a major player in the Indonesian mass timber market. We are also strategically located between Australia and the Middle East, opening up export opportunities.

Lastly, is there anything you would like to add about INCLT or the use of CLT in South East Asia?
van Seggelen: CLT and glulam are nothing without the right connectors and screws. It is a big opportunity for local and international hardware companies to dive in and join this adventure. We need all the CLT expertise and experience we can get here, as we have started from scratch and still have many terrains to conquer. We encourage students from Indonesia and other parts of the world to join the CLT adventure here, as Indonesia needs more architects, civil engineers and wood construction specialists. Also, there is much work to be done in fast-growing-tree programmes and plantations. Any foreign companies interested in volunteering, sharing knowledge or supporting in any way to put Indonesian CLT on the map are very much welcome to contact me.

We are now actively speaking to investors and developers to partner in establishing a mass CLT production facility. With strong market demand, a supportive regulatory environment, and the necessary resources — including production plans, acacia wood supply, adhesive support, experienced hardware supply and European machinery expertise — we are confident this venture will be a success. **WIA**

A complete acacia CLT panel made by INCLT

RUBNER IN ASIA

With a large footprint across Europe, how does Rubner fare in Asia, where mass timber is slower in being adopted compared to Europe and US? **Phyllis Chong**, business development director of Rubner Timber Engineering, shares more about the company.

By **Yap Shi Quan**

Mactan Cebu International Airport

Can you first introduce Rubner and the kinds of services you provide for the wood construction industry?
Phyllis Chong: With production facilities across four countries, namely Austria, Italy, Germany and France, Rubner is a Europe-based high-performance timber engineering company. We have the capacity to produce 85,000m^3 of glue-laminated timber (glulam) components, 10,000m^2 of cross-laminated timber (CLT) and 250,000m^2 of roof and wall elements. All of our timber sources are from sustainable managed forest and are certified by the Programme for the Endorsement of Forest Certification (PEFC).

As a family-owned timber construction company for almost a century, we believe that it is part of our responsibility to contribute to a greener world and achieve a more sustainable future for the next generation by working with wood, a natural and renewable building material. Our timber engineer professionals have spent decades building our expertise and becoming a strong and reliable partner in the timber construction sector. We have a multitude of projects ranging from residential housing, commercial and industrial buildings, multistorey buildings, infrastructure, sport halls, education centres and special projects. All projects have one thing in common: Our experience and strength enable us to deliver premium quality timber construction projects around the world. We offer a full range of services from consulting services and support, engineering and design, production and prefabrication, and delivery and onsite execution.

How are Rubner's operations, I quote, "unique in Europe"?
Chong: Rubner will always guarantee full transparency along the entire value chain. It usually takes a long time to go from the tree being planted in a sustainably managed forest to the finished timber building. We are not just a timber engineering company but also have our in-house sawmill where we obtain our timber directly from our own sources. The starting point of our work is the in-house sawmill. The sawn timber obtained is the basic material for the fabrication of glulam, CLT, solid wood panels and solid construction timber. The material is then supplied to different Rubner Group sites where it is manufactured into building components such as structures, walls, slabs and roof elements for single-family houses, apartment buildings, as well as individual large-scale structures.

Our internal interface management processes to our in-house sawmill secures the provision of the necessary timber quantity in the required quality for each individual construction project. We

"Like a construction project that needs a team to construct and complete a building, every stakeholder has to work together to develop a roadmap to increase the use of timber in construction [in Asia]."

Phyllis Chong
Business development director
Rubner Timber Engineering


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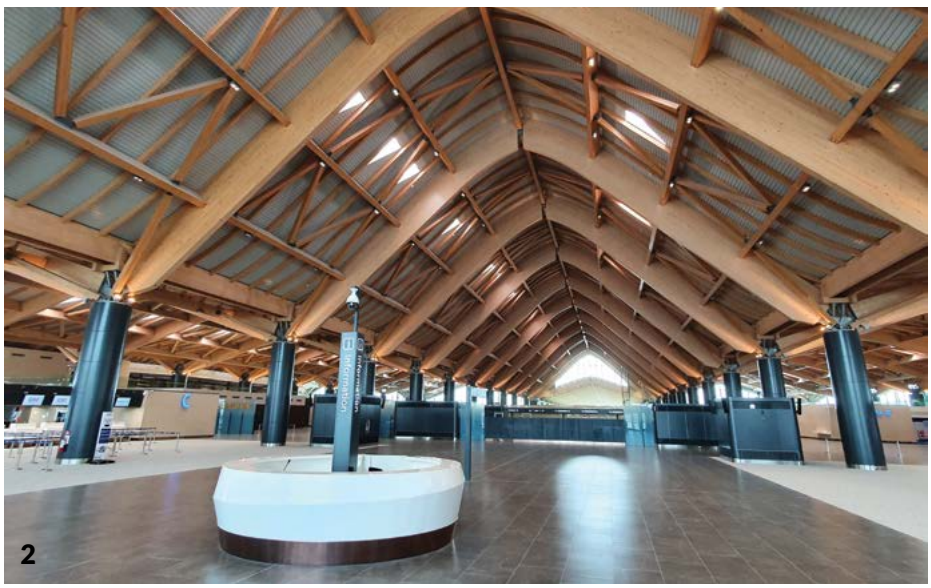
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1 Mactan Cebu International Airport
2 Clark International Airport

can meet all requirements: optimised cuts, quality and availability. All these factors make the difference as to why Rubner is "unique in Europe", and therefore we ensure maximum supply reliability and transparency.

What is Rubner's footprint in Asia?
Chong: In 2016, Rubner started their very first project in Asia, the Mactan Cebu International Airport in the Philippines, and subsequently continued with the same client for another project, the Clark International Airport. In conjunction, Rubner has delivered more than 18 projects in Singapore and this number is growing with other projects in Asia.

With our experience and strength working on worldwide projects, we always understand and support our clients even through diverse culture in some countries. We are always shipping the complete finished product, which is ready to be installed. This is to make sure that we are not wasting on shipping lower value raw materials.

In your opinion, what is Asia's reception and adoption of mass engineered timber (MET) so far?
Chong: MET as a building structure element is still a new concept to most countries in Asia. In recent years, we can see a few countries in Asia are introducing the use of timber as an alternative material, especially in Singapore. However, the amount of MET usage is still not significantly increasing compared to the other part of the world, such as Europe, America and Australia.

Every Asian country has its own kind of barrier. The most common one will be the local building codes. As MET is relatively new, the country itself may not have their own local building codes for European wood. Thus, it might become an obstacle to get the approval from the local government. However, the projects which we completed in Singapore and Philippines, Eurocode was acceptable and in addition, the projects complied with the local building codes and requirements.

Every stakeholder has their own role to increase the use of MET in Asia. Like a construction project that needs a team to construct and complete a building, every stakeholder has to work together to develop a roadmap to increase the use of timber in construction. In addition, we have to create collaboration among the cross-government departments and relevant organisations to identify key factors and actions – why and how to increase the use of MET. As we have to achieve the net zero target, missions and goals have to set up how to reduce the greenhouse gas mission. MET will definitely play an important role to enable the construction industry to meet

the challenges of industrial decarbonisation and deliver net zero target.

What are Rubner's plans for Asia in the near future, and what strategies does the company have to convince potential investors or developers in using more MET?

Chong: Since Rubner started the first project in Asia, we have been actively involved in promoting the use of timber structures in Asia through exhibitions and conferences or workshops. This is something Rubner will continue to do if the opportunities arise.

Timber is the only renewable construction material. Aside this fact, the use of timber has become a worldwide statement of sustainability in construction, especially for timber from sustainable managed forests. By educating potential investors or developers on the benefits of timber and their concerns of using it such as fire safety, termite issue and humidity, it is the first step to convince them in using more MET in their project.

In addition, we always welcome the opportunity to collaborate with the potential investors or developers if they have intention to use timber for their upcoming project. By partnering with us, we will always ensure to develop sustainable solutions and durable products that will endure for many generations within the budget and time frame.**WIA**

Phyllis Chong
Business development director
Rubner Timber Engineering

MACTAN CEBU INTERNATIONAL AIRPORT AND CLARK INTERNATIONAL AIRPORT

Rubner was directly engaged by the project operator GMR Megawide Cebu Airport Corporation as a specialist for the design, manufacture, supply, delivery and installation of the timber roof structure including beams and columns for the Mactan Cebu International Airport and the Clark International Airport, both completed in 2018 and 2022 respectively.

The prefabricated structural components were shipped to the Philippines from Rubner's factory at Ober-Grafendorf, Austria, in three lots and the timber elements were assembled in only three months. Four thousand five hundred cubic metres of laminated timber elements were delivered and erected with a span width of up to 30m and arch height of up to 15m.

According to Chong, all the laminated timber components in the common timber strength classes complying with Eurocode 5-1-1 were fabricated at their in-house production site in accordance with the project requirements. The first process began with freshly felled and industrially dried raw lamellas, delivered from their sawmill to production site just-in-time to enter the fully automatised processing chain. The lamellas were checked on for the quality and moisture content level. Imperfections were removed from the lamellas and lamellas were turned into different lengths after the cutting.

Following a strict quality control, lamellas with different lengths went through the finger jointing machine where the lamellas were finger jointed to the required length. These lamellas are then finally planed and glued, and then formed into the desired shape in a pressing jig. Once the hardening and planing processes concluded, CNC machines cut the beams into the exact dimensions according to the CAD design. Laser-controlled drilling and milling tools provide for quality workmanship of millimetric accuracy.

With the continuous control mechanisms, Rubner achieved a precision of the timber elements, which even falls below the required tolerance limits. The glulam was then impregnated, followed by the final step for the integration with the structural steel connection.

