

The 2019 MWP Award – Full motivation

Citation

The 2019 Marcus Wallenberg Prize is awarded to Distinguished Professor Gerhard Schickhofer for his role in providing insightful scientific and engineering research data required to standardize wood-based construction products with the rigor necessary for the reliable design of timber structures. His role in the development of cross-laminated timber (CLT) has been the key factor in the marked expansion of construction activities in multi-storey wood buildings.

Background and Prize Motivation

Prof. Schickhofer's seminal initial work laid the scientific and technological foundation for the subsequent extensive research and development that led to production of competitive CLT products. In the early stages of CLT development he established many of the necessary test procedures and benchmarks for standardisation. Thus he played a key role in the implementation of CLT as an engineered construction product for engineers and designers by exploring and interpreting many of the technological ramifications of using CLT. These advances provided the construction industry an opportunity to radically transform the “wood-based construction and design” sector of the wood building industry. The innovative engineered material has been adopted in many novel building applications, such as in tall wooden structures, and will likely have a dramatic global impact by enhancing the value and utilization of sustainably produced wood, as well as for storing carbon in buildings for decades-to-centuries, helping to mitigate climate change.

Cross-laminated timber (CLT) has become a well-known and competitive engineered timber product of global interest. It has become the leading building component for current medium- and large-scale wooden residential and office buildings. Within 15 years, the CLT production that initially started in Germany and Austria has risen to about 800,000 cubic meters p.a.



Figure 1. Structure of UBC's Brock Commons tall wood building. [Image courtesy of Acton Ostry Inc., UBC Research Team, <http://www.vancitybuzz.com/wp-content/uploads/2016/02/UBC-Tall-Wood-Residence-Brock-Commons-9.jpg>]

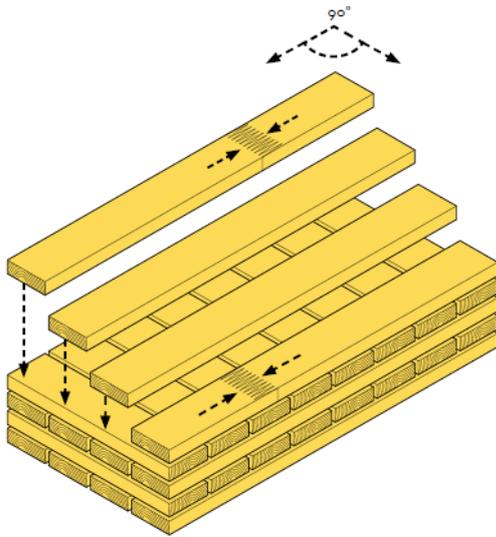


Figure 2. CLT panel layout. (From the book “100 UK CLT Projects”, Waugh Thistleton Architects. <https://www.thinkwood.com/clt100book>).

The orthogonal, laminar structure allows its application as a full-size wall and floor element as well as a linear timber structural element able to bear loads in- and out-of-plane. Prefabrication of CLT guarantees a short assembly time (one storey per day) on a building site.

Gerhard Schickhofer’s award is based on his ground-breaking scientific and engineering contributions to the development and successful technology transfer of cross-laminated timber (CLT), enabling its adoption as a mainstream building material. Since the mid-nineties, Prof. Schickhofer, along with his research team, has generated an impressive body of scientific and engineering knowledge and technology that has been crucial to the CLT success story. The Institute in Timber Engineering and Wood Technology that he heads, and the Competence Centre (Holz.bau Forschungs) that he cofounded, support and conduct application-oriented research using rigorous methodologies based on solid science. In addition, these institutes have acted as principal interfaces between the research community and the global timber industry.

The work of Gerhard Schickhofer in developing the concept of cross-laminated timber and his work with industry to develop certification and bring the material to the market, along with his ongoing commitment to research and development of the material has had a significant impact on construction and the architecture of the 21st century.

