

## Performance Criteria for Natural-Looking Coatings on Mass Timber Products Using Exterior Applications

Innovative architects and engineers concerned about global warming and carbon footprints are more than ever trying to increase the application of wood and wood products in their designs. With growth in construction of green buildings, we will soon witness a greater market demand for mass timber products, especially the use of cross-laminated timber (CLT) in tall buildings. In many aspects, coating performance on CLT should be similar to that on solid wood. However, we lack information on the interaction of coating and glue in CLT and how different coating formulations can maintain structural integrity of CLT by minimizing dimensional changes of the wood and UV degradation of both wood and glue.

### Background

Newly constructed wood buildings are visually appealing but can eventually lose their beauty without proper protection. To preserve the natural beauty of wood products exposed to outdoor conditions, protective coatings should be applied to reduce the effect of weathering degradation of wood. Currently, no published work defines criteria for choosing the best coatings for mass timber products. It is vital to provide comprehensive guidelines for protecting and maintaining the appearance and increasing the durability of mass timber products.

### Objective

The objective of this research is to promote the application of mass timber products, especially CLT, by identifying a range of suitable coatings that can



Exterior view of a mass timber wooden building (Woodsolution.com).

prolong performance and the natural appearance of these products used in the construction of tall buildings.

### Approach

More than 35 coating formulations that are available in the North American market have been obtained. Preliminary laboratory tests will measure the chemical, physical, and thermal properties of each of these coatings. In addition, the ability of coatings to improve dimensional stability of wood will be assessed in laboratory tests. Following these tests, a smaller range of coatings will be selected for natural weathering tests in three locations—Mississippi, Wisconsin, and British Columbia, Canada. Their performance on CLT will be evaluated over a four-year period.



Subset of coatings obtained for this study.

### Expected Outcomes

Results of this project will increase our knowledge of coating performances on mass timber products, specifically CLT. We intend to use these data to identify factors influencing long-term performance of coatings in outdoor exposure. Finding correlations between measured coating properties and their performance will help producers formulate more durable coatings. In addition, this study has the potential to offer solutions to preserve the natural beauty of wood buildings while increasing their service life.

### Timeline

Coatings were obtained in June 2016. Laboratory analyses of coating characterizations by measuring their chemical, physical, and thermal properties and their performances in the laboratory are expected to be completed by February 2017. Outdoor exposure tests will be initiated March 2017 and be completed by May 2021.

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