

## **Development of thick laminated wood plates using MPB wood**

**Yue Chen**  
**Ph.D. Candidate**  
**yuechen@interchange.ubc.ca**

**Frank Lam**  
**Professor**

**J. David Barrett**  
**Professor Emeritus**  
**Department of Wood Science, University of British Columbia**  
**2424 Main Mall, Vancouver, B.C. Canada, V6T 1Z4**

The province of British Columbia in Canada is currently experiencing the largest recorded Mountain Pine Beetle (MPB) outbreak in North America. The extent of the epidemic in the interior of British Columbia has passed the point where it is no longer just a forestry issue. Emerging and alternate timber processing and value-added industries which utilize timber that is incremental to the needs of the existing industry are encouraged in order to recover the greatest value from dead timber before it burns or decays. One of the most significant alternatives in the market of construction materials for timber buildings is the emergence of thick laminated wood elements in floor, wall, and roof components, with a real potential of competitiveness in term of economy, service life and environmentally friendly material.

In this study, comprehensive three dimensional finite element models were developed with a commercial software ANSYS to analyze the behavior of thick laminated wood plates using MPB killed wood. A three-layer cross laminated plate with a nominal dimension of 1.2 m × 2.4 m × 150 mm was studied for consideration of building thick MPB panel prototypes for demonstration of concept and model verification. Using the nominal dimension determined by the 3D model, a specimen thick MPB wood plate was manufactured at the University of British Columbia using randomly selected MPB lumber with a nominal cross section of 38 mm × 89 mm (2'' × 4'') from a package of #2 and better grade material. Lumber was planed, sanded and cut into proper sizes when it reached the equilibrium moisture content. Lumber members were put side by side to form individual layers of the plate. Adjacent layers were

fastened using Phenol–resourcinol–formaldehyde (PRF) resin. Two point loading method was used to test the bending behavior of the plate to verify the computer simulation. Test results were in good agreement with the prediction of the model.

These products can help penetrate into building sectors where performance is of prime importance. This includes low-rise commercial, industrial and multi-family residential building market in North America, Japan, and emerging markets such as China and Taiwan.