Chong said that the main challenge they faced in building in South East Asia was the unpredictable raining season: "This is not just an issue for Rubner but for the whole construction project and the teams. We might have to experience the delay of the actual project and the problem of storing the material on site. However, we are very fortunate to be in front of the project and the issues can be resolved amicably with the client."

Since then, Mactan Cebu International Airport has won a few awards and one of them is World Architecture Festival 2019 under transport category, while Clark International Airport is listed as one of the world's most beautiful airports by the prestigious Prix Versailles, the World Architecture and Design Award at UNESCO.

“A REWARDING EXPERIENCE”: TIMBERLINK COLLABORATES WITH KALLESOE TO DELIVER A COMBINED CLT AND GLULAM RADIATA PINE PLANT

Structural pine products manufacturer Timberlink has completed their NeXTimber facility – reportedly the first combined cross-laminated timber (CLT) and glue-laminated timber (glulam) radiata pine facility in Australia – around Kallesoe’s systems and equipment. **Yap Shi Quan** speaks to Timberlink and Kallesoe about some of the milestones and challenges they faced during the project timeline.

Timberlink’s new combined CLT and glulam radiata pine mass timber facility

Back in August 2023, Timberlink’s new facility, NeXTimber, produced its very first glulam beam. Subsequently in October, the facility manufactured its first CLT panel, and by the end of that month the facility was open to orders.

“We have built what we believe is a world-class facility in South Australia, and we welcome any international interest in our products,” David Oliver, EGM Sales, Marketing & Corporate Affairs at Timberlink, told *Wood in Architecture*. “Mass timber stores carbon, and we believe it is the way to build into the future.”

But the five-year journey to construct this 15,000m^2 mass timber facility was not without its challenges. Disruptions in the supply chain and travel restrictions due to COVID-19, on top of weather issues, made this already large and complex project even more complicated.

“Timberlink and Kallesoe have worked together to meet the completion date. And ultimately, we arrived in October 2023 with a plant that is very close to being commissioned as we planned,” said Oliver.

BUILDING THROUGH COVID-19

According to Oliver, Timberlink began planning for a combined CLT and glulam manufacturing facility in 2018. After doing some initial research on the market demand and possible equipment capabilities, they decided on Kallesoe as their primary supplier of CLT and glulam manufacturing machinery.

He explained why: “One of the key items we identified early was radio frequency pressing technology that would be important for a successful end performance of a structural panel. This, along with the fire rating performance of Kallesoe’s panels as well as their ability to edge glue with melamine urea-formaldehyde (MUF) adhesives, was

what convinced us to choose Kallesoe ultimately. Additionally, what attracted us to Kallesoe was the efficiencies in plant design; they have experience in terms of upstream and downstream integration with other third-party equipment."

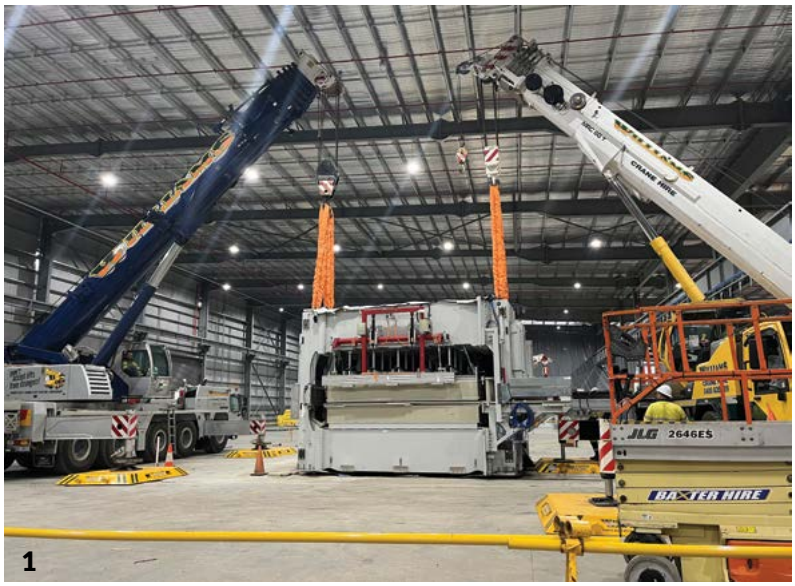
But of course, with the onset of the pandemic, on-site visits to the construction ground, nightmarish sea freight logistics, and remote equipment testing all made the discussion and design stages with Kallesoe more "challenging", as Oliver described. Discussions had to be done virtually and in weekly intervals to keep everyone in Timberlink and Kallesoe on track; transparency was key to ensuring quality, safety and efficiency.

Timberlink's biggest challenge was the delays in the construction of the building itself, with weather events and the supply chain of the fabricated building materials holding them up. Another challenge was in the process flow, where the size of logs in Australia tended to be smaller than in Europe, which meant a higher piece count was required.

On Kallesoe's end, the CEO Kristian Kallesoe explained to *Wood in Architecture* that the process of transporting their equipment to Australia involved "careful compliance with shipping regulations and close coordination with logistic partners".

But both Timberlink and Kallesoe managed to tide through these difficulties, in part due to Timberlink's experience in dealing with COVID-19 difficulties, and also Kallesoe's flexibility in catering to Timberlink's schedule.

Oliver elaborated: "Prior to building the mass timber facility, we completed an AU$90m investment of a new saw line at the same site



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1 Timberlink designed the equipment layout first and made sure the plant design followed accordingly
2 Transporting Kallesoe's presses
3 Closer look of the facility-in-progress

in Tarpeena, South Australia, which was built through COVID-19 as well. We learnt a lot of lessons from that. We knew sea freight logistics would be a problem, with about 140 containers of equipment being shipped over. As such, we had the opportunity to lease a large warehouse near the site, where we could destuff the containers and marshal the equipment to the site more easily."

About Kallesoe's flexibility, he added: "Kallesoe had an opportunity to bring some of the production forward as they had a gap in their production schedule. So, some of the equipment was brought to Australia earlier than intended, and was stored in a facility 10mins away from the site. I think this is one of the things that ultimately contributed to the success of this project. And they worked very hard with us to compress the schedule when we had weather issues."

Oliver noted that for this project, they did not design the plant layout first. Instead,

they designed the equipment layout first and made sure the plant design followed accordingly. They could do this because Kallesoe provided the drawings of the actual production line early. Subsequently, the pre-qualification of Kallesoe's equipment was completed in another Kallesoe line in Europe to speed up Timberlink's testing, and Timberlink tested the acoustic, fire, and structural compliancy – all in time to achieve their first CLT and glulam press dates "as planned".

KALLESOE'S SPECIALTY

According to Kallesoe, Timberlink was aware of how other kinds of presses worked especially in Australia and New Zealand. However, "they wanted to try a newer technology", he said.

But what exactly is the "radio frequency pressing technology" that convinced Timberlink to choose Kallesoe? Radio frequency press works similarly to microwave technology, as Kallesoe explained: "The radio frequency focuses on the adhesives in the CLT or glulam. It runs at 13.56MHz, which means the molecules in the adhesives are vibrating or oscillating at 13.56 million times per second, creating friction in the bonds. This then heats up the adhesives, thereby hardening it.

"Compared to a cold press, we can speed up the pressing process with radio frequency technology while also allowing flexibility; the manufacturer can have a long opening time – up to 90mins – but ultimately have a faster curing time."

Besides their presses, Kallesoe also provided their proprietary manufacturing enterprise system (MES) software, called KMS Track&View, to help Timberlink run their plant. The KMS Track&View is an integrated software that controls all the equipment in the facility. Using data taken from Timberlink's inventory management system, operators will know where exactly each CLT or glulam is in the system, from the moment it enters the production facility until it leaves the press.

In the event there is a mistake in the production line, the operator will be able to trace the exact point where it went wrong. "They can go back to the production system and look at the log to see what happened throughout the process," said Kallesoe.


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"THE VALUE OF INTERNATIONAL PARTNERSHIPS"

After the facility was up and running, Kallesoe's focus was on optimising the operations, making sure each workstation performed at its highest possible level. They also provided support in the form of training sessions for Timberlink's team for the rest of the year to help them get up to speed with running the full facility.

All in all, both sides had nothing but positive experiences, even when encountering the challenges faced from the pandemic. As Kallesoe put it: "Working with Timberlink has been a rewarding experience. The collaboration was marked by effective communication, shared commitment to quality and safety, and a solution-oriented mindset and approach to the challenges faced."

Kallesoe continued: "Glulam and CLT were really a big thing for all of us because we have been almost three years underway now, and this was really a big milestone for us to see that we finally got the products out. So, I think the collaboration confirms the value of international partnerships and mutual benefits of the shared experience and expertise."

Oliver shared similar sentiments: "Overall, it has been a successful partnership, and we will continue to work with Kallesoe in the future as we try and build a world-class timber products business.

"We rate [Kallesoe's] solutions very highly. I mean, they ticked all the boxes in terms of what we wanted to achieve, especially for the radio frequency pressing and the edge gluing technologies. They have been great to work with in spite of the challenges, particularly early on when we were not able to travel. Also, along the journey, Kallesoe was able to provide and share with us examples of equipment enhancements and system controls improvements." **WIA**

HENKEL'S FIRST BIO-BASED PUR ADHESIVES FOR LOAD-BEARING TIMBER CONSTRUCTION

The certified wood adhesives from Henkel reduce ecological footprint, enabling sustainable transformation.

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The construction industry is facing a challenging pivot towards sustainable practices and lowering CO2 emissions. Mass timber or wood construction – with its ecological advantages – is a driver to achieve these goals. As a supplier of certified adhesives for load-bearing mass timber, Henkel engineered wood has transformed the industry by shifting from fossil-based to bio-based formulations.