Of the researchers and professionals who have contributed to the development and applications of engineered wood products over the last 20 years, Prof. Schickhofer stands out for his vision of transferring scientific knowledge to practical application. His user-friendly software tools (e.g., CLTdesigner) and handbooks (e.g., European CLT BSPhandbuch and the Canadian and US CLT handbooks) have had an enormous influence in the field.

Prof. Schickhofer’s research, passion, and commitment to the field of CLT have played a key role in raising the profile of wood for the construction of massive and tall structures. His contributions and vision have, directly and indirectly, enabled the construction of many tall, robust, and elegantly engineered wooden buildings around the globe.

Gerhard Schickhofer



Dipl.-Ing. Dr. Prof. Gerhard Schickhofer was born in 1962 in Vorau, Austria. He received his PhD. in 1994 at Graz University of Technology and was appointed Professor and Head of the Institute of Timber Engineering and Wood Technology at the same university in 2004.

Prof. Schickhofer has been internationally recognized for his insightful research and his technology transfer contributions that have been key to the commercialization of CLT.

The TU Graz research program led by Prof. Schickhofer has been, and continues to be, tightly aligned to both the current and evolving needs of CLT producers and the mass timber construction industry. This group has provided research direction and technical support to the industry and has catalysed close working relationships between the academics at Graz, cooperating universities, and the producers, architects and engineers working on CLT. The mechanisms used to develop and enhance the use of the product include regular CLT workshop, seminars, and frequent mill visits that are supplemented by an array of user-friendly software tools (e.g., CLTdesigner) and handbooks. The latter continue to be produced by the Centre under Prof. Schickhofer's leadership. The successful Canadian and US CLT handbooks, upon which Prof. Schickhofer provided editorial guidance and peer review, were modelled on the European CLT BSPhandbuch.*

Prof. Schickhofer and his team have also played a crucial leadership role in the development of European standards and Technical Approvals procedures for CLT production and CLT's use in mass timber construction. As an accredited testing laboratory and technology centre, the Institute of Timber Engineering and Wood Technology continues to support the evolving European CLT industry through technical support, testing, and training.

In 1994 Gerhard Schickhofer presented his PhD thesis on "Starrer und nachgiebiger Verbund bei geschichteten, flächenhaften Holzstrukturen" and he received a Josef-Umdasch Award in 1995 for this work. A scientific compilation of his work was published in 1996 as a paper with the title "Elastic Analysis of Flexibly Jointed Laminated Timber Plates".

* <https://graz.pure.elsevier.com/en/publications/bsphandbuch-holz-massivbauweise-in-brettsperholz>
<https://www.thinkwood.com/products-and-systems/clt-handbook>
<http://clta.jp/wp-content/uploads/2017/03/05f71a820fb402d10c20fd05ee196547.pdf>
<https://www.thinkwood.com/clt100book>
<https://www.cltdesigner.at>

In 1998 he used for the first time the term BRESTA-H before calling the product CLT. Tests were conducted under the framework of the first national Austrian approval for CLT (company: KLH, <http://www.klhuk.com>). Prof. Schickhofer received the Austrian Industrial Research Promotion Fund (FFF) award for this work, as best project in the ‘value added’ category. This seminal work was instrumental in the design and building of the first CLT bridge deck as part of the Wandritsch bridge, Styria, Austria, built in 1998. Due primarily to Prof. Schickhofer’s contributions the first national guideline on CLT, the so-called “Holzmassivbauweise”, was published in 2002. This led to the acceptance of the application of CLT in multi-storey buildings. He further enhanced to adoption of CLT by defining and developing a strength class system for CLT, with notations such as CL24h and CL28h, as a basis for the working draft of design of CLT in a revised Eurocode 5-1-1. Together with Reinhard Brandner, he recently summarised the contributions of the TU Graz group in the publication “Cross laminated timber (CLT): Overview and development.” His team continues to work on different technical aspects of CLT as well as on technology transfer activities for CLT in various countries.

References

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- Brandner, R., Flatscher, G., Ringhofer, A., Schickhofer, G., Thiel, A. Cross laminated timber (CLT): overview and development. *European Journal of Wood and Wood Products* (2016), 74(3), 331-351.