RESEARCH in Progress

Nondestructive Evaluation of Wood

Nondestructive evaluation is the science of identifying characteristics of a material without altering it. Nondestructive evaluation technologies are the scientific foundation for all assessment and grading conducted with wood-based materials and products.

Nondestructive evaluation relies on a variety of techniques (lasers, x-rays, ultrasound, acoustics, vibration, and others) to look at and understand materials. We use the information obtained to make decisions about what to do with materials, products, or structures.

Background

Wood is highly variable because of genetic variation and variable growing environments. To make the best, highest use of our forest resources, we need to have technologies that help us assess the quality of a particular tree, log, or primary product. We can then use it for its best use—nondestructive evaluation technologies enable us to characterize important properties of wood, allowing us to use it appropriately. The USDA Forest Service Forest Products Laboratory, in cooperation with organizations from around the world, develops nondestructive evaluation technologies as part of its program to find the best uses for our timber resources.

Ultrasound techniques were used to assess the condition of this 2,500-year-old wooden mummy coffin.

Objective

The objective of this program is to develop nondestructive evaluation technologies for a range of forest materials and products, with a focus on developing technologies for assessing woody biomass from