



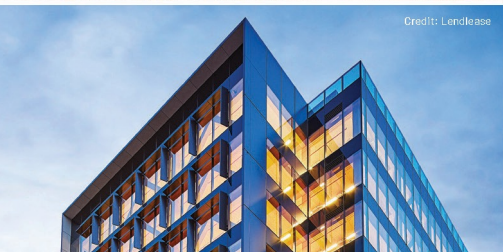
WORLD CONFERENCE ON TIMBER ENGINEERING 2025

BRISBANE, AUSTRALIA

Advancing Timber for the Future Built Environment



Credit: Tourism and Events Queensland



Credit: Lendlease

WCTE 2025 Program

June 22 – June 26, 2025



Credit: Lendlease

Welcome to WCTE 2025

It is with great pleasure that the Australian Organising Committee welcome delegates from around the world to join us in Brisbane, Australia to attend WCTE 2025. We would like to thank the conference's host organisation, the University of Queensland, which is home of the Australian Research Council Industrial Transformation Research Hub to Advance Timber for Australia's Future Built Environment (ARC Advance Timber Hub).

Internationally, there is a rise in the number of engineering and architectural firms, developers and investors who are demonstrating that timber buildings and structures are the preferred solution for many projects. For its part, Australia is bringing innovative timber solutions to the tall buildings market, developing uniquely performance-based design solutions to make timber viable for building of height and complexity equal to that of any other country in the world.

This activity providing further relevance and importance to the research carried out and being discussed at this conference by the international timber design and construction community. We are currently experiencing increased interest in timber as a biobased construction material, and one that offers a major opportunity to reduce embodied carbon, enhance carbon storage, and support thriving regional bioeconomies.

The use of timber in building construction is growing at a rapid pace in Australia and the government continues to provide incentives for the use of engineered timber products in construction. This including a commitment of \$100 million for activity in a newly created national research institute, Australian Forest and Wood Innovations (AFWI). This institute is designed to transform the Australian Timber Industry and enable it to make significant contributions to Australia's carbon positive bio-based future.



WCTE 2025 Chair



WCTE 2025 Deputy Chair



WCTE 2025 Secretary

WCTE 2025, under the principal conference theme of:

Advancing Timber for the Future Built Environment

has amassed a comprehensive WCTE 2025 technical program, covering the following themes:

Material Performance & Durability

Sustainability and Timber in a Circular Economy

Timber Engineering & Structural Performance

Timber Architecture & Biophilic Design

Education, Innovation & Challenges

Exemplars & Construction Case Studies

The Organising Committee of WCTE 2025 would like to express our sincere gratitude to all contributors and participants for their carefully prepared, stimulating and interesting abstracts. Thanks are also extended to the members of the WCTE 2025 International Scientific Committee for review of over 1,000 submissions. Without their dedicated efforts, the conference and the proceedings, which has 700 papers, would not have been realised in this way.

We would like to thank our supporters and sponsors. The organisation of a conference of this scale (with over 900 delegates) would not be possible without the support and contributions from these organisations and individuals.

Finally, we would also like to thank the Coordinating Council of the WCTE for their support and trust as well as our colleagues in WCTE 2023 from Norway for sharing their expertise and experience with us.

WCTE 2025 Organising Committee

Chair: Keith Crews, Professor, The University of Queensland

Deputy Chair: Greg Nolan, Professor, University of Tasmania

Secretary: Kelly Rischmiller, The University of Queensland



NORTH GORGE WALK, MINJERRIBAH

COME AND EXPLORE BRISBANE

Queensland's most incredible holiday destinations are ready to welcome you. There are so many places to explore in Brisbane region, so say hello to new adventures.

QUEENSLAND.COM

Queensland

Message from the Minister for the Environment and Tourism and Minister for Science and Innovation, the Honourable Andrew Powell MP:

Welcome to the World Conference on Timber Engineering (WCTE 2025). We are delighted to have you with us.

We extend a warm welcome to all attendees, whether you've travelled locally or internationally, and encourage you to explore everything Brisbane has to offer. From its vibrant culinary landscape to its rich cultural heritage, Brisbane provides a distinctive experience for every visitor.

