

## Cross-Laminated Timber Roof Panels at the Promega Corporation Facility: Documenting Installation and Monitoring In-Service Moisture Conditions

Cross-laminated timber (CLT) is a prefabricated solid engineered wood product made of at least three orthogonally bonded layers of lumber to form a solid timber panel intended for roof, floor, or wall applications. It is a highly “green” material that is made from an abundant renewable resource, sequesters carbon, has low embodied energy, and has excellent aesthetic, structural, and thermal properties. Although this engineered wood product has been used in Europe for over 15 years, the production of CLT and design of CLT structural systems have just recently begun in North America.

### Background

The USDA Forest Products Laboratory (FPL) has, for the past two years, been assisting in removing technical barriers to the use of CLT and trying to develop interest in the United States for its utilization. Coincidentally, Promega Corporation, a leader in providing innovative solutions and technical support to the life sciences industry, is currently constructing a new facility in Fitchburg, Wisconsin, that features CLT. This is the first large-scale commercial utilization of CLT in the United States using CLT manufactured in North America. As with any new building system, it is important for the design and construction community to have information on how CLT is installed and how it performs.

### Objective

The objectives of this research are twofold: (1) to document the CLT installation process with photography



Example of CLT panel with three layers.

and video and (2) to install sensors in the CLT panels and collect data on in-service moisture and temperature conditions.

### Approach

Photographs and video have been taken at various stages during installation of the CLT panels. Wireless sensors were installed to measure wood moisture content, temperature, and relative humidity. Sensors were installed at various locations, on both the top side of the CLT panels and the bottom (interior) side. Sensors on the top side were installed shortly after CLT panel installation, prior to placement of a waterproof membrane and rigid insulation. Interior sensors were installed directly below the topside sensors.

### Expected Outcomes

Photographic and video documentation of the construction project will provide value to the building design





**CLT roof panel being lifted into place at the new Promega Corporation facility.**

and construction community, showcasing CLT used in a commercial building application. The CLT panels, composing the structural roof deck, are expected to exhibit excellent performance as part of a well-designed and constructed building enclosure. Moisture and temperature conditions are expected to be stable and close to typical values for wood members in the building interior. Measurements will provide documentation of actual performance.

### **Timeline**

Installation of CLT panels began in August 2012 and was completed in October 2012. Monitoring will continue for two years after construction.

### **Cooperators**

USDA Forest Service, Forest Products Laboratory  
Promega Corporation  
Structural Wood Corporation  
Structurlam Products LP



**Wireless moisture-temperature sensor being installed in a CLT panel.**

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