RESEARCH in Progress

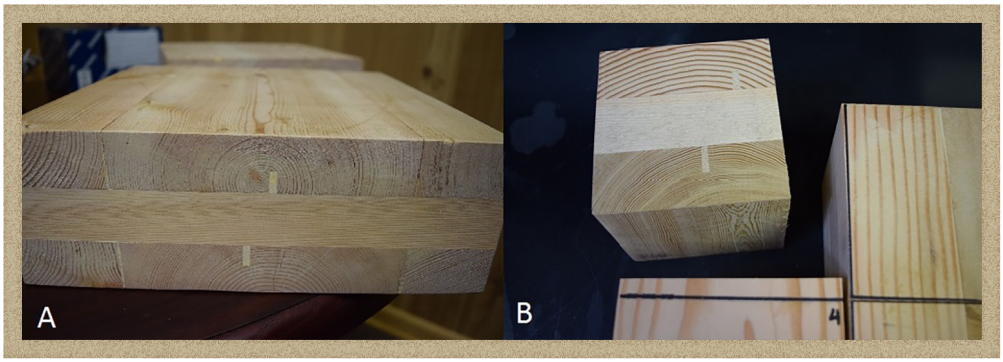
Coalition for Advanced Wood Structures
a university, industry, government partnership

Evaluating Decay Resistance of Mass Timber

Mass timber, which includes cross-laminated timber (CLT), has begun to see use in the mid-rise and tall building construction market in parts of Canada and the northwestern United States. In the past few years, manufacturers have looked toward expanding the use of mass timber in the North American market. However, testing of mass timber resistance to wood-degrading fungi has yet to be examined. With large sections of the United States falling into Intermediate (3) to Severe (5) decay zones, an examination of resistance to wood decay fungi that may infest large-scale mass timber products is necessary.

Background

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.



Cross-laminated timber panel section. (A) Intact panel section, three layers; (B) 4-in. cube cut from panel section in preparation for scaled-up decay testing.

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MISSISSIPPI STATE UNIVERSITY

Objectives

The objectives of this project are to determine the resistance of CLT to commonly occurring wood decay fungi; develop a soil block assay that accommodates the large size of CLT material; and compare methods (visual ratings, mass loss, and x-ray density profiling) for assessing fungal decay in CLT.

Approach

The fungal soil block assay will be modified from the AWPA E10-15 Standard Method. Modifications will be made to accommodate the larger dimensions of CLT. A series of randomized blocks cut from standard grade CLT will be used, to include a variety of sections from glue line interfaces. Standard test fungi will be included, likely *Trametes versicolor*, *Gloeophyllum trabeum*, *Postia placenta*, and *Irpex lacteus*. The series of soil block tests will be repeated with another series of random blocks cut from a panel of CLT.

Expected Outcomes

Outcomes anticipated from the results of this project are increased knowledge of fungal degradation applied to mass timber composite products such as CLT and the development of more targeted standardized test methodologies for testing CLT.

Timeline

The setup of the project will begin with the receipt of CLT sections in the fall of 2016. Preparation, setup, and monitoring of the first series of soil block tests are expected to extend into early 2017. Repeated tests will be conducted in early 2017. Data analysis of mass change, x-ray density scans, and visual rating changes will occur throughout the timeline as needed. Monitoring dates are subject to change based on actual start date of testing and time needed to observe changes in mass timber products.

Cooperators

USDA Forest Service, Forest Products Laboratory

Mississippi State University

Contact Information

Grant Kirker
USDA Forest Service, Forest Products Laboratory
Madison, Wisconsin
(608) 231-9256; gkirker@fs.fed.us

Katie Ohno
USDA Forest Service, Forest Products Laboratory
Madison, Wisconsin
(608) 663-5176; kohno@fs.fed.us

C. Elizabeth Stokes
Mississippi State University
Starkville, Mississippi
(662) 325-5811; b.stokes@msstate.edu

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