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Advancing Tall Timber, One Code Revision At a Time

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Interviewee

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Hans-Erik Blomgren is senior engineering manager at Timberlab providing technical design services for mass timber building projects. Timberlab is a Portland, Oregon-based mass timber contractor that provides sourcing, design, fabrication, and install services on building projects across the United States. During his career, Blomgren has worked as a structural engineering consultant on large-scale commercial building projects, and also in manufacturing as a cross-laminated timber product development manager. He currently represents Timberlab on the American Wood Council's Wood Design Standards code development committee.

In 2021, several major obstacles were overcome in the path to adoption of mass timber as a viable option for high-rise construction in North America. First, the International Building Code (IBC) 2021 was released, which allowed construction of mass-timber buildings up to 18 stories. Then, in October 2021, New York City approved changes to its building code, allowing mass timber products such as cross-laminated timber for buildings up to 85 feet (26 meters) in height. As an advisor on code-related subjects, Hans-Erik Blomgren, senior engineering manager at Timberlab, provides the context and implications of these changes in the Talking Tall Interview with Daniel Safarik, CTBUH Journal Editor.

What is significant about the fact that a major market for tall buildings, New York City, has just approved construction of mass timber buildings up to 26 meters?

For most of the world, cross-laminated timber (CLT) is a new technology. There was a reticence to accept CLT because it's new and different. And you have to appreciate the building officials' position as the gatekeepers for ensuring new materials are safe. I always remind people that the mass timber movement's going right at the skeleton of the building—it's fundamentally disruptive—so swapping out a new structural element will have strong implications after the first project's accepted. It's going to be replicated.

We've just gotten to the point where almost every US city accepts the 2015 International Building Code (IBC), the first in which CLT was defined, if not the 2018 code. But the practical experience with mass timber in most building and fire departments is low. We can't overstate how much of a bottleneck that knowledge gap is.

The City of New York now is in a place where they have historical heavy timber construction, but none has been constructed for many decades. It's the same story in Seattle, when the six-story Bullitt Center (2013) was considered a significant mass timber structure only a few years ago. No heavy-timber construction had been done there for 60 years. So, the role of organizations like WoodWorks and the American Wood Council has been to overcome the knowledge bottlenecks that exist in city building and fire departments, and get all project stakeholders on the same page about how to build these buildings to code, and that is a big deal.

The building conditions in New York are different in that there are a lot of infill lots where developers want to get mass timber into six- and seven-story market-rate or high-end residential buildings, but these buildings have to be fire-safe for occupants and first responders, as well as to adjacent properties. In other markets, buildings aren't as densely adjacent to each other.

Yes, and New York being a city that doesn't have alleys between the streets, there is another factor that limits firefighter access and egress options.

Factors like that are exactly what makes the topic jurisdictionally unique. Big cities always amend the national code to fit the reality of their city. So that's why I believe one has to accept the process and how long it takes for first projects.

Who was pushing for the change? What were some of the machinations and the compromises involved?

Structural engineers and architects, and certainly the American Institute of Architects (AIA), have been strong proponents for taking the long view of sustainable construction and lower embodied and operational carbon and buildings. Susan

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Jones, founder of atelierjones, has been involved; and Tanya Luthi, vice president of structures at Entuitive, and myself have been boots-on-the-ground proponents of this, sitting on code committees.

And I think it has had results. Through my work on the standards committees with the American Wood Council for CLT standards, I've seen the product standard really improve from a fire standpoint, such as the endurance of the adhesives. That's only happened through stakeholder input and dialogue and the consensus-based code process that exists—and it takes time. It feels slow when you're pushing the ball uphill, but in hindsight, it actually has happened pretty quickly. And this push has been fundamentally important to getting the City of New York to recognize CLT as a mass timber product, so that it now effectively fits in allowed combustible construction types found in the 2015 and 2018 IBC, which the other jurisdictions in the country started to adopt before New York.

Figure 1. First Tech Federal Credit Union, Hillsboro, Oregon (2018), was the first mass timber project constructed by Swinerton Mass Timber, which would become Timberlab. © Jeremy Bittermann

Expanding a bit to the global scale, clearly it's the case that mass timber in high-rise buildings is more common in Europe than North America. What do you think accounts for that difference, and why is the US in particular seemingly so conservative when it comes to the design of these buildings?