Business events like WCTE 2025 play a vital role in driving our visitor economy, and the Queensland Government is proud to support this event through Tourism and Events Queensland.

Thank you for your participation. We hope WCTE 2025 proves both valuable and inspiring and look forward to welcoming you back to Brisbane, Queensland in the future.

Andrew Powell MP
Minister for Tourism



Thank you to our WCTE 2025 International Scientific Committee

| | | | |
|--------------------------|----------------|-----------------------------|--------------------------|
| Fank, Pamela Yohana | Argentina | Sandhaas, Carmen | Germany |
| Torran, Eduardo | Argentina | Schober, Kay-Uwe | Germany |
| Cowled, Craig | Australia | van de Kuilen, Jan-Willem | Germany |
| Crews, Keith | Australia | Harte, Annette | Ireland |
| Dewsbury, Mark | Australia | Ballerini, Marco | Italy |
| Dunn, Andrew | Australia | Casagrande, Daniele | Italy |
| Gasparri, Eugenia | Australia | Faggiano, Beatrice | Italy |
| Gattas, Joe | Australia | Fragiacomo, Massimo | Italy |
| Gilbert, Benoit | Australia | Giongo, Ivan | Italy |
| Nolan, Gregory | Australia | Piazza, Maurizio | Italy |
| Noroozinejad, Ehsan | Australia | Polastri, Andrea | Italy |
| Ottenhaus, Lisa | Australia | Isoda, Hiroshi | Japan |
| Shanks, Jon | Australia | Kobayashi, Kenji | Japan |
| Singh, Tripti | Australia | Leijten, Adrian | Netherlands |
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| Füssl, Josef | Austria | Quenneville, Pierre | New Zealand |
| Kaufmann, Hermann | Austria | Raftery, Gary | New Zealand |
| Lukacevic, Markus | Austria | Zarnani, Pouyan | New Zealand |
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| Descamps, Thierry | Belgium | Modaresi, Roja | Norway |
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| Neto, Calil | Brazil | Stamatopoulos, Haris | Norway |
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| Dagenais, Christian | Canada | Tomasi, Roberto | Norway |
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| Popovski, Marjan | Canada | F. Llana, Daniel | Spain |
| Salem, Sam | Canada | González-Rodrigo, Beatriz | Spain |
| Salenikovitch, Alexander | Canada | Íñiguez-González, Guillermo | Spain |
| Smith, Ian | Canada | Danielsson, Henrik | Sweden |
| Tannert, Thomas | Canada | Frühwald Hansson, Eva | Sweden |
| Viau, Christian | Canada | Goto, Yutaka | Sweden |
| Wiesner, Felix | Canada | Johansson, Marie | Sweden |
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| Li, Zheng | China | Serrano, Erik | Sweden |
| Zhang, Shengdong | China | Vessby, Johan | Sweden |
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| Kuklík, Petr | Czech Republic | Lehmann, Martin | Switzerland |
| Björnfot, Anders | Denmark | Sigrist, Christophe | Switzerland |
| Fink, Gerhard | Finland | Steiger, René | Switzerland |
| Fortino, Stefania | Finland | Chen, Jessie Y. | United States of America |
| Jaaranen, Joonas | Finland | Clouston, Pegg | United States of America |
| Moutou Pitti, Rostand | France | Morrell, Jeff | United States of America |
| Blass, Hans J. | Germany | Riggio, Mariapaola | United States of America |
| Dietsch, Philipp | Germany | Sinha, Arijit | United States of America |
| Haller, Peer | Germany | Muszynski, Lech | United States of America |
| Jockwer, Robert | Germany | | |

Thank you to our WCTE 2025 Sponsors

GOLD SPONSORS



NeXTimber® by Timberlink manufactures Australian made Engineered Wood Products (EWP) and provides mass timber building solutions with Cross Laminated Timber (CLT) panels and Glue Laminated Timber (GLT) members. Made from sustainably managed Australian plantation pine, NeXTimber CLT panels and GLT members offer long term carbon capture and storage like traditional timber but with the strength, uniformity and technical predictability to support increasingly demanding applications such as hybrid and tall wood buildings.



