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THE PROLIFERATION AND RISK CONSIDERATIONS OF MASS TIMBER

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Living in the Pacific Northwest, it is easy to become immersed in the natural beauty that surrounds us. The rivers, lakes, and vast forest trails allow for some of the best recreational activities in the country. The geography also showcases the heritage of a key natural resource and economic driver in the region, timber. The long history of the timber industry has turned a new chapter in the last decade with the help of technology, need for sustainability, and its innovative uses in construction and real estate. In this article I am going to discuss the resurgence of the forestry industry through mass timber, while highlighting the risk and insurance considerations it poses.

CLT'S INTRODUCTION TO THE US MARKET

A pinnacle project in Portland, Oregon helped put cross-laminated timber (CLT), a mass timber product, on the map back in 2018. Standing 12 stories high, the Framework project was to be the tallest building in the U.S. made of CLT. CLT is made by joining together several layers of kiln-dried lumber boards in alternating directions, bonding with structural adhesives, and pressing to form a solid, straight, rectangular panel. Although relatively new to the U.S. market, CLT has long been a viable building product in Europe, first introduced in the early 1900s in Austria and Germany. It has been a competitive material in mid-rise and high-rise buildings due to its easy handling during construction and high level of prefabrication.

It took some time for CLT to catch up with U.S. standard building and construction codes, but in 2018, Oregon became the first state to legalize mass timber high rises. Unfortunately, the Framework project never came to realization due to financial constraints around the site and occupancy. That said, it set a precedent and allowed for the advanced testing and engineering to push CLT past a novelty product and into one that has become one of the hottest and most revered building materials. Since 2018, there have been numerous successful CLT projects in Portland, including Carbon 12 at 12 stories; and British Columbia, including Brock Commons Tallwood House at 18 stories.

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PROS AND CONS OF CLT

The unique advantages of having an all-wood building are many:

- Reduced carbon footprint and effect on the environment.
- Less energy consumption compared to concrete and steel manufacturing.

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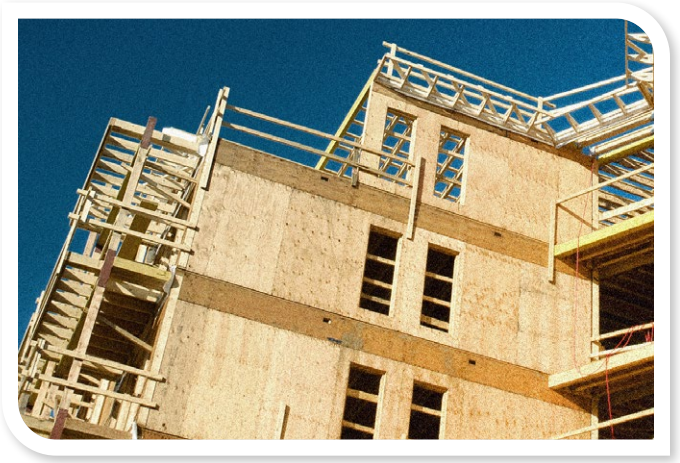
- Much less time to construct the building - the Brock Commons Tower Structure only took 10 weeks to complete, not including interior finishing. That's about four months faster than a typical structure of this size.
- Green product - CLT is natural, sustainable, and lightweight.
- Aesthetically pleasing
- Valuable seismic features, including flexibility and connections. It also boasts outstanding structural properties.
- Improved fire safety during construction – requires much less congestion and fire loading, no hot work, and leaves a very clean site.
- Prefabrication and the time and cost savings associated with offsite production
- Approximately 90% less construction traffic and 75% fewer workers on the active deck.



However, CLT does come with some disadvantages, including the risk and insurance considerations that it poses:

First off, CLT is considered fire resistant, not fire resistive. Although it meets the two-hour fire ratings due to its charring properties, it is still a combustible product and will continue to burn until extinguished. Unlike steel, this key underwriting consideration will affect the cost of property insurance during the course of construction and after completion. Structurally though, the CLT performs well when compared to steel and concrete construction under fire testing.

A more recently observed and closely watched nuance of CLT is the strength of the binding agents used to glue the individual boards together. There is at least one example now of a project at Oregon State University's campus where the CLT delaminated under pressure, causing significant damage and requiring replacement costs. This specific incident's cause of loss was identified as human error at the manufacturing plant - a temperature change that caused the glue not to adhere properly. Stricter quality control measures have resulted.

Underwriter scrutiny of CLT is high, as there are relatively few case studies of development projects compared to those made of concrete and steel. There are even fewer CLT projects above six stories high - the prescriptive code limit in the United States. Certain projects like Carbon 12 were able to go beyond these codes through an alternative means process, but it is costly and time consuming to do so; two key elements that can fail a project.

Water is another leading risk factor to consider, as it can lead to warping, rotting, and mold if not appropriately addressed. Strategies to manage the adverse effects of water include enveloping or tenting the entire project or capping the CLT with a glue topper on the edges or along the top decking. Moisture testing allows some owners and contractors to assess the wood's ability to dry out during the project. Most owners and contractors familiar with CLT have high confidence that they can limit the risk of water damage on a project, even in Pacific Northwest winters.

CLT's lateral load performance is also resilient to wind and earthquake-related damages. With Portland, and the

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Pacific Northwest as a whole, expected to suffer significant property damage from the 500-year Cascadia subduction zone earthquake event, a building's seismic fortitude is essential. Multiple companies and collaborations in the U.S. and overseas have performed CLT shake tests, such as Katerra and the NHERI (National Hazards Engineering Research Infrastructure) Tall Wood project. Although the height of the buildings used for these tests is under six stories, the results show that CLT performs well under lateral pressure simulations like an earthquake. However, it is still a best practice to use a concrete and steel core to supplement the CLT frame in most high-rise buildings.

THE FUTURE OF CLT

It is evident that the proliferation of CLT and its various forms (e.g., dowel-laminated timber, nail-laminated timber, glulam) will continue to evolve as a safe and sustainable building material. As the U.S. and the International Code Council (ICC) continue to adapt the governing codes for mass timber, the buildings will only grow taller. The latest update was in 2019 when ICC approved a set of proposals to allow tall wood buildings as part of the 2021 International Building Code (IBC). The code will include provisions for up to 18 stories of Type IV-A (heavy timber) construction for business and residential occupancies. The insurance industry from both the carrier and brokerage communities will also evolve how we manage and price the risk of CLT buildings versus the easier-to-underwrite steel and concrete construction.

Along with further education, testing, and use cases, technology will likely reduce the risks and increase QA/QC through automation and decrease in human error. If you have any further questions regarding CLT and its use in your operation as a contractor, architect, or developer, reach out to an experienced insurance broker.

References and Resources

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3. Benefits and risks of building with Cross Laminated Timber, https://axaxl.com/fast-fast-forward/articles/benefits-and-risks-of-building-with-cross-laminated-timber