In the US, building code is a legal document. And the US is known for its legal processes and liabilities. So, as a practicing structural engineer, you really design with a different perspective of what your stamp on the drawings means, and what you can and can't do by code. In Europe, CLT is not formally built into Eurocode. But they have a technical approval process, which every manufacturer has to meet. Those are generally accepted for approvals in the EU and the UK. And that's arguably become an effective tool to rapidly advance mass timber technologies in the marketplace. In the US, under our code, we do have an "alternative product standard," through the International Code Council (ICC) Evaluation Service, which issues product reports. But to develop one of those is a really big endeavor. You have to start with what's called "acceptance criteria," which need to get stakeholder input from external parties. It's not as easy for one proponent to work with an approval agency and develop something proprietary; there has to be an open and public review process for each of these acceptance criteria.

I think we have to give credit to entities like the Softwood Lumber Board, for seeing the potential for mass timber. The biggest importer of Canadian softwood lumber is the United States. So, there are strong alliances there. Canada has an entity called FPInnovations, which is a government and private sector funded organization that helps push innovation in forest products. Through those pathways, mass timber has basically been adopted first in Europe, then in Canada, and finally in the US. We haven't been the early adopter. But we're a huge market. So, it's been exciting to watch that grow and have owners, architects, and engineers awaken to the reality of what's achievable.

Where does Timberlab fit in all this?

I think the project that really created Swinerton Mass Timber, which is now Timberlab, was the First Tech Federal Credit Union in Hillsboro, Oregon, a mass timber building with a hybrid steel braced frame (see Figure 1). Chris Evans, our president, cut his teeth on this new material at that time, and discovered the business math was favorable. I do believe it's unique that a general contractor had the interest to spin off a company like this. We are able now to define ourselves as a standalone company and make our own profit. We are a resource for, and work really closely with Swinerton, and use that relationship to grow nationally.

Having said that, our company is branded now as Timberlab intentionally, to not just be seen as tied to our parent company. We're out delivering and winning work as a subcontractor to many general contractors because the market is there, because we understand the supply chain, design for manufacturing and assembly (DfMA), transport, and installation. The market is still emerging, and every CLT manufacturer makes a little bit different product with different design values. Our goal is to help clients get the best value, so they don't have to buy into one product manufacturer too early into the design.

And how does this relate to the well-established glued laminated timber market in North America?

Because CLT is new, the new companies investing in plants already have CNC capabilities to digitally fabricate panels. The

Figure 2. Heartwood, an eight-story mass timber affordable housing project, is underway in Seattle. © atelierjones

Figure 3. Ascent, Milwaukee is on track to become the world's next-tallest timber building upon completion in August 2022. © CTBUH

glulam world, though, is older companies doing what they've been doing for many, many years. And their business model has been to package, wrap, and ship to distribution centers and get paid. It is a huge step change to shape your company around the value-add of bringing a finished building product. You have to go out and win the work. You have to have a management team that can work in Revit and talk design manufacturability with project teams—that's a huge investment. So that's where Timberlab has really stepped in, and we can provide the glulam computer numerical control (CNC) milling part. And in the Portland market, for example, we have a great basket of glulam manufacturers to buy from. So, we can source from them, but then when we ship it out our door wrapped, it's ready to be that extra piece with the CLT that goes into a building as a finished product.

What are some of the high-rise projects you're involved in now, or were involved in recently?

We're working on Heartwood, a 2021 IBC Type IV-C, eight-story workforce housing project in Seattle with Susan Jones (see Figure 2). It's using a post-and-beam frame with CLT floors and a buckling-restrained-brace (BRB) lateral system, and on the 25-story Ascent project in Milwaukee (see Figure 3). With Katerra, I worked on 80 M Street in Washington D. C., a seven-story existing building that had a three-story, two-hour fire-rated exposed mass timber addition on the top.

What is the next step forward in codes or practices that you see as being exciting with respect to mass timber?

There are two critical pieces of code that now as of January 2022 have been formally approved under the forthcoming 2024 IBC. These were the result of a round of large-compartment fire testing in the fall of 2020 to demonstrate that 100 percent exposed mass timber in ceilings is safe in Type IV-B construction, which is the 8-to-12-story range. The limit was 20 percent exposed in the 2021 IBC. That limit was based primarily due to now-outdated adhesive formulations in the CLT. The 100-percent exposed mass timber in ceilings makes the building more economical and marketable. There is one project where we're already presenting this test data to the building department under the 2024 IBC, even though that has not been adopted yet by the city. Building officials are now more likely to accept projects under the 2024 IBC early. It's only changed two lines of code, and it took two years of effort, but I believe it will have a fundamental impact on the continued advancement of mass timber in the United States. ■