USDA/NIFA Program: ***Biobased Products and Bioenergy Production Research***

TITLE: Structural Composite from Modified Wood

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INSTITUTION: Oregon State University

NON-TECHNICAL SUMMARY: The long-term goal of this research is the development of a new type of structural composite that is produced from low quality and under-utilized forest resources. These new products will have higher value than current products by creating composite materials with high strength and stiffness suitable for critical building construction applications, such as beams, columns, and headers. Hardness is also improved, which is desirable for flooring, furniture, and cabinet applications. The technology being developed is called viscoelastic thermal compression (VTC). The process uses heat, steam, and mechanical compression to increase density by reducing the amount of natural void space found in wood. The degree of densification is selectable up to approximately 1,400 kg/m^3. One species that works very well with VTC processing is hybrid poplar, which is a clone of various *Populus* species. Intensively managed FSC certified hybrid poplar plantations, such as found in northwest Oregon, can grow a merchantable log in only 10 years. Unfortunately, the virgin timber is low density and lacks the characteristics needed for structural products. VTC processing has been demonstrated to increase strength, stiffness, and hardness more than 4 times the virgin hybrid poplar. The properties of VTC wood far exceed the very best Douglas-fir and Southern pine lumber available. The process may be applied to solid wood, veneer, strands, and even wood strand composites. Beyond the research funded by USDA, VTC processing has been successfully applied to many other species of timber. Work is continuing to optimize the processing parameters and explore new composite design configurations. VTC technology is ready for commercialization.

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