Rothoblaas is a global innovation company with its roots in the Italian Alps, where a long tradition has fostered the development of solutions that now enable the construction of timber buildings of more than 20 stories. Through the provision of innovative standardized components and specialized consultancy, Rothoblaas assists industry professionals in creating stunning, safe, and efficient buildings. Its product range encompasses fastening, airtightness, water and soundproofing, fall protection systems, tools and machines.



In this current economic climate, it is important that your project is competitive regarding both cost and time. As a leading manufacturer and supplier of screws for timber connections, SPAX has revolutionised the timber fastening industry by developing innovations that will give you that competitive edge by saving you time, reducing your project costs and outlasting the lifetime of the project. SPAX products are certified as 100% made in Germany so there is no compromise in quality. SPAX is specified by architects and engineers throughout Europe, America, Asia, Australia and New Zealand so it is truly a global company which offers local support. We have bundled the expertise of our local and international network in structural timber construction in our new SPAX International Timber Construction Competence Centre. This enables us to offer our international customers personalised and professional advice on all questions relating to timber construction.

SILVER SPONSORS

HASSLACHER
NORICA TIMBER

From **wood** to **wonders**.

HESS
TIMBER LIMITLESS

A MEMBER of HASSLACHER group

The HASSLACHER group is a globally active innovation leader in the field of intelligent and integrated system solutions for modern timber construction. The family-run enterprise has had its roots for generations in the use of wood as a wonderfully renewable raw material and for more than 120 years has stood for a pioneering spirit, performance, quality, sustainability and social responsibility.



KLH MASSIVHOLZ GMBH is the pioneer and one of the world's leading manufacturers of cross laminated timber (KLH® - CLT) with over 25 years of experience. Our Teufenbach-Katsch facility, established in 1999, has expanded over the years. Two decades later, we opened a second state-of-the-art production site, making it one of the most modern CLT plants worldwide. As a family-owned company, we act not only as a manufacturer but also as a project partner, working with local distribution partners to provide technical services for sustainable, innovative building solutions. Over the years, we have successfully delivered over 45.000 projects worldwide.



Multinail Advance is an exciting addition to the Multinail Brand. Our core focus is to introduce Multinail's extensive range of products and services to new markets while innovating and developing solutions tailored to both existing and emerging sectors. Our primary focus includes multi-residential projects, mid-rise buildings, and mass timber construction. Multinail Advance is committed to enhancing the competitive edge of our fabricators by expanding timber construction into new markets and contributing to the growth of the Australian timber industry.

RUBNER
Better with wood

THECA
TIMBER

Forward-looking, high-performance and goal-oriented. We set standards in global timber engineering and want to inspire people with our services and get them excited about wood as a building material. More than 500 employees at six locations in Italy, Germany, Austria and France realize the individual visions of our customers together with architects and planners. In doing so, we strive to overcome the limits of the imaginable and to significantly influence developments. Our passion for wood as a material, our comprehensive know-how in the planning of individual solutions and our generous production capacities make us the leading timber construction company in Europe.

BRONZE SPONSORS



ASH are at the forefront of mass timber engineering, design, and manufacturing in Australia, leading innovation and delivering some of the largest and most noteworthy projects in the country. With a dedicated in-house design team, MASSLAM is the largest locally sourced and manufactured hardwood glulam in Australia and holds EWPA certification.



CADWORK - Leading 3D CAD/CAM and BIM software for timber construction. Offers a complete solution - Design - Manufacture - Site. Collaborates with machine providers to support latest CNC technologies. Allows you to build Digital Twins and solve issues before they arise. Is easy to learn and intuitive to use.



Engineered Wood Products Association of Australasia (EWPA) is a technical association for manufacturers of engineered wood products throughout Australasia. See www.ewp.asn.au. On behalf of our industry and member companies, EWPA coordinates a broad market development program, including technical advocacy, certification and testing, standards development, R&D facilitation, and technical support.



The unique, innovative Loggo concept promises to be a most viable, cost-effective and green future building solution, by turning low value forest 'thinnings' and peeler cores into high value EWP's. Loggo's special 3D model presentation will showcase its suitability in the worldwide struggle for more affordable accommodation from housing to mid-rise apartment blocks.



