

## Cross-Laminated Timber: Poised to Compete with Steel and Concrete

By Bill Mitchell

Cross-laminated timbers (CLTs) are large wooden “panels” made of several layers of lumber that have been glued together. Think of these panels as being similar to plywood, except that each ply is made up of sawn lumber rather than veneer. Like plywood, the direction of the wood grain of the lumber in each layer is at right angles to adjacent layers. CLT panels have at least three layers, but can be made with up to 11 layers, depending on the characteristics needed for a specific application, and range in thickness from about 2.5 inches to as much as 20 inches. The size of the panels available varies somewhat based on the capabilities of the manufacturer. Panels can be formed into very large sizes: from 16 feet to 50 feet long or more and from 4 feet to 10 feet wide or greater. While lumber used in CLT must be kiln dried to approximately 12 percent moisture (plus or minus 2 percent), different species, sizes (such as 2 x 3, 2 x 4, 2 x 6, 1 x 4, and 1 x 6), and grades of lumber can be used in manufacturing the product.



A five-story model building built to demonstrate the use of cross-laminated timbers in multistory residential and commercial structures.

this product will be adopted in the United States and Canada. Some proponents think it has substantial growth potential in the long term in these markets.

CLT was originally developed in the 1990s in Switzerland and Austria. It began to grow in the early 2000s in response to several factors, including the emerging green market, building-code changes, more manufacturing capacity, improved processes, and increased awareness. Currently, Stora Enso (Austria), Martinsons (Sweden), and at least six other European companies produce CLT products. Two companies in Canada manufacture CLT products: Nordic Engineered Wood Products, in northern Quebec, and Structurlam, in the southern interior of British Columbia. At least one CLT plant is under development in Montana.

### Many Applications

CLTs can be used in a variety of applications. Typically they have been used as part of building systems for the construction of multistory apartments, commercial buildings, and other buildings that use structural timber construction. They are used as exterior and interior wall panels and floor/ceiling and roof systems.

As solid, massive construction members, CLT panels have a number of characteristics that make them attractive, including high strength. This capability gives architects the freedom to design buildings that incorporate long spans and cantilevered elements. The dimensional stability of CLT panels allows for the pre-installation of plumbing, electrical, and other fixtures. Test structures made with CLT panels have performed well in seismic testing and have excellent earthquake survival characteristics. Because CLT panels are solid, with no voids, they tend to char, but not burn like buildings built with traditional lumber, and, consequently, they have good fire performance ratings. They also exhibit good thermal properties. Because CLTs are made with lumber that is a natural and renewable resource, they have a number of environmental characteristics that make them particularly attractive to an important segment of consumers and builders.

While CLT panels/buildings are not cheap to produce, they reportedly can be cost-competitive in several ways. First, the time (and therefore cost) of erecting a structure is greatly reduced. As an example, a nine-story apartment building in London, containing 29 units, was completed in a remarkable 27 days with a crew of four. Second, there is less noise associated with construction. Third, because CLT products are designed for a specific structure, there is little waste generated on the job site. Fourth, there is less need for skilled construction labor, since the prefabricated components need only be assembled onsite. What’s more, CLT panels are assembled in fabrication plants and machined with computer-controlled machine tools (CNC), ensuring high quality.



Installing a single cross-laminated timber wall panel.

Based on research completed for FPInnovations and others, including the analysis of several case studies and experience with CLTs in Europe, it appears that CLTs can compete favorably with concrete and steel in high-end housing, mid- to high-rise residential and commercial structures, and large warehouses (such as tilt-up-type structures).

APA—The Engineered Wood Association (<http://apa.wood.org>), a nonprofit trade association of the US and Canadian engineered wood-products industry, is developing performance standards for CLTs for approval by the American National Standards Institute. While the adoption of CLT in North America is in the early stages, these timbers may provide the wood products industry with an opportunity to take market share from steel and concrete in several non-residential markets. Those of us with timber in our veins would certainly enjoy that occurrence.

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lion tons of wood biomass per year, primarily from within a 75-mile radius of the plant.

#### Pellet Plant Groundbreaking

Westervelt Renewable Energy LLC held a groundbreaking on October 25 for a wood-pellet plant near Aliceville, Alabama. The company, a division of The Westervelt Company, estimates that the plant will produce 250,000 to 500,000 metric tons of pellets per year from southern yellow pine for both export and domestic markets. The Westervelt Company, based in Tuscaloosa, Alabama, owns nearly 500,000 acres of timberland.

#### Switch from Coal to Biomass

Enviva LP recently announced that it has signed a contract with Richmond, Virginia-based Dominion Virginia Power, one of the largest energy producers in the United States, to supply biomass to two power facilities in Southampton and Hopewell, Virginia. Earlier this year, Dominion announced plans to convert the coal-burning plants to using biomass fuel. Dominion’s appli-

cation to convert the power stations is pending before the Virginia State Corporation Commission. Enviva has been supplying wood chips and wood pellets to power-generation and industrial customers in the United States and Europe since 2007.

#### Mill Closures

Several US forest-products mills announced permanent or indefinite closures in recent weeks, according to Random Lengths’s *Woodwire* newsletter ([www.randomlengths.com](http://www.randomlengths.com)): Georgia-Pacific’s sawmill in Marion County, Mississippi, and its stud mill in Monticello, Georgia; Roseburg Forest Products’s particleboard mill in Louisville, Mississippi; Hoquiam Plywood plant in Hoquiam, Washington; SierraPine’s medium-density fiberboard plant in Rocklin, California; and Stimson Lumber’s sawmill in Colville, Washington.

To keep pace with the latest forest products industry news, visit the “Featured News” section of the SAF website at [www.safnet.org](http://www.safnet.org). Also be sure to see the “Forest Products Industry” section in each issue of SAF’s electronic newsletter, *The E-Forester*.