

Preliminary Evaluation of Mechanical and Physical Properties of Modified Wood

Over the centuries, wood has served as one of the major building materials for residential construction in the United States. It is a renewable resource, is relatively inexpensive, works easily with simple tools, and does not require a high degree of technical sophistication to install. Wood as a construction material has contributed to make housing affordable for most Americans.

To meet the growing demand for wood as a building material, much of it is grown on intensively managed plantations. Unfortunately, this fast-grown material has a lower specific gravity than traditionally available wood and thus lower strength characteristics. Also, this new material tends to have less heartwood, which translates to less rot resistance and more problems with shrinkage and swelling than wood available 20 years ago.

Background

Major producers of southern yellow pine timber have recognized that current growing stock in many plantations is deficient in bending stiffness, which precludes it from major use in housing construction. This fast-grown material is reaching merchantable age and will soon be on the market in increasing volumes. Thus, new uses for this new pine forest are critical to maintaining a viable market for southern yellow pine in

housing. In this project we will study chemical modification of plantation wood to enhance its structural properties for use in residential construction.



Plantation forests yield wood with strength properties that are often lower than those of wood traditionally used. Through wood modification, strength properties and other characteristics can be improved.

Objective

The overall objective of this project is to study the strength, mechanical, shrinking and swelling, and chemical properties of chemically modified southern yellow pine. Results will be used to assist the forest products industry in determining viable options for enhancing wood properties for the residential housing market.

Approach

In cooperation with the wood products industry, semi-commercial samples of thermally treated, starch impregnated, and/or acetylated southern yellow pine lumber will be collected and tested. We will first identify and solicit U.S. wood products industries that are currently evaluating the commercial feasibility of these processes. Subsequent testing will include hygroscopicity, swelling and shrinkage, bending stiffness and strength, chemical properties, durability, and chemical penetration and retention.

Expected Outcomes

This research will identify for southern yellow pine lumber producers and others those wood properties that can be improved and estimate the magnitude of



Research scientists at North Carolina State University, in cooperation with the Forest Products Laboratory, are examining ways to improve the strength and physical properties of wood.

improvement possible through wood modification on a commercial basis. This research will help identify those processes that offer the most commercial promise and where future research efforts must be focused to speed the commercial adaptation of the technology.

Timeline

We anticipate the project to begin September 2005. By February 2006 we will have identified industry cooperators, completed a literature review, and obtained test samples from industry cooperators. Testing should be completed by July 2006, with data review and reporting completed by August 2006.

Cooperators

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