Responsible Wood is the Standard of choice for Australian forests and forest products. The Responsible Wood Certification Scheme is built on a fit for purpose Australian Standard ensuring that Australia's forests, and all products sourced from them, are among the most sustainable in the world.



With over 180 years of experience in Austria, Schmid Schrauben Hainfeld is one of Europe's leaders in screw production and fastening technology. Schmid offers flexible manufacturing, customised packaging, and strong customer service. Its brands include RAPID®, StarDrive GPR and customised products up to 1,500 mm in length.

BRONZE SPONSORS



Established in 2009, Siegware provides top-quality European building hardware from brands like Siegenia, Sherpa, Isocell, and Adler to Australia and New Zealand. They focus on reliable supply, expert technical support, and excellent customer service, ensuring value for their clients in the energy-efficient construction sector.



Simpson Strong-Tie focusses on creating engineered structural products that help people build safer and stronger homes and buildings. Considered a leader in structural systems research, testing and innovation, Simpson Strong-Tie® products are recognised for helping structures resist high winds, hurricanes and seismic forces.



XLAM is manufactured in Australia and New Zealand from locally grown plantation pine. When trees are harvested, they are then re-planted. As the trees grow, they absorb carbon from our air and lock it up in the wood fibre. Mass timber is an endlessly renewable product contributing to greener building practices.

BARISTA SPONSORS



The Brüninghoff Group comprises six companies in construction, manufacturing, and services, offering integrated solutions in planning, development, and execution. With around 700 employees, it is a European industry leader focused on sustainability and climate-friendly, resource-efficient methods. The company specializes in timber and hybrid construction, delivering projects from industrial halls to housing and offices.



The ARC Research Hub to Advance Timber for Australia's Future Built Environment (ARC Advance Timber Hub) is an Australian Research Council (ARC) Industrial Transformation Research Hub. It aims to develop the resources, enablers, and drivers to advance sustainable timber, as a natural resource, to be the material of choice, leading towards a net zero future for Australia's built environment.

RECEPTION SPONSORS

Welcome Reception



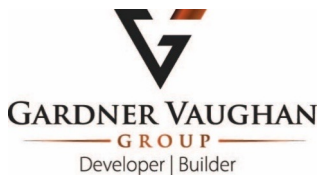
CLT Toolbox is purpose-built software for structural engineers designing with mass timber. With intuitive calculators aligned to international codes and supplier data, it simplifies CLT, GLT, LVL, and hybrid system design. From connection checks to diaphragm analysis, engineers can confidently model real-world timber structures. Used across ANZ, Europe, the UK, and North America, CLT Toolbox is making timber design faster, simpler, and more accessible. Meet our team, explore the platform, and help shape the future of timber engineering.

Gala Dinner



WoodSolutions is an industry initiative and not for profit organisation, created by Forest & Wood Products Australia, to provide independent, non-proprietary technical information, education, and resources about timber and wood products to professionals and companies involved in building design and construction. Together with industry bodies, technical associations, and suppliers, WoodSolutions aims to communicate the benefits and value of timber products to the industry. WoodSolutions works to encourage and support the adoption of effective and efficient methods, techniques, and standards on the use of timber in the built environment by creating a nationwide network that inspires the next generation of design and constructions professionals and consumers.

Closing Reception



A Developer and Builder with over 35 Years Experience in South East Queensland. Gardner Vaughan Group (GVG), one of South East Queensland's most active apartment developers, continues to solidify its commitment to consistency and quality, with a strong pipeline of projects and the recent completion of several significant developments. With a vertically integrated, full-service model that brings design, construction, and project management together under one roof, GVG maintains complete control over every aspect of its developments.

OTHER SPONSORS

Master of Ceremonies



Aurecon is a design, engineering and advisory company. Our purpose is bringing ideas to life, to imagine and co-create with our clients a better future for people and the planet.

Early Career Researcher



The Gottstein Trust is the national educational trust of Australia's ultimate renewable industry – wood products grown in forests and plantations. The Trust creates opportunities for people to acquire knowledge that will promote the interests of the Australian industries that grow and use sustainably grown forest resources.

