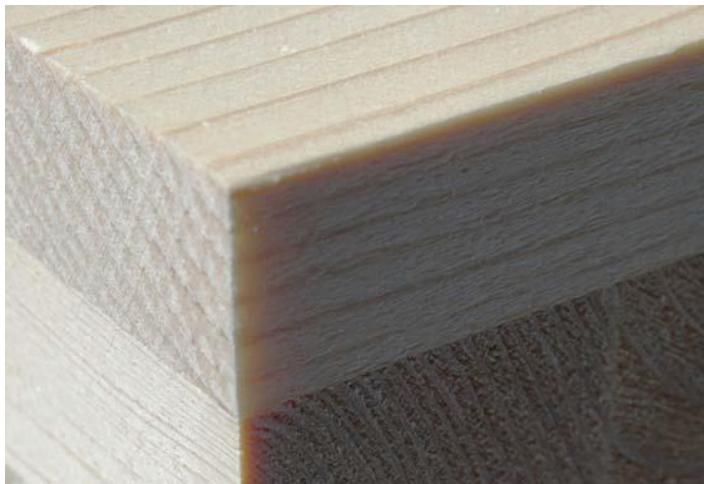


## Benefits and risks of building with Cross Laminated Timber



By Cheri Hanes, CRIS, Risk Engineer, North America Construction

1/31/2019

**Widely used in Europe, Cross Laminated Timber (CLT) is one of the newest and hottest topics and materials in American construction today. It's strong, lightweight, sustainable and working with it affords builders many great applications. What is it really, and are you likely see it on your projects? What are the risks and how can you manage them? In this two-part series, we look at the myths, issues and the value this product can deliver on a project.**

CLT is made by finger jointing kiln-dried dimensional lumber to the required size and gluing it together, in perpendicular layers. The layering is repeated to the desired thickness, typically three, five, or seven layers. These solid panels are then compressed and set to dry. What results is a product that is strong and stable and overcomes the inconsistencies inherent in unmodified wood.

Once these engineered panels are brought into spec for a project using Computer Numerically Controlled (CNC) fabricators; what arrives on-site requires very little additional modification. The elements are set in place as structural load resisting systems, or for select elements such as floors, walls, or roofs, leaving very little waste.

CLT was developed in Austria in 1996, and Europe remains the leading region for its production and use. There are fewer CLT manufacturers in North America, but its incorporation into US code and, therefore, building structures is growing—though codes have been restrictive towards the product's use in buildings of six stories or more, this is changing.

In 2015, the International Building Code (IBC) began recognizing CLT products manufactured to ANSI/APA PRG-320, the US standard for Performance Rated Cross Laminated Timber. Efforts are afoot that may lead to more product acceptance over the next few years. For example, The International Code Council (the body that establishes the IBC) appointed an Ad Hoc committee

to focus on Tall Wood Buildings and have proposed 19 code changes for the 2021 edition, allowing the use of wood in buildings across a much broader spectrum, including those up to 18 stories. In December of 2018, The International Code Council (ICC) has released the unofficial voting results on the proposed code changes, including passage of the entire package of 14 tall mass timber code change proposals. The proposals create three new types of construction (Types IV-A, IV-B and IV-C), which set fire safety requirements, and allowable heights, areas and number of stories for tall mass timber buildings. Official results are expected to be announced during the first quarter of 2019. The new provisions will be included in the 2021 International Building Code (IBC).

**" It is important to plan the needed up-front design time to capture the owners' needs and desires at the outset, as a defense against schedule delays."**

---

### **Impacts to material and labor costs**

CLT's cost for materials and labor may be lower than traditional steel or concrete. Though variable, material cost savings may be as much as 15% compared to concrete, steel, and masonry for mid-rise residential buildings. Why? CLT is lighter, so requires a smaller foundation. Labor demands for CLT projects are also less. In a tight labor market, this can be significant. Prefabricated panels require fewer workers to place them. There may also be options around which type of labor is used.

### **Speed, design and manufacturing schedule pros and cons**

Overall, the product's general fabrication precision gives builders confidence in their planned project dimensions. This allows other trades to confidently prefabricate components and assemblies.

The speed of install for CLT vs. traditional materials varies. Installation is anecdotally faster than light gauge steel by 1/3 or so, and similar to above grade Cast-in-Place superstructure. The structure is stable and tough as soon as it is placed, so builders realize quicker trade ready states, and are able to sequence following trades immediately while keeping them safe.

All this saves time. That said:

Design delays can impact production and your schedule, especially when a new product or method is in play. Owners may discover possibilities – aesthetic and otherwise – they never knew existed before, and this can lead to revisions. The building-ready nature of the CLT product means that each revision equals more design and coordination time before production can take place. It is important to plan the needed up-front design time to capture the owners' needs and desires at the outset, as a defense against schedule delays.

Manufacturing issues may also impact the schedule. So far, builders have not reported issues on getting materials on time. However, manufacturers are reportedly reaching capacity on one shift, and will be adding a second shift. Builders would be wise to secure a project's production slot as early as possible.

## Geographic and site considerations

One's project location will influence whether or not the use of CLT will be desirable. In dense, urban areas where there is little room for lay down, or other site considerations making material storage an issue, the fact that this material lends itself to Just-In-Time (JIT) delivery can be a real positive.

Also, in timber producing regions, the perception of local industry support can be a strong factor in an owner choosing CLT. But builder beware! In an abundance of enthusiasm to support local industry, employing a manufacturer with inadequate experience with the product could have very costly results. Do your diligence.

### Other CLT benefits and considerations

There is much more to CLT than meets the eye. Consider these additional factors when scoping out your building plans.

- **Sustainability** – Wood is considered very positive environmentally due to renewability, reduced carbon impacts, and carbon sequestration.
- **Strength** – Blast testing has revealed impressive performance, and where this is a requirement for blast resistance, cost savings can be realized using CLT.
- **Fire performance** – Fire dangers are always top of mind when considering a wood structure and significant research has been conducted. During fire testing, steel connections are the typical points of failure, not the CLT itself. The natural process of charring during a fire actually serves to protect the structural integrity of the product. This is not an open and shut case, however, and the discussion around this topic continues.
- **Safety considerations** – Edge protection may be built in, and the material itself is stronger than other materials it replaces (metal decking, for example) providing a safer working environment for stacked and following trades.
- **Aesthetics** – It is indisputable that architects are doing beautiful things with CLT – but this is also where things can get complicated with regards to transportation and details/connections.
- **Noise** – Less work on site means less noise on site, and there are certainly circumstances where this is a factor.
- **Legal concerns** - Questions may include design management – (how the design piece affects the contract type and liability, if it does at all?) and issues around the statutes of limitations which may apply to prefabricated components, with regards to the state of manufacture and of construction. Your contract terms may need to clarify these items.

Given all of this, there is no question that the likelihood of seeing CLT on one of your projects is increasing.

### About the author

*Cheri Hanes* is a risk engineer with AXA XL's North America Construction insurance business. She's always open to talk more about CLT. Contact her at [cheri.hanes@axaxl.com](mailto:cheri.hanes@axaxl.com).