Developed with bio-based materials, the new Loctite engineered wood adhesives: HB S ECO and CR 821 ECO, reduce CO2 equivalent (CO2e) emissions by more than 60% compared to fossil-based alternatives.* Both ECO variants are available for load-bearing timber construction. Henkel is thus adding value, making the use of mass timber more sustainable.

According to Dr Christian Fild, global director of engineered wood at Henkel, two of its certified polyurethane (PUR) adhesives are launched as bio-based variants with Loctite HB S ECO and Loctite CR 821 ECO. "Our first bio-based PUR

adhesives deliver the high levels of safety, durability, productivity and reliability our customers expect from Henkel adhesives," he said. "For our direct customers and architects, the sustainability of the adhesives [is] a fundamental part of modern wood construction. Henkel's engineered wood adhesives are becoming a building block on the path to greater sustainability."

Used globally, the Loctite HB S product series has introduced a sustainable option with the additional ECO variant to the product range. Loctite HB S ECO is a one-component PUR adhesive that is free of volatile organic compounds and solvents. The adhesive is manufactured with 63% bio-based materials and is certified according to the ISCC PLUS mass balance method.* Compared to conventional HB S solutions, the ECO variant generates 66% lower CO2e emissions.*

As a bio-based two-component PUR resin, Loctite CR 821 ECO enables invisible bonding of hybrid wood construction elements. With easy product handling due to its flow properties, the product offers certified load-bearing applications such as glued-in-rods. The ECO variant improves the environmental footprint: CO2 emissions are 62% lower than a fossil-based version.* The product is developed with 71% bio-based materials and is partly ISCC PLUS certified.*

Beyond product manufacturing and properties, these products also support easy application. Henkel has ensured that necessary certifications for load-bearing timber construction are taken care of with its Loctite ECO products: ECO adhesives come with appropriate documentation, including lifecycle assessments and ISCC PLUS certificates.

According to the mass balance model, the production at the end must be able to remove the specified amount of bio-based material present at the beginning of the process in a closed system for ISCC PLUS certification. The mass balance model enables the production of solutions that are a mixture of bio-based and fossil materials. In this context, every participant in a product's supply chain must be certified from the point of origin to the warehouse. The relevant Henkel sites already meet these requirements today. **WIA**

**References are available upon request*

1 *Bjergsted Financial Park, Norway*
2 *Close-up of Joint & Seam wood panels*
3 *Gare Maritime, Belgium*

THE FREEDOM TO IMAGINE AND REALISE THEIR WOODEN ART PROJECTS

A wooden art installation unveiled to the Italian public was designed to a high degree of imaginative and finishing quality using technology by the SCM Group.

By **Yap Shi Quan**

Back in November 2023, the art exhibition Contemporary Expressions was opened to the public at the Asian Art Museum (MAO) in Turin city, Italy.

Visitors entering the exhibition would immediately be greeted by the Flying Kodama – a wooden installation conceived by Japanese architect Toshiki Hirano, architecture firm Kengo Kuma and its architecture platform, Sekisui House Kuma Lab, and realised by artisan workshop D3Wood, with financial support from the SCM Group and scientific assistance from Marco Imperadori, professor at Politecnico di Milano and scientific advisor at Arte Sella Architecture.

"The project began in 2018 at Arte Sella, leading to a work measuring almost 6m in diameter that brought an element of geometry and porosity to the Casa Strobele wood," Marco di Pietro, marketing and communication specialist at SCM, told *Wood in Architecture*. "It continued in 2019, with the installation of the first work's twin in an urban setting in Taiwan. A version in reduced scale was then displayed at Palazzo Franchetti in Venice for the Architecture Biennial in 2023, presenting an oak variation on Kodama as a piece of sculpture."

WHAT IS FLYING KODAMA MADE WITH?

According to SCM, the Kodama – which means "tree spirit" in Japanese – is a sphere measuring 120cm in diameter, designed to be hung as if floating, and is made up of interlocking blocks of pale ash that fit together to create an interplay of joints and contrasts.

It is made using various solutions by SCM Group. The first is hypsos, a five-axis CNC machining centre with an integrated cabin, designed to process complex shaped elements in curved wood or solid wood. Its machining unit is said to

enable operators to perform heavy duty operations on solid wood, especially 3D element, and with optimal finish quality.

The second is the class f520 jointer. According to SCM, its concave/convex device allows high-quality bonding of the workpieces, reportedly eliminating joint lines while offering good coupling. The system on the connecting rods provides maximum movement fluidity while avoiding deformations on the working table.

The last machine used is the minimax st 5es circular saw-shaper. It has a cast iron saw unit with a rigid closed loop structure that can accommodate a blade of maximum 400mm in diameter with the scoring blade mounted, ensuring easy and high-quality cutting of veneer panels and thick solid wood material. The rotation fulcrums of the saw unit have a 120mm diameter and stand on steady crescent shaped rests that separate it from the base, making it a steady solution.

The sliding table of the minimax st 5es is 360mm-wide, on which larger workpieces can also be processed. It has a large spindle moulder column made entirely of cast iron as well, and comes with four standard processing speeds, ideal for any type of machining, from moulding to routing and tenoning.

ON WOOD AND ARTISTRY

Lit from the interior by a series of concealed LED strips, the Flying Kodama creates a play of light and shadow, defining a mysterious, dream-like space filled with references to Japanese culture, in particular Junichiro Tanizaki's volume *In Praise of Shadows*.

While the main classical elements in the west are earth, air, fire and water, in Asia, and Japan and Zen philosophy in particular, there is a fifth element: the Void. In Flying Kodama, Kuma amplifies this void on three different and concomitant levels: interior concavity, exterior convexity and the ineffable space in between porosity. Light penetrates this porosity like a kind of enlightenment – Bodhi in Buddhism, or reawakening, wisdom and freedom.

To convey such complex symbolism behind the artwork, the machines used to create it must also be precise, reliable, and flexible enough to bring the vision to fruition. di Pietro elaborated: "The main goal of SCM is to manufacture machines that can give designers the freedom to process and create wood structures with as few limits as possible. In doing so, the designer or artist would be free to imagine and realise what they envision, with no obstacles to their processing abilities."

He also mentioned that one of the challenges of installing the Flying Kodama was to actually hang it. When it was exhibited at Arte Sella in 2018, the Kodama was exhibited on the ground. To hang the installation on the ceiling the arts installers had to take into account different forces and balances – and to that end, they succeeded. **WIA**

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1 The class f520 jointer
2 hypsos CNC machining centre
3 The minimax st 5es circular saw-shaper

BALANCING AESTHETICS WITH "SUSTAINABLE COMFORT"

Marano Furniture's LUMI Collection is reflective of designer **Kylie Yang**'s design philosophy of creating "outstanding product experiences while upholding environmental and social responsibility values".

By **Yap Shi Quan**

The Girondo sideboard

Back in May 2023, Singaporean furniture design brand Marano Furniture released the LUMI Collection, consisting of seven furniture pieces that "focus on the beauty of nature while striving to provide maximum comfort and liveability for homeowners", Yang told *Wood in Architecture*.

The collection demonstrates Yang's design philosophy of emphasising practicality, aesthetic value, quality, durability, and sustainability. "These principles guide my creative work in the fields of home furniture and luxury product design, aiming to provide users with outstanding product experiences while upholding environmental and social responsibility values," she explained.

Balance is key to Yang's designs. Not only do the furniture pieces in the LUMI Collection exude elegance and sophistication, but they also make the living space more comfortable and liveable. In her words, the collection "revolves around striking a balance between natural aesthetics and functional comfort, ensuring that living spaces are not only visually appealing but also conducive to a cosy and inviting atmosphere".

"As a furniture designer, my focus has shifted towards creating innovative designs that cater to these changing demands and adding a little touch to the details, giving rise to the concept of 'family-friendly' furniture," Yang added. "These pieces are more than just decorative elements; they are practical tools that fulfil the needs of everyday life. Most importantly, they enhance the aesthetic appeal and comfort of the home, making family moments more enjoyable when everyone comes together."

For instance, the LUMI Collection's Girondo dining table has a table top made of solid wood composite board with high deformation resistance index. Its surface is coated with high-quality and environmentally friendly PU paint for durability and longer-lasting beauty. The Lorma coffee table features rounded edges that lend it a softer, more inviting demeanour – instead of sharp corners – crafted with the safety and comfort of young families with children in mind.

The LUMI Collection mirrors shifts in family lifestyles. As modern living continues to evolve, people's expectations for home furniture have transformed, necessitating furniture that can adapt to various uses and requirements. Given the current housing spaces, which are often on the smaller side, furniture with multifunctional features ensures

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both aesthetics and practicality. This helps to save space and enhance functionality, making it a popular choice for modern living.

Which is why furniture at Marano Furniture is designed with "sustainable comfort" in mind. At the firm, comfort and sustainability are two intertwined concepts at Marano Furniture; one cannot do without the other. "Sustainable comfort" can provide a comfortable user experience while reducing adverse environmental impacts, promoting a more sustainable way of living. This involves prioritising the sourcing and selection of quality sustainable and eco-friendly materials for the best interest of users and the environment. E0-grade materials are also incorporated to ensure zero harmful formaldehyde pollution in homes. Solid wood such as walnut and oak are used, incorporating natural materials while also maintaining environmental sustainability.