SUPPORTED BY



CREATE CHANGE



AGENDA AT A GLANCE

SUNDAY, 22ND JUNE 2025

- **REGISTRATION**
2:00 PM – 4:00 PM
- **OPENING CEREMONY**
4:00 PM – 5:00 PM
- **HISTORY OF WCTE - JAN WILLEM**
5:00 PM – 5:30 PM
- **KEYNOTE 1 - KARL HEINZ WEISS**
5:30 PM – 6:00 PM
- **WELCOME RECEPTION**
6:00 PM – 8:00 PM
Includes canapés and drinks

MONDAY, 23RD JUNE 2025

- **REGISTRATION**
7:30 AM – 8:30 AM
- **WELCOME ADDRESS**
8:30 AM – 9:00 AM
- **KEYNOTE 2 & 3 - PHILIPP DIETSCH & JODIE BRICOUT**
9:00 AM – 10:30 AM
Includes Panel Discussion for Keynotes 1 to 3
- **MORNING TEA**
10:30 AM – 11:00 AM
- **SESSION 1**
11:00 AM – 1:00 PM
1A, 1B, 1C, 1D, 1E, 1F, 1G, 1H, 1I
- **LUNCH**
1:00 PM – 2:00 PM
Poster Presentations 1:30 PM – Poster 1A, Poster 1B, Poster 1C
- **SESSION 2**
2:00 PM – 3:30 PM
2A, 2B, 2C, 2D, 2E, 2F, 2G, 2H, 2I
- **AFTERNOON TEA**
3:30 PM – 4:00 PM
- **SESSION 3**
4:00 PM – 5:30 PM
3A, 3B, 3C, 3D, 3E, 3F, 3G, 3H
- **CLOSE - VISIT BRISBANE**
5:30 PM
Things to Do EAT & DRINK:
<https://visit.brisbane.qld.au/things-to-do/eat-and-drink>

TUESDAY, 24TH JUNE 2025

REGISTRATION

8:00 AM – 8:30 AM

SESSION 4

8:30 AM – 10:30 AM

4A, 4B, 4C, 4D, 4E, 4F, 4G, 4H, 4I

MORNING TEA

10:30 AM – 11:00 AM

SESSION 5

11:00 AM – 1:00 PM

5A, 5B, 5C, 5D, 5E, 5F, 5G, 5H, 5I

LUNCH

1:00 PM – 2:00 PM

Poster Presentations 1:30 PM – Poster 2A,
Poster 2B, Poster 2C

SESSION 6

2:00 PM – 3:30 PM

6A, 6B, 6C, 6D, 6E, 6F, 6G, 6H

AFTERNOON TEA

3:30 PM – 4:00 PM

SESSION 7

4:00 PM – 5:30 PM

7A, 7B, 7C, 7D, 7E, 7F, 7G, 7H

CLOSE - VISIT BRISBANE

5:30 PM

Things to Do EAT & DRINK:

<https://visit.brisbane.qld.au/things-to-do/eat-and-drink>

WEDNESDAY, 25TH JUNE 2025

REGISTRATION

8:00 AM – 8:30 AM

KEYNOTES 4, 5 & 6 - GERALD EPP, KATHARINA LEHMANN & HARRY MILLS

8:30 AM – 10:30 AM

Includes Panel Discussion for Keynotes 4
to 6

MORNING TEA

10:30 AM – 11:00 AM

SESSION 8

11:00 AM – 1:00 PM

8A, 8B, 8C, 8D, 8E, 8F, 8G, 8H, 8I

LUNCH

1:00 PM – 2:00 PM

Poster Presentations 1:30 PM – Poster 3A,
Poster 3B, Poster 3C

SESSION 9

2:00 PM – 3:30 PM

9A, 9B, 9C, 9D, 9E, 9F, 9G, 9H, 9I

AFTERNOON TEA

3:30 PM – 4:00 PM

SESSION 10

4:00 PM – 5:30 PM

10A, 10B, 10C, 10D, 10E, 10F, 10G, 10H

GALA DINNER

7:00 PM – 10:30 PM

Welcome Drinks from 7:00 PM, 7:30 PM – 3
Course Sit Down Dinner, including drinks
DRESS CODE: Semi-formal/cocktail

