



Advanced Quality and In-Service Condition Assessment Procedures for Mass Timber and Cross-Laminated Timber Products

<https://research.thinkwood.com/en/permalink/catalogue2558>

Organization: Forest Products Laboratory
Mississippi State University

Country of Publication: United States

Material: CLT (Cross-Laminated Timber)

Topic: Mechanical Properties

Keywords: Non-Destructive Evaluation

Bond Performance

Monitoring Techniques

Serviceability

Quality Assurance

Research Status: In Progress

Notes: Project contacts are Frederico França at Mississippi State University and Robert J. Ross at the Forest Products Laboratory

Summary:

With the rapid development of CLT manufacturing capacity around the world and the increasing architectural acceptance and adoption, there is a current and pressing need regarding adhesive bond quality assurance in manufacturing. As with other engineered glued composites, adhesive bondline performance is critically important. Bondline assessment requires technology in the form of sensors, ultrasonics, load cells, or other means of reliable machine evaluation.

The objectives of this cooperative study are to develop quality assurance procedures for monitoring the quality of mass timber and CLT during and after manufacturing and to develop assessment techniques for CLT panels in-service.

Resource Link

<https://www.fpl.fs.fed.us/documnts/rips/fplrip-4714-036-MSU-Advanced-Franca-Ross.pdf>



Cross-Laminated Timber (CLT) Resistance to Infestation by Subterranean Termites

<https://research.thinkwood.com/en/permalink/catalogue2265>

Organization: Mississippi State University, USDA Forest Service Forest Products Laboratory
Country of Publication: United States
Material: CLT (Cross-Laminated Timber)
Topic: Mechanical Properties
Keywords: Biodegradation
Research Status: In Progress
Notes: Contact: C. Elizabeth Stokes, Mississippi State University, Juliet Tang, Forest Products Laboratory

Summary:

Outcomes anticipated from the results of this project are biodegradation information for CLT products and an improved understanding of biodegradation differences between CLT products and comparable laminated and solid wood products. Results will benefit the emerging CLT industry and provide valuable information for market expansion into areas with high termite pressure.



Development of Preservative-treated Southern Pine Cross-laminated Timber

<https://research.thinkwood.com/en/permalink/catalogue2566>

Organization: Mississippi State University
Country of: United States
Publication:
Material: CLT (Cross-Laminated Timber)
Application: Industrial Application
Topic: Moisture
Mechanical Properties
Keywords: Industrial Mats
Preservative Treatment
Weathering
Durability
Research Status: In Progress
Notes: Project contact is Hyungsuk Lim at Mississippi State University

Summary:

This project aims to develop the preservative-treatment procedures for industrial cross-laminated timber (CLT) mats composed of southern yellow pine (SYP) lumber. The feasibility of pre- and post-treating CLT panels with an environment-friendly preservative system for ground-contact applications at an industrial scale will be evaluated from adhesion, mechanical, and durability performance aspects. As for the pre-treatment method, CLT panels will be consolidated with preservative-treated lumber adopting industrial CLT manufacturing parameters, including glue-type and clamping pressure. Alternatively, conventional CLT panels will be pressure treated with the same preservative system and dried afterward. As one of the primary focuses of the research, drying schedules which would not damage wood or adhesive layers will be determined. Also, penetration and retention of the preservatives throughout the post-treated panels will be analyzed. Adhesion and mechanical performance of the treated panels will be evaluated according to industry-accepted standards. Durability performance of the treated panels will be examined through laboratory weathering and on-site field tests.



Effect of Notches on the Performance of Cross-Laminated Timber

<https://research.thinkwood.com/en/permalink/catalogue2559>

Organization: Forest Products Laboratory
Mississippi State University

Country of Publication: United States

Material: CLT (Cross-Laminated Timber)

Topic: Mechanical Properties

Keywords: Notches
Notched Connections
Bending Properties
Flexural Properties

Research Status: In Progress

Notes: Project contacts are Robert J. Ross at the Forest Products Laboratory and Ruben Shmulsky at Mississippi State University

Summary:

Notches, particularly when incorporated on the tensile face, influence the ultimate capacity of members, such as beams and floor panels. Understanding and quantification of failure modes, ductility, and strength of notched CLT floor panels can allow the safe application of notches on building construction. Despite wood's ductility, notches are known areas of stress concentration. The 2018 International Residential Code for one- and two-family dwellings (International Code Council 2017) restricts the use of notches on engineered wood products by requiring structural calculations instead of elucidating the ways notches might be used. To employ CLT to its maximum potential, there is a current and pressing need for better knowledge regarding the influence of notches on flexural performance.

This research seeks to review the literature regarding notches in solid and engineered beams, review typical CLT design details that employ or utilized notched panels, and conduct pilot-scale testing of notched CLT panels.

Resource Link

<https://www.fpl.fs.fed.us/documnts/rips/fplrip-4714-038-MSU-Notches-Shmulsky-Ross.pdf>



Evaluating Decay Resistance of Mass Timber

<https://research.thinkwood.com/en/permalink/catalogue718>

Organization: Forest Products Laboratory
Mississippi State University

Country of Publication: United States

Material: CLT (Cross-Laminated Timber)

Topic: Serviceability

Keywords: Funghi
Decay

Research Status: In Progress

Notes: Project contacts are Grant Kirker (Forest Products Laboratory), Katie Ohno (Forest Products Laboratory) and C. Elizabeth Stokes (Mississippi State University)

Summary:

Mass timber, as a renewable prefabricated structural panel material, is seen as highly desirable in the “green” building movement and has excellent thermal insulation, sound insulation, and fire restriction qualities. CLT is one of the more recent additions to the mass timber market worldwide, and although the product has undergone structural property testing in several laboratories, degradation testing of this non-preservative-treated product has only recently been initiated (Singh and Page 2016). Preliminary testing with exposure to *Oligoporus placenta* and *Antrodia xantha* indicated that untreated CLT is susceptible to the spread of mold and decay fungi, while treatment with boron somewhat reduced the extent of the decay fungus spread (Singh and Page 2016). These panels are easily handled on-site and have a much higher strength-to-weight ratio than their precast concrete competitors, which make them ideal for rapid construction of modular buildings, including apartment/condominium structures (Van de Kuilen et al. 2011). However, installations using CLT as a primary structural component in humid/damp climates, such as the southeastern United States, may be heavily affected by molds and decay fungi, and effects on CLT strength should be determined prior to widespread use of the product in these areas.

Resource Link

<https://www.fpl.fs.fed.us/documnts/rips/fplrip-4723-026-MSU-Kirker-Ohno-Stokes.pdf>