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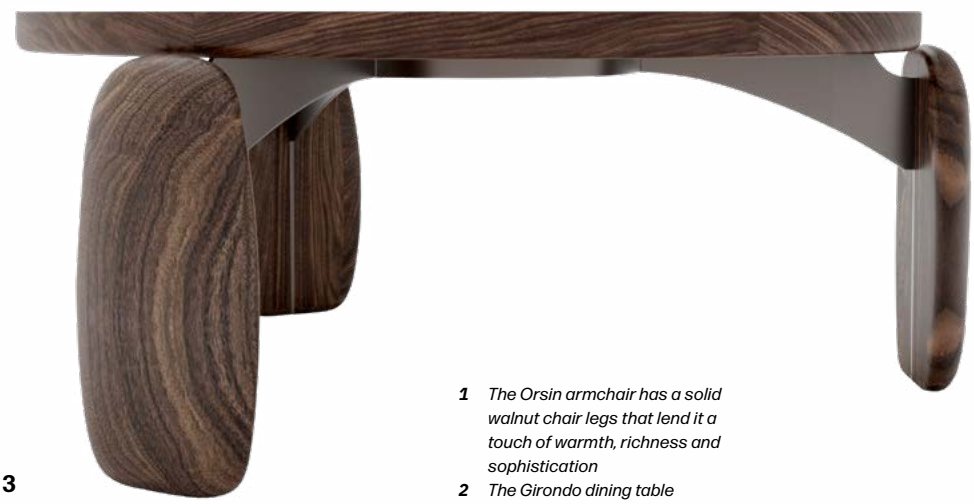
Indeed, Marano Furniture's insistence on sourcing environmentally friendly materials does not stop at the LUMI Collection. Another of the brand's recently-launched collection, the Nordic Collection that features mid-century modern-inspired furniture, as well as another collection designed by Yang, the Silhouette Collection, are also made with E0-graded materials. According to Yang, the Silhouette Collection is about "ensuring that sustainable comfort is woven into every curve and contour", as much as it is about "capturing the essence of the passage of time, playing with light and shadow" – balancing functionality, aesthetics, and sustainability.

For furniture designers who wish to make more sustainable designs, Yang concluded with some advice: "The main emphasis [of sustainable design] lies in materials, the production process, and future recyclability during the design phase. Emphasising eco-friendly and sustainable materials is crucial, as is the attention given to the flexibility of furniture, often achieved through modular designs that enable users to customise and adapt their furniture to changing needs.

"Sustainability is a dynamic domain, necessitating designers to remain informed about the latest trends and practices. Collaborating with fellow professionals in the field will be instrumental in propelling furniture design towards a more sustainable path." **WIA**



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1 The Orsin armchair has a solid walnut chair legs that lend it a touch of warmth, richness and sophistication
2 The Girondo dining table
3 The Lorma coffee table

AWAKEN: NIPPON PAINT'S COLOUR TRENDS OF 2024-2025

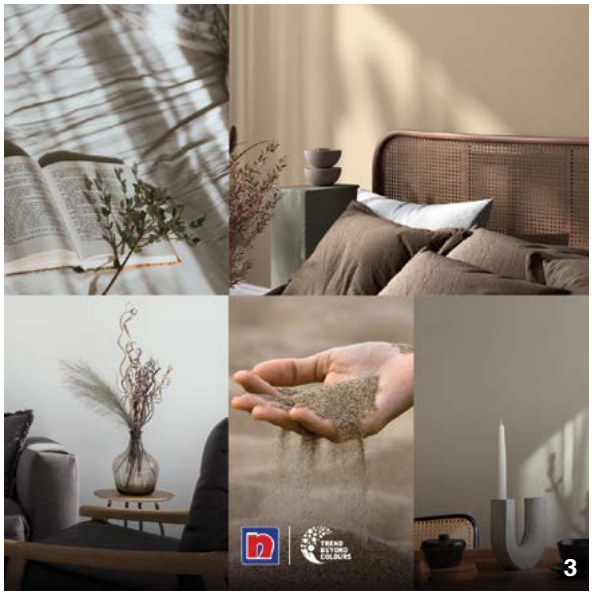
Amira Yunos spoke to **Jo-Lynn Yap**, senior manager of group colour leadership, NIPSEA Group, about the colour selection process and how this year differs from previous years. The hues of Sandcastle, Golden Yellow, Turquoise Reflection and Earthling express a palette for awakening: one of tranquillity, self-expression, renewal and equilibrium.

How were the colours selected?
Jo-Lynn Yap: Nippon Paint believes in staying at the forefront of design trends, and our colour selection process is a testament to that commitment. We partnered with Colour Hive, a reputable UK-based agency with two decades of experience in colour forecasting. Working closely with our diverse colour team from different countries, we delved into Colour Hive's extensive research, which provided invaluable insights into the influences shaping global design trends.

The collaboration allowed us to directly align our colour palette selection with the identified influences. As a paint brand, we focus on connecting with our audience through our refreshed range of colours that transform spaces into personalised retreats. Whether it is creating a tranquil corner, a vibrant workspace, or a modern sanctuary, our palette is designed to complement the diverse energies people seek in their daily lives.

The names caught our eye. How did the team come up with such titles such as Earthling, Sandcastle and Turquoise Reflection?
Yap: We are thrilled that you appreciate the creativity behind our colour names, which are part of our captivating Nippon Paint's Colour Creations II colour collection. The thoughtful process of naming colours involves drawing inspiration from various sources, such as objects, moments, and emotions. The serendipity of our selected hues for the Colours of the Year resonating with the identified influences is not only apt but also a delightful coincidence. This synergy beautifully captures the essence of each influence, adding a layer of meaning to our 2024-2025 palette that extends beyond colours.

How do these colours reflect the demands in the furniture industry? What values, style and aesthetics are seen with these colours?
Yap: As a comprehensive coatings and construction solutions brand, we offer colour and paint solutions that go beyond walls and ceilings, extending to furniture and wood elements like trimmings, floorboards, and skirtings. These components are



1 *The key colour landscape encapsulates the forecast*
2 *Perfect harmony in Earthling*
3 *Quiet time with Sandcastle*
4 *Express yourself with Golden Yellow*
5 *Healing waters in Turquoise Reflection*

integral to any living space, serving as main features or complementary elements. Our versatile colour collection is suitable for various surfaces, including wood and metal, allowing homeowners to rejuvenate their furniture with ease. Whether opting for an opaque finish or a translucent tint to enhance natural wood grains, the possibilities are limitless.

We specifically select wood colours as part of a holistic approach to a themed colour palette, aligning with the overarching theme of the space. Our curated colours enhance the functionality of a room, offering homeowners a spectrum of choices to match their preferences.

The demand in the furniture industry varies, as furniture may be newly purchased or in need of a fresh coat of paint. To address this, we provide two key solutions: the right solution for the targeted surface and a range of colour choices for repainting or makeover projects. For new furniture, we collaborate with our B2B customers to deliver the appropriate finishing and colour solution for their final product.

How are this year colour trends different from previous years?
Yap: The central theme of our 2024-2025 colour trends, 'Awaken', embodies a more optimistic, expressive, and purposeful approach. While colours are inherently subjective, our focus on clear objectives – understanding the purpose of each space and the desired ambiance – sets this year apart. Our palette is carefully curated to reflect the evolving preferences and aspirations of individuals, fostering dynamic and engaging environments.

The emphasis on awakening spaces with purposeful and expressive colours distinguishes this year's trends from previous ones, signalling an energising and empowering shift in colour decision-making. **WIA**

Images: NIPSEA Group

TURNING UP THE HEAT IN DESIGN

Indonesian manufacturer Omega Mas produces their own thermally modified timber which is providing South East Asian designers with a new creative opportunity.

In 2015, Dietmar Dutilleux – director of Omega Mas in Parsuruan, East Java, Indonesia – purchased two vacuum kilns: one of 6m and one of 12m in length to meet demands from a US-based client. Originally used to dry the large pieces of timber required to fulfil the productivity demands of the ongoing orders from the US, Dutilleux became curious about the capabilities of the new equipment. What followed was a period of experimentation by thermally modifying a range of different tropical and temperate hardwoods including American red oak. "We found that we could increase durability, stability and a unique richness of colour," he said of the trial. "We launched some items with no finishing and found that everyone liked what they saw, so we continued."

The Thermomechanical Treatment (TMT) process is a high intensity kiln schedule that lasts between 3-4 days. The temperature reaches between 180°C and 215°C, and the vacuum of the kiln provides an oxygen-free atmosphere which prevents combustion from occurring. During the process, the chemical and

The same timber carving is employed in the Naguri table and the minimal, sculptural form allows the texture of the timber to be the focus

physical properties of the timber undergo permanent change. The cooking process removes the hemicelluloses and carbohydrates from the timber, making it more resistant to pests and fungi. The process also lowers the moisture absorbency of the wood so it does not need further chemical protection. It also means that the timber has greater dimensional stability – it is not susceptible to warping, swelling and shrinking, regardless of variations in temperature and humidity. Hence, it is excellent for outdoor applications.

Singapore-based designer and Omega Mas collaborator, Jarrod Lim, had previously worked with thermally modified timber. "It was impressive in terms of finish and durability," he said, adding that one of his frustrations when creating for outdoor use was that protection had to be provided by coating the surface of timber using paint or another chemical sealant. "This creates two issues: the first is that the protective layer is thin and can easily wear away over time and the second, if paint is used, any scratches instantly expose the colour of the timber and emphasises any damage."

With thermally modified timber, however, neither of these is an issue as the structure and tone of the timber have been changed throughout the board. When cut or shaped, the colour is consistent throughout. In the creation of the Kyon Ottoman and the Naguri side table, Lim's carved design exposes the outcome of the thermal modification process and the aesthetic properties running through the material.

The texture of the timber in the Kyon Ottoman forms a strong visual element which is balanced by a simple, rounded raised cushion. This combined with the sheer size of the piece makes a sophisticated statement. The same timber carving is employed in the Naguri table and the minimal, sculptural form allows the texture of the timber to be the focus. Both pieces are versatile. "I can envisage them being used in both commercial and residential settings," Lim said. "Since the thermally modified timber can handle outdoor conditions, they would be perfect for public spaces in hotels or poolside at a resort."