THURSDAY, 26TH JUNE 2025

REGISTRATION

8:00 AM - 8:30 AM

SESSION 11

8:30 AM - 10:30 AM

11A, 11B, 11C, 11D, 11E, 11F, 11G, 11H, 11I

MORNING TEA

10:30 AM - 11:00 AM

SESSION 12

11:00 AM - 1:00 PM

12A, 12B, 12C, 12D, 12E, 12F, 12G, 12H

LUNCH

1:00 PM - 2:00 PM

Poster Presentations 1:30 PM - Poster 4A,

Poster 4B, Poster 4C

**KEYNOTES 7, 8 & 9 - PHILLIP
TNDL, GUY GARDNER & RALPH
BELPERIO**

2:00 PM - 3:30 PM

AFTERNOON TEA

3:30 PM - 4:00 PM

**KEYNOTES 7 TO 9 PANEL
DISCUSSION**

4:00 PM - 4:30 PM

CLOSING CEREMONY

4:30 PM - 5:00 PM

CLOSING RECEPTION

5:00 PM - 6:00 PM

Includes canapés and drinks



Monterey Apartments Kangaroo Point
Image courtesy of Gardner Vaughan Group

WCTE 2025 THEMES

MPD - Material Performance & Durability

STCE - Sustainability and Timber in a Circular Economy

TESP - Timber Engineering & Structural Performance

TABD - Timber Architecture & Biophilic Design

EIC - Education, Innovation & Challenges

ECCS - Exemplars & Construction Case Studies

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WCTE 2025 Technical Program

Overview – Wednesday

WCTE 2025 THEMES

MPD – Material Performance & Durability

STCE – Sustainability and Timber in a Circular Economy

TESP – Timber Engineering & Structural Performance

TABD – Timber Architecture & Biophilic Design

EIC – Education, Innovation & Challenges

ECES – Exemplars & Construction Case Studies

| Session 8 - 11am to 1pm Presentations are 15 minutes each | 8A | 8B | 8C | 8D | 8E | 8F | 8G | 8H | 8I |
|--|--|--------------------------------------|---|---|---|---|--|---|-----------------------------------|
| | TESP - Engineering | TESP - Engineering Connections | TESP - Engineering Flooring, Inel Gottstein Study Tour Presentation | TESP - Engineering - design challenges for timber buildings | EIC / STCE - Engineering - Design for Wind & Seismic load events / Structural Behaviour | MPD - Engineering - structural behaviour | STCE - Engineering / Architecture - Advancing the Circular Economy | TESP - Engineering - Dynamic Testing & Fire Engineering | TESP - Practitioner / Engineering |
| Session 9 - 2pm to 3:30pm Presentations are 15 minutes each | 9A | 9B | 9C | 9D | 9E | 9F | 9G | 9H | 9I |
| | ECES / EIC / TESP - Practitioner / Engineering | TESP - Engineering Fire Engineering | TESP - Engineering Connections | TESP - Engineering Structural behaviour | STCE - Engineering - Advancing the Circular Economy in Europe | TESP Engineering - Connections | TESP - Engineering | TESP - Engineering - Seismic / Vibrations | ECES - Architectural |
| Session 10 - 4pm to 5:30pm | 10A | 10B | 10C | 10D | 10E | 10F | 10G | 10H | |
| | TESP - Engineering Seismic Performance | TESP - Engineering Shear Performance | MPD - Architectural / Engineering / Practitioner | TESP - Engineering | EIC - Architectural | MPD / TESP - Engineering - fire or moisture hazards | TESP - Engineering - performance of Hybrid structures | TABD - Architectural | |
| Poster Session 3 - 1:30pm to 2pm Presentations are 4 minutes each | Poster 3A | Poster 3B | Poster 3C | | | | | | |
| | EIC, STCE (Engineering/ Practitioner) | TESP (Architectural) | MPD (Engineering) | | | | | | |

WCTE 2025 THEMES

MPD - Material Performance & Durability

STCE - Sustainability and Timber in a Circular Economy

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[illegible]

