

Abstract submission for 2009 Structures Congress

Investigating the Feasibility of using Wood Welding Techniques to Create Laminated Veneer Lumber

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Regardless of the specific product (Glue-lams, plywood, or Laminated Veneer Lumber - LVL), the processing of engineered lumber is similar. Trees are broken down into small pieces, combined with adhesives, and pressed to their final shape. This process helps to remove the natural variability and defects found in timber creating stronger, larger, and more reproducible materials than can be found in nature. The research presented herein focuses on using the process of wood welding to create a piece of engineered lumber composed of multiple plies joined without adhesives.

Wood welding is a variation of vibration welding, commonly used to join thermoplastics and metals, but only recently adapted to function with wood. Under the proper conditions, a polymer like material in the timber is partially liquefied from the heat generated by vibration and applied pressure. This melting process allows fibers from different pieces of wood to become entangled, attach to one another, and form bonds upon cooling without the use of resins or adhesives. By using only wood fibers to make the connection, the finished product is environmentally friendly, biodegradable, recyclable, and sustainable.

The focus of this research will be to develop and construct a welding and processing device to fabricate 2x6 or 2x8 LVL specimens. The specimens will be tested and evaluated for strength and stiffness in comparison to equivalent full size dimensioned lumber as well as pre-manufactured LVL's of similar size.