Regional director for American Hardwood Export Council (AHEC) South East Asia and Greater China, John Chan, added, "It is wonderful to see the likes of Omega Mas and Lim embracing the possibilities afforded by the developments in timber technology. We have been excited by what they have been able to achieve with American red oak and look forward to seeing how they continue to explore the other American species, such as tulipwood, that are suitable for thermal modification."

Images: AHEC

1 *The sheer size of Kyon Ottoman makes a sophisticated statement*

2 *The texture of the timber in the Kyon Ottoman forms a strong visual element which is balanced by a simple, rounded raised cushion*

THERMALLY MODIFYING TŌTARA TO INCREASE DURABILITY OPENS DOORS

It could only be a matter of time before a locally grown, indigenous and specialty softwood species is seen on the iconic buildings in New Zealand if early research results are anything to go by. Scion scientists have been researching whether thermally modifying tōtara could enhance its durability enough for exterior building uses, opening the door for a wider range of products and applications.

Thermal modification is a method in which timber is heated to high temperatures without oxygen. The process enhances wood dimensional stability – meaning it shrinks and swells less with changes in moisture content. A high degree of modification can increase wood durability making it more likely to be suitable for exterior uses like cladding and decking. Radiata pine is not naturally durable but has been successfully thermally modified to increase durability and this product has been commercialised for cladding.

Scion's research into thermally modified tōtara began around 2017 using about 80-year-old trees from Northland. Tōtara was chosen because it has natural durability and tests have been done with both the generally nondurable sapwood – living, outermost portion – and potentially durable heartwood – dead, inner wood. Testing is also being done on the exotic species Mexican cypress.

To get sufficient durability for New Zealand conditions, the wood must be modified at very high temperatures

Scion senior technologist Rosie Sargent said that while any thermally modified species will have some improved durability, tōtara and lusitanica have been the most successful to date. To get sufficient durability for New Zealand conditions, the wood must be modified at very high temperatures. "It is a question of 'Does it perform for specific applications?' and 'Can you do it without destroying the wood?'" she said.

After thermal modification, the wood is tested for durability using long-term accelerated field tests and fungus cellar stakelet trials. The tests are chosen with the aim of being able to assess if the product can meet building and durability standards. She added, "We are finding that it increases the durability of both the sapwood, which is not durable at all, as well as the heartwood which is."

The fungus cellar creates ideal fungus growing conditions to speed up decay. Small wooden stakelets are left in the controlled high-decay situation and the level of decay is assessed over time and can be compared to the performance of known products. The stakelets remain in test until all are rotted away. The thermally modified tōtara has been in the fungus cellar for about 6.5 years, and the lusitanica for more than 3 years. In comparison, untreated radiata pine stakelets can severely decay in as little as 6 months. In the field, durability testing is being done on accelerated decking and L-joints made from thermally modified tōtara and lusitanica as per international testing protocols. Both species have been in field testing for about 2 years. Tests can take anywhere from 5-10 years and non-durable wood such as radiata sapwood will fully decay much quicker. "While testing in both the field and fungus cellar is ongoing, early results are positive," Sargent said.

"We are finding that it increases the durability of both the sapwood, which is not durable, as well as the heartwood which is," added Elizabeth Dunningham, Interim portfolio leader. She said that it is important to have data about indigenous products and trees to make good planting and product development decisions, as existing data is limited. She pointed out that were also strategic reasons for choosing tōtara, due to the high interest and importance placed on this species by its Māori partners. There is also a need to focus its emerging indigenous species research on a few key species on which other studies already started show promising development potential.

Scion is directly involved with Taitokerau Māori Forestry as partners in the Tōtara Industry Pilot. This resulted in new markets for the farm-based tōtara, with the view of developing a regional industry. While most of the uses of tōtara would be historic due to limited supply at present, some of its commercial uses for tōtara heartwood include outdoor furniture, indoor furniture and cabinetry, veneer panels, framing, posts and beams.[1] Chairman of Taitokerau Māori Forests Ernest Morton said the group supports Scion's work.

Reference

1. *Farm Forestry New Zealand. Farm tōtara. <https://www.nzffa.org.nz/specialty-timber-market/showcase/farm-totara/>*

Images: Scion

1 *Scion senior technologist Rosie Sargent*

2 *Scion is directly involved with Taitokerau Māori Forestry as partners in the Tōtara Industry Pilot*

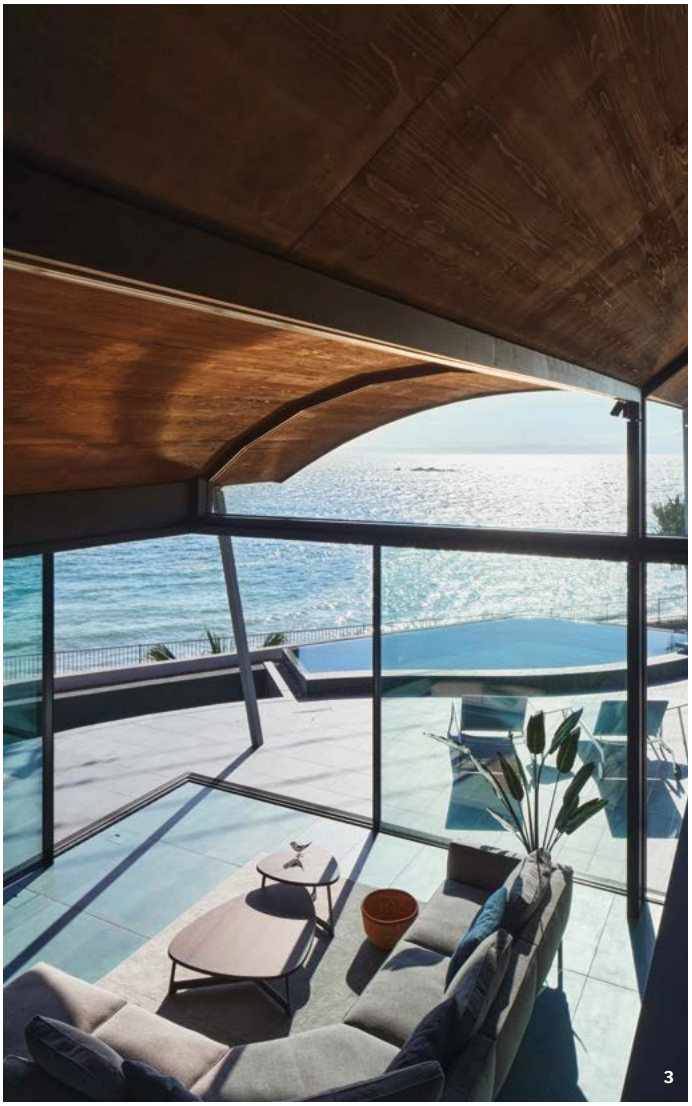
VILLA A CLT ROOF

Architectural firm: teamSTAR
Location: Yokosuka city, Japan
Structural engineer: soaps
Completion date: September 2023
Site area: 770m^2
Photography: Kenya Chiba

Villa A, named for its location on Akiya Beach in Yokosuka city, Japan, commands a breathtaking view of the Pacific Ocean near Hayama town, the birthplace of Japanese yachting culture.

Befitting this stunning natural environment, the villa's design seeks a sculpturesque form, symbolised by the vaulted roof and its series of arches that resemble white, rolling ocean waves. While the building structure is mainly made with reinforced concrete, the roof is a wooden structure consisting of a series of continuous arches built with 7m x 900mm cross-laminated timber (CLT) panels. The curved lines of the vaulted roof create the illusion of expansiveness in the interior space.

"Given the motif of the sea, we looked for a wooden structure that shared similarities with yachts and bridges. Concrete was too heavy a material for the arched roof. Therefore, wood, a lightweight material, was chosen," the teamSTAR architects told *Wood in Architecture*. "However, wood by itself is weak as a structural material, so CLT was selected



1 The roof construction process
2 LVL joint member
3 The curved lines of the vaulted roof create the illusion of expansiveness in the interior space

as a material that can realise a strong flat structure without beams. The CLT is exposed in the rooms, contributing to a sense of openness that makes the occupants forget that they are indoors."

The designing of this roof required "extremely precise planning and construction techniques to implement". Though the site is located on the slope of a south-west-facing hillside, the roof is oriented westward, towards Mt Fuji. The building's configuration conforms to the elevation differences inherent to the site, evident from the step-like gradation of the vaulted roof's arches. At the same time, the slope of the water gradient is taken. In addition, because of the arched shape, the height of the roof differs depending on the part of the roof. In this case, detailed 3D surveying was required to accurately set the relative height of the roof to the sloping ground.

The engineering company that worked with teamSTAR commented: "In the manufacturing process, we paid close attention to the creation of 3D data, while in the construction process, since the location is in a coastal area, we had to pay attention to the large CLTs because they were affected by the wind."

Since the roof is constructed of wood, it is planned to have no dimensional error. However, because wood is a natural material, it will warp, swell, and move due to temperature and humidity, resulting in slight dimensional errors. Furthermore, when the glass and sash are loaded, their weight will cause

4 The villa's design seeks a sculpturesque form, symbolised by the vaulted roof and its series of arches that resemble white, rolling ocean waves

5 The building's configuration conforms to the elevation differences inherent to the site, evident from the step-like gradation of the vaulted roof's arches

6 The roof is a wooden structure consisting of a series of continuous arches built with 7m x 900mm CLT panels

them to drop in position. The distortion of these natural materials and the deflection caused by the load were considered in advance, and the construction was carried out by calculating backwards from the final shape.

The architect's plan was to assemble the 76 pieces over a one-month period. The construction plan was similar to that of an arched bridge, where the arch roof is assembled from both ends and the top is connected at the end. The CLT panels are joined in the short and long directions by laminated veneer lumber (LVL) joint members. This allows CLT panels to be connected to each other without the use of hardware as much as possible.

Since the roof would not be stable until each piece was assembled, it was necessary to adjust the shape of the roof using anchors and shoring. The cross-sectional shape is a simple series of arched roofs with a radius of 4,700mm, but the edges are not orthogonal to the roof but at an angle of 45° because the axis is oriented towards Mt Fuji. The shape of the edges was therefore complex, and the shape of the LVLs needed to be changed for each CLT panel. The different shapes were all studied in 3D and cut from the LVL panels.

Lastly, the columns of the structure stand at an angle like a sailboat, and the joints between the roof and reinforced concrete walls were different for each shape of the roof, over water and in the water, requiring detailed study to meet the performance requirements. **WIA**

BUILD WOOD, *build wellness*

The biophilic qualities of wood have been well-documented by many studies. How do healthcare and wellness facilities use wood in their structure to improve the quality of living for their inhabitants?

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A HARMONIOUS ENVIRONMENT

Project: Velindre Cancer Centre
Architects: White Arkitekter
Client: Velindre University NHS Trust, Sacyr UK
Location: Cardiff, Wales, UK
Size: approximately 36,000m^2
Images: Vivid Vision

The new Velindre Cancer Centre in South Wales aims to be the UK's most sustainable hospital and to set a new standard for cancer care. White Arkitekter's focus has been the inter-related reduction of whole life carbon impact and improving health outcomes through a fabric first approach, and the use of daylight, views and natural materials, which contributes to a stress-relieving and harmonious environment for patients, visitors and staff.

NATURAL MATERIALS FOR HIGH SUSTAINABILITY GOALS

To meet the high sustainability goals, the building design prioritises local sourcing and natural materials with low carbon footprints that promote health and wellbeing. The scheme has a hybrid structural strategy, with mass timber structure to public areas, and enclosing the radiation treatment department. With the use of materials such as hempcrete and mineral plasters that are breathable and flexible, a natural and calming environment is created for patients, relatives and staff.

To support a circular approach, the materials must be robust, easy to maintain, repair, or reuse. The design also seeks to reduce the amount of material used. This is achieved through a compact and efficient building plan and optimised structural and material use strategy. Heat and cooling come from air heat pumps and

1 *The landscape approach to 'keep it wild' is rooted in climate adaptation, biodiversity gain and community benefits programme*
2 *White Arkitekter hopes to create "a healthcare environment for the future that supports the mental and physical wellbeing of both patients and families"*
3 *The architects were tasked with providing a design that makes people feel good, that is strong, long-lasting, flexible and efficient*
4 *The scheme has a hybrid structural strategy, with mass timber structure to public areas, and enclosing the radiation treatment department*

solar cells are mounted on the roofs. The building aims to achieve at least BREEAM Excellent.

"We asked for a design that makes people feel good, that is strong, long-lasting, flexible and efficient. We have got that and so much more. We look forward to welcoming our first patient into the new centre," said Steve Ham, CEO of Velindre University NHS Trust.

IN HARMONY WITH NEW GREEN ENVIRONMENTS

The landscape approach to 'keep it wild' is rooted in climate adaptation, biodiversity gain and community benefits programme, providing greater access to the site for members of the public while maintaining the distinctive natural setting. Existing trees will be retained and over 600 new trees, including pollinator-friendly, native species will be planted. Nature-based solutions manage surface water and drainage to reduce flood risk.

At the same time, new landscape features such as an orchard and community kitchen garden are planned to support healthy habits. The design of informal playgrounds and a variety of walking, cycling and relaxation areas encourage play and movement in nature. Research shows the importance of greenery in hospital environments. In addition to having a calming, healthy effect, access to nature can speed up the healing process.

"Together with the NHS and our partners we want to create a healthcare environment for the future that supports the mental and physical wellbeing of both patients and families, while also offering a state-of-the-art workplace for staff," said Michael Woodfoord, director London Studio, White Arkitekter.

The Acorn consortium was appointed following a public procurement process run by Velindre University NHS Trust, and includes Sacyr, Kajima Partnerships, Aberdeen, Andrew Scott, Kier Facilities Services, White Arkitekter, Ingho, Hydroc, BAC, MJ Medical, Turley, Studio Response, Camlins Landscape Architects, Osborne Clarke, Operis and Confab Lab.

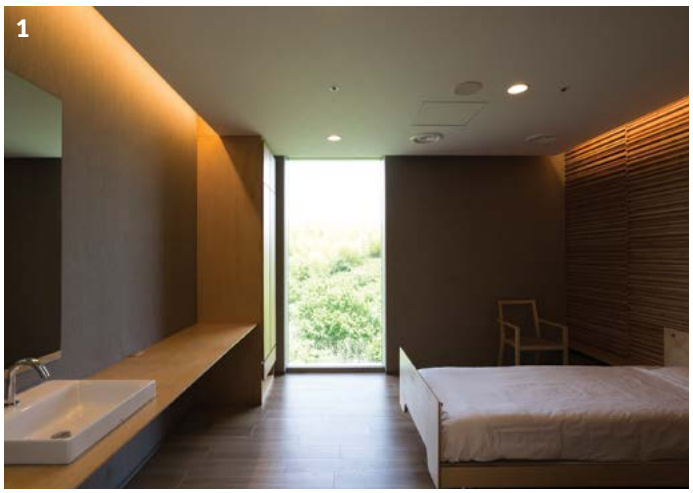
REHABILITATING WITH NATURE

Project: Narita Rehabilitation Hospital
Location: Chiba, Japan
Architects: Kengo Kuma and Associates
Construction: Sumitomo Mitsui Construction
Structural engineers: Kanebako Structural Engineers
Facility: Kankyo Engineering
Photography: Mitsumasa Fujitsuka

The low-rise Narita Rehabilitation Hospital, dedicated to patients who need rehabilitation, is located in small wooded foothills, also known as satoyama in Japanese, near Narita International Airport.

Vegetation on the rooftop gently slopes and connects with the ground, merging with the forest surrounding the building. The patients' rooms are elevated to the second level. Large windows are set in front of the bed at each

1 *Large windows are set in front of the bed at each room, allowing patients to face the forest in close proximitybenefits programme*
2 *Narita Rehabilitation Hospital*
3 *View from outside*
4 *The exterior cedar louvres*
5 *View of nature from inside*

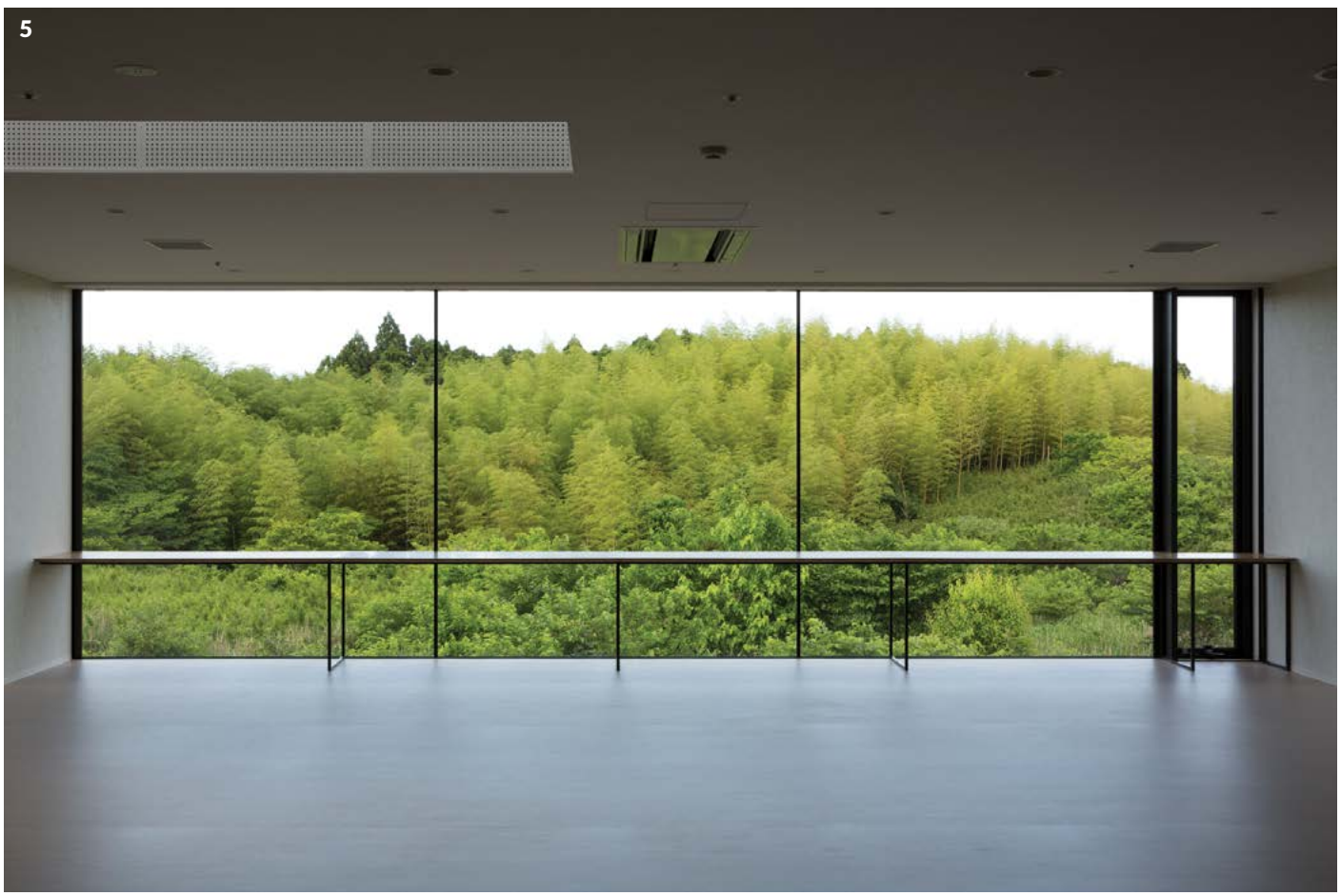


room, allowing patients to face the forest in close proximity, even during their private hours. The green rooftop works not only as the sequence to the ground, but also as an exercise promenade for the patients.

The exterior is clad with cedar louvres so that it creates multi-faceted expressions, responding to the subtle shadows of the trees. Kengo Kuma and Associates tried to use Japan-grown cedars as much as they could.

"Working with wood requires certain experience and knowledge, and designers' instructions cannot be conveyed by the drawings alone – such as how the grain should appear in which direction and so on. So, it is essential to work with skilled engineers and builders. We tend to team up with same people, in this sense," said a spokesperson from Kengo Kuma.

Furthermore, the client wanted a hospital design that could assimilate the nature surrounding it, so wood was Kengo Kuma's interpretation of their wish. Though unavoidable, hospital has an image of disinfection, but by using wood, the architects could mitigate it and create warm and gentle atmosphere throughout in this project. The client was aware that the wood would age naturally and change its colour and appearance over time.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A WELCOMING SPACE

Project: Lytton First Nation Health Centre
Architect: Unison Architecture
Completion: 2015
Photography: Unison Architecture

Situated in Lytton, British Columbia, and overlooking the Fraser river, Lytton First Nation Health Centre hosts visiting professionals, nurses, exams and dental rooms. The design of the community health room features high ceiling and clerestory windows to bring in natural light to the space as well as to celebrate the cultural and traditional form of the pithouse.

Completed in 2015, the facility is designed in close collaboration with the Lytton First Nation Community, including the Chief, Council, Health committee and community members to reflect their vision of health and wellness. Unison Architecture, after consulting with the community, recognised the need for some 'in-between' spaces other than the functional rooms that would be welcoming to community members, even if they are not seeking to meet with a practitioner. And since the approved programmes were already set and budget was limited, Unison Architecture decided to place the large meeting room or Community Health room as the centre of the project. This approach allows community members to use the large room whether they need to book a space for a meeting or for other activities such as weaving, threading, or canning food.

According to Farshid Rafiei, the principal architect, wood structures play an important role in First Nation's culture and history. The use of wood has several positive effects, both psychologically and physically, for clients, staff, and visitors:

"The trauma from Residential School for Lytton First Nation

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members led us to avoid materials that were used in institutional settings such as exposed concrete walls or metal doors. Additionally, the use of wood was inevitable due to availability, familiarity of trades, workability, and the warm and welcoming nature of wood. This helped us achieve our goal of making the facility a warm and welcoming place for not only clients and staff, but for public at large. Currently Lytton Health Centre has a successful dental programme which serves not only Lytton, but also neighbouring communities," he said.

Douglas fir was used in various structural forms for the Lytton First Nation Health Centre, such as glue-laminated timber (glulam), or solid tongue-and-groove wood when they needed to create spans, and used it as veneer for doors and millwork. The Douglas fir is a locally grown and sourced structural softwood, indigenous to the west coast of British Columbia, so they could benefit from both the structure and aesthetics of the wood in the facility. Rafiei and his team sourced them from nearby mills, thereby creating local jobs.

"Wood has a natural appearance that can help create warm and welcoming environments, which is particularly beneficial in healthcare settings," Rafiei explained about the use of wood. "The presence of wood reduces stress and anxiety, improve mood, and enhance overall wellbeing as if you are in a natural setting. We designed Lytton Health Centre based on biophilic design principles, which incorporated natural elements into built environments. For example, wood can contribute to better indoor air quality. Certain types of wood can absorb and release moisture, helping to regulate humidity levels

1 Wood has a natural appearance that can help create warm and welcoming environments, which is particularly beneficial in healthcare settings
2 The Lytton First Nation Health Centre is also known as the Tl'kemtsin Community Health Centre
3 Douglas fir glulam was used to create spans
4 Unison Architects strove to make the health centre a warm and welcoming place for not only clients and staff, but for public at large

5 It is important for the wood to be properly treated and maintained, to prevent the growth of mould or the release of harmful substances

6 The presence of wood reduces stress and anxiety, improve mood, and enhance overall wellbeing

in a room. This can be beneficial for respiratory health. The use of wood in structure and building enclosure helped us to reduce the thermal bridging that contributed to occupant's comfort."

But Rafiei cautioned architects or engineers that it is important for the wood to be properly treated and maintained, to prevent the growth of mould or the release of harmful substances.

He added: "Since wood is a natural material, it is important to specify it correctly. An important aspect to consider is its moisture content and how it will react in the new environment. Depending on the species and use of the wood, we may need to kiln dry it, or ensure that the building environment maintains sufficient humidity to prevent checking and cracks in the wood.

"When using wood in health facilities, it is important to consider factors such as durability, maintenance, fire resistance, and infection control. Proper treatment and finishing of the wood are essential to ensure that it is safe, hygienic, and suitable for a healthcare environment."

WOOD AND THE HEALTHCARE MARKET

Project: Maria's Garden Nursing Home
Location: Kagawa, Japan
Architects: Sasaki Kankyo Kobo
Structural wood supplier: Dainihon Wood-Preserving
Raw material supplier: Canada Wood Japan
Completion: April 2024
Text: Lance Tao, Canada Wood programme director

Located in the remote area of Shodoshima Island in Kagawa Prefecture, near Japan's fourth-largest island, Shikoku, Maria's Garden Nursing Home is a notable construction project that employs the 2x4 light wood frame system, also known as platform frame construction. This method involves constructing floors and walls using standard 2in by 4in pieces of lumber and is characterised by its efficiency and adaptability to large structures. The project spans a single storey with a total floor area of 2,840m².

A significant aspect of this construction is the use of nail plate trusses for the building's large gable roof. These trusses are engineered for long spans, allowing

The main structure uses SPF dimension lumber

for wide-open spaces within the building. They are manufactured offsite by Prime Truss, demonstrating a commitment to precision and efficiency, before being transported and assembled onsite.

Platform frame construction, a technique prevalent in 2x4 construction, involves completing the first floor's joists and then covering them with sub-flooring to create a platform. This platform serves as the base for constructing both exterior walls and interior partitions. The method is straightforward to implement, offering a stable working surface at each floor level. Additionally, it is easily compatible with different prefabrication approaches, making it a versatile choice for building.

The use of spruce-pine-fir (SPF) dimension lumber for the main structure and Canadian oriented strand board (OSB) for wall sheathing is central to the project, with an estimated total of 510m³ of structural wood used.

This project is led by the Social Welfare Corporation St Catherine, with design and construction managed by Sasaki Kankyo Kobo. The wooden structural components are supplied by Dainihon Wood-Preserving (DMB Shikoku), showcasing a collaborative effort across multiple specialised entities. Engineering support is provided by Twenty-Four Technical Service, ensuring the project meets all structural requirements.

Scheduled for completion in March 2024 and to open in April, Maria's Garden Nursing Home stands as a testament to the collaborative market development efforts by Canada Wood Japan and the Japan Wood Truss Council (JWTC). These efforts have been focused on promoting the nail plate truss system and the 2x4 light wood frame construction method. This system has been increasingly adopted in Japan, evident from the use of nail plate trusses in over 2,000 projects in 2020, leading to a 17% increase in lumber consumption for larger projects. This project exemplifies the successful application of these techniques, highlighting their benefits in terms of efficiency, sustainability, and architectural flexibility.

WOOD MARKET IN JAPAN

Japan's ageing population continues to put pressure on its housing market, a key area for Canadian lumber exports. Despite this, the non-residential sector is witnessing growth, fuelled by economic development, government policies, urbanisation, advancements in technology, and the expansion of the tourism and hospitality industries. Efforts towards sustainability and green building also play a crucial role in shaping the real estate market.

The Japanese construction industry, however, is navigating a tough environment with increasing competition for projects and rising labour and material costs. To cope, construction firms are pushed to not only enhance productivity by adopting more efficient work methods but also to rethink the value they deliver through business transformation.

In the non-residential segment, wood construction offers a cost-effective solution for smaller buildings, mainly attracting projects under 1,300m². This market is steadily growing, particularly in sectors like agriculture, healthcare, and social welfare, where wood's market penetration has reached 25-30%. The preference for wood is largely due to its cultural significance, especially among older Japanese who have a fondness for traditional wooden structures. Additionally, developers favour wood for its speed of construction, ease of prefabrication, and labour efficiency, which significantly reduce costs.

1 Maria's Garden Nursing Home under construction
2 Maria's Garden Nursing Home employs the 2x4 light wood frame system, also known as platform frame construction
3 Japan has long been a pioneer in wood construction techniques, with a growing trend towards utilising mass timber and engineered components, like large-span truss systems

Japan has long been a pioneer in wood construction techniques. The growing trend towards utilising mass timber and engineered components, like large-span truss systems, nail-laminated timber (NLT) and cross-laminated timber (CLT), has empowered Japanese developers to undertake large-scale, non-residential projects using wood-based construction methods. In response, Canada Wood Japan has collaborated with its Japanese partners to host the Big & Tall Wood Challenge competition for the past five years. This competition aims to foster innovation in wood construction.

Currently, Japan's construction industry is navigating through three significant trends:

Strengthened energy requirements: Japan's Ministry of Land, Infrastructure, Transport, and Tourism (MLIT) has revised its energy conservation laws, introducing stricter energy efficiency mandates for housing. From 2025, new housing must adhere to enhanced energy-saving standards, evolving to net-zero energy homes (ZEH) by 2030. This poses great opportunities for wood construction to be adopted as a preferred solution for its higher performance in energy saving.

Tightening labour laws: Amendments to the labour code, effective from 2024, will cap overtime at 960 hours per year, significantly affecting the transport and construction sectors. This regulation is expected to push the construction industry further towards prefabricated wood construction and components and other methods that reduce onsite construction time and enhance efficiency.


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Wood use in midrise construction: Affordability in Japan's housing market is declining. Consequently, there is growing interest in the multi-family and midrise apartment sector, presenting opportunities for wood construction, particularly mass timber, to meet the rising demand in this evolving market landscape.

Given these developments, the outlook for wood utilisation in Japan's non-residential construction sector is optimistic, according to Canada Wood.

LEAN AND EFFICIENT DESIGN

Project: Peepeekisis Cree Nation Community Hub
Location: Peepeekisis, Saskatchewan, Canada
Client: Peepeekisis First Nation
Architects: Reimagine
Structural engineers: Fast + Epp
Photography: GBP Creative Media

Peepeekisis Cree Nation is situated in the Treaty Four Territory in Canada, and is a part of the File Hills First Nation. Serving as a catalyst for community integration, growth, and wellbeing, the single-storey Peepeekisis Community Hub creates an inviting and culturally engaging space for visitors.

Designed with versatility in mind, the hub caters to a range of community activities. The expansive Community Hall, accommodating up to 400 people, is an ideal space for hosting a variety of larger scale events. The Daycare Centre provides essential childcare and support services for families, and the hub also features a well-equipped commercial kitchen, a Gas Bar, a retail outlet, and a cultural atrium, which is an ideal setting for community gatherings.

"People are intensely drawn to natural beauty and surroundings. In constructing a building, we are able to utilise natural elements and bring in some of that exterior beauty to our built spaces. Biophilic design incorporates the use of natural materials, natural light and airflow. Environments with natural timber materials have been shown lower blood pressure and heart


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rate, provide a calming environment and a sense of warmth," commented Stephan Pasche, associate principal at Fast + Epp.

An exposed mass timber system was chosen to frame the building as it was able to efficiently handle the complex geometry, provide a beautiful aesthetic and deliver sustainable benefits. Douglas Fir glulam posts and beams were used to support glue-laminated timber (glulam) floor and roof panels.

According to Fast + Epp, glulam was chosen for this project for several reasons. The circular project geometry and long span requirements lead to the use of glulam beams with a tighter spacing. The narrow width of the glulam panels was able to accommodate the sloping geometry of the roof. The product availability, pricing and product lead times were superior to cross-laminated timber (CLT) and dowel laminated timber (DLT) for this project. Nail laminated timber (NLT) was considered, but the prefabricated nature of the glulam panels allowed for offsite fabrication with high quality and tight tolerances.

"One of Fast + Epp's primary objectives on a project is to provide a safe structure that is not over-designed. Finding lean and efficient design solutions is in our view a structural engineer's best contribution to sustainability," said Pasche. "Breaking down complex problems and seeking out simple solutions leads to economy of design. Letting the structure perform double and triple duty as aesthetic components, concealing services, and acting as an acoustic element – all speaks to design efficiency."

Pasche further explained that the Fast + Epp team is mindful that the most successful designs are the result of fruitful interdisciplinary collaboration of all team members, where humility and respect govern their relationships. The collaborative process for this project began early on in working with Reimagine Architects. Early structural design schemes were examined in finding the most appropriate material that would be able to span long distances, efficiently handle the complex geometry, have natural beauty and provide the required load and fire ratings.

For advice on how to design and build with timber, Pasche commented that some considerations are to first understand the natural properties of the wood and how it behaves when exposed to varying temperatures and moisture conditions. Understanding how wood shrinks is a large influence on how timber members are connected together. Connections are designed so that the wood is not restrained and prevented from shrinking, but allowed to move naturally. Another important consideration is how mass timber elements and connections behave in a fire. This influences minimum timber sizes and conceals certain elements of connections to provide a safe structure. **WIA**

1 *Biophilic design incorporates the use of natural materials, natural light and airflow*
2 *The Peepeekisis Cree Nation Community Hub viewed from outside*
3 *Designed with versatility in mind, the hub caters to a range of community activities*
4 *The circular project geometry and long span requirements lead to the use of glulam beams with a tighter spacing*

WORKSPACE DESIGN SHOW AMSTERDAM 2023 A SUCCESS

1

2

1 From innovative furniture solutions to state-of-the-art technology, the exhibition floor buzzed with creativity and inspiration

2 The Design Talks Lounge and Occupiers Forum were intellectual hubs where ideas flowed freely

The inaugural Workspace Design Show held at the RAI Amsterdam concluded on 12 Oct 2023 successfully with a slew of workplace design solutions and a line-up of speakers and exhibitors.

Seventy-five exhibitors participated at the event, representing a mix of industry manufacturers and designers. From innovative furniture solutions to state-of-the-art technology, the exhibition floor buzzed with creativity and inspiration.

According to the organisers, over 3,000 visitors filled the venue, drawn by the designs and networking opportunities. These design professionals hailed from 42 different countries, creating a melting pot of ideas and perspectives.

Both visitor and exhibitor sentiments were reportedly high, considering this edition was the first hosted in the Netherlands. The Workspace Design Show is normally held in London, UK. The Design Talks Lounge and Occupiers Forum were intellectual hubs where ideas flowed freely. More than 40 speakers engaged the audience in 12 interactive panel discussions per day, covering topics ranging from sustainable workspaces to the future of office design.

The success of the inaugural Workspace Design Show in RAI Amsterdam sets the stage for even greater achievements in the years to come. As the industry evolves, the organisers expect Amsterdam to continue to be a beacon for workplace design innovation and collaboration. **WIA**

UPCOMING EVENTS

2024

MARCH

19 - 21, March
BuildTech Asia, Singapore

18 - 21, March
53th CIFF Guangzhou 2024 (Phase 1), Guangzhou, China

28 - 31, March
53th CIFF Guangzhou 2024 (Phase 2), Guangzhou, China

APRIL

16 - 21, April
Salone del Mobile, Milan, Italy

MAY

27 - 30, May
Project Qatar, Doha, Qatar

28 - 30, May
DOMOTEX asia/CHINAFLOOR, Shanghai, China

29, May - 01, June
Hanoi Wood Expo, Hanoi, Vietnam

29, May - 01, June
Hanoi Furniture Fittings & Upholstery Expo, Hanoi, Vietnam

JUNE

04 - 06, June
INDEX Dubai, Dubai, United Arab Emirates

19 - 21, June
South China International Industry Fair, Shenzhen, China

19 - 22, June
Design Shanghai, Shanghai, China

24 - 26, June
Sylva Wood Expo, Shanghai, China

JULY

03 - 06, July
Archidex, Kuala Lumpur, Malaysia

SEPTEMBER

04 - 06, September
Bex Asia, Singapore

11 - 14, September
53rd CIFF Shanghai 2023, Shanghai, China

26 - 28, September
FIND Design Fair Asia, Singapore

NOVEMBER

01 - 04, November
China Yiwu International Forest Products Fair, Zhejiang, China

26 - 29, November
The Big 5 Global, Dubai, UAE

28 - 30, November
Cairo Woodshow 2023, Cairo, Egypt

2025

FEBRUARY

15 - 18, February
The Big 5 Saudi (Week 1), Riyadh, Saudi Arabia

24 - 27, February
The Big 5 Saudi (Week 2), Riyadh, Saudi Arabia

MARCH

06 - 09, March
India Wood, Bengaluru, India

MAY

20 - 23, May
Interzum Cologne, Cologne, Germany

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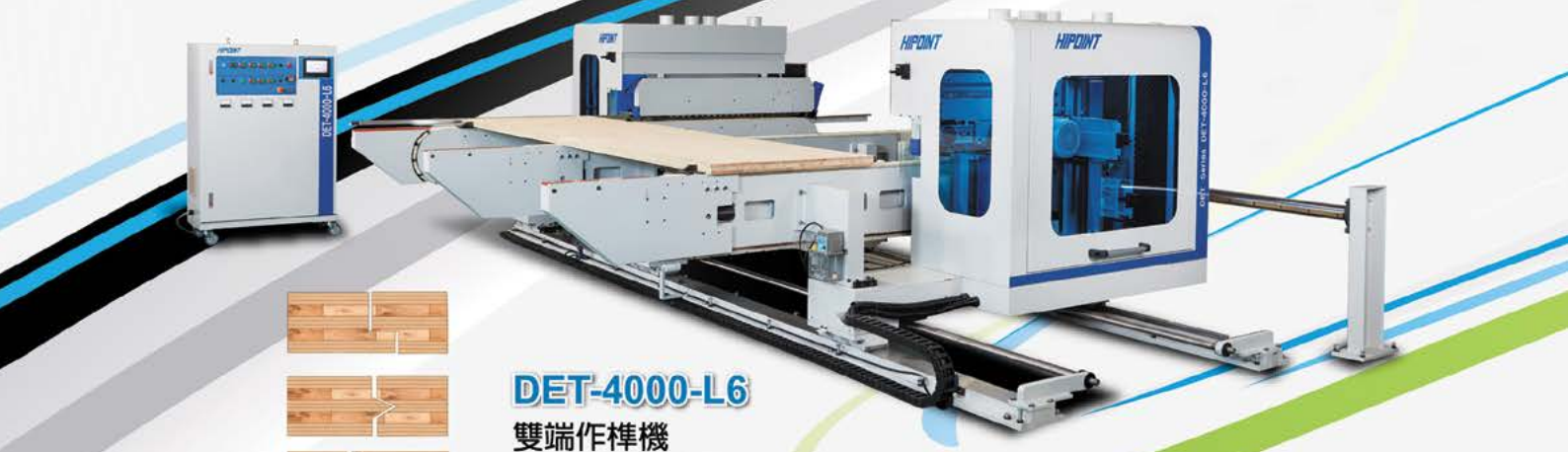

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