RESEARCH in Progress

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

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

Cross-laminated timber (CLT) is a relatively recent addition to the North American timber construction market. Part of a developing category of "mass timber" construction products, CLT has begun to see use in mid-rise and tall building construction markets in parts of Canada and the northwestern United States. In the past few years, manufacturers have looked toward expanding the use of this product further into the North American market. However, no termite infestation experiments have been published for the product. An examination of the product's resistance to degradation situations that commonly occur in the areas served by the U.S. timber construction materials market must therefore be undertaken.

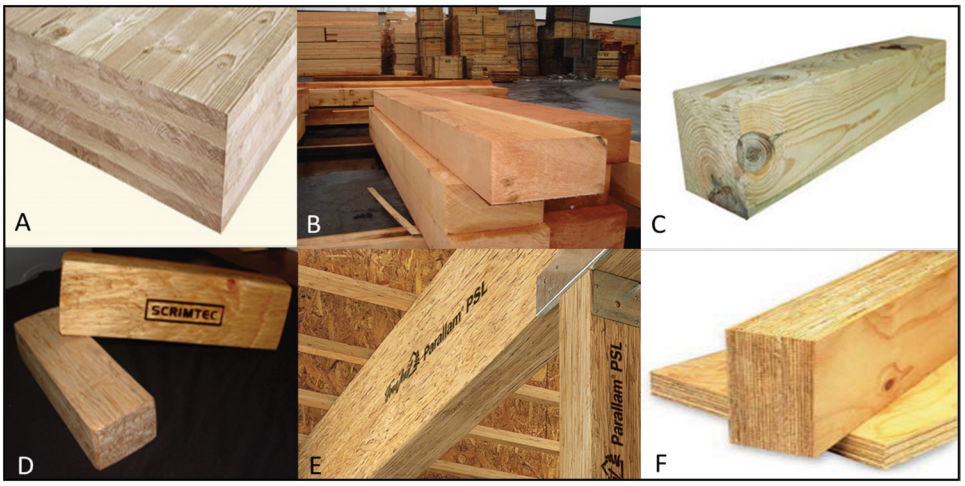

Figure 1—Engineered products for tests include (A) CLT 5-ply panel, (B) untreated dimensional spruce/fir lumber, (C) pressure-treated dimensional spruce/fir lumber, (D) Scrimtec engineered lumber, (E) Parallam engineered lumber and (F) Microlam engineered lumber.

Background

In European and limited North American markets, CLT has been used in various applications, competing primarily with precast lightweight concrete panels. The primary incentive for expanding the use of CLT in the North American market is to establish a wood product large panel option for construction professionals (Karacebeyli and Douglas 2013). CLT, as a renewable prefabricated panel material, is seen as highly desirable in the "green" building movement and has excellent thermal insulation, sound insulation, and fire restriction qualities. These panels are easily handled on-site and weigh considerably less than their precast concrete competition, making them ideal for rapid construction of modular building, including apartment/condominium structures (Van de Kuilen et al. 2011).

Objectives

The objectives of this project are to (1) determine the resistance of this construction material to two commonly occurring subterranean termites, *Reticulitermes* spp. and *Coptotermes formosanus*, (2) develop a termite laboratory assay that accommodates the large size of CLT material, (3) compare three methods for assessing termite resistance, and (4) compare resistance of indoor and outdoor use CLT with comparably sized dimensional and laminar wood products.

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Approach

Resistance of CLT to termites will be compared with five other wood products (Fig. 1). The termite laboratory assay used to assess resistance will be modified from the AWPA E1 Standard (AWPA 2015). Modifications will be made to accommodate the large dimensions of CLT. In addition, a procedure using x-ray density profiling to quantify termite damage will be developed (Fig. 2) and compared with current methods (visual rating and mass loss). The first experiment will be a no-choice test using *Reticulitermes* exposed to each of the six wood products. The second and third experiments will be single-choice tests with *Reticulitermes* and *C. formosanus*, respectively. Termites will be given a choice between a CLT block presented in combination with each of the non-CLT blocks. No-choice and single-choice tests will be monitored for a minimum of 4 weeks.

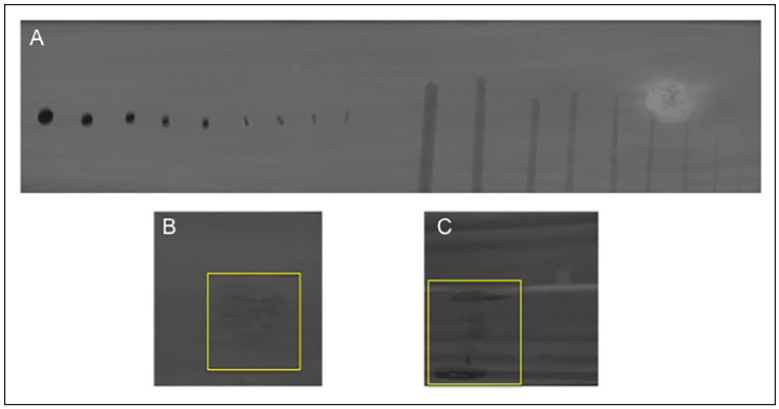

Figure 2—X-ray density imaging of wood. (A) Section (24 in.) of 2- by 6-in. (nominal) pine board drilled from the top and side with bits ranging from 1/2 to 1/16 in. in diameter to assess technique for imaging mass loss within interior portions of wood blocks; (B) and (C) sections (5.5 in.) of termite-damaged 1- by 6-in. (nominal) pine boards. The termite-damaged areas are highlighted within the yellow boxes. Darker areas represent areas with lower density within the board.

Expected Outcomes

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.

Timeline

The project was initiated in May 2016. Methods for using x-ray density profiling to quantitatively assess termite damage will be completed by December 2016. Preparation, setup, and monitoring of no-choice tests will be completed by December 2017. Single-choice tests will be completed by December 2018. Data analysis of mass loss, x-ray density scans, and visual ratings will occur throughout the timeline and will be completed by June 2019.

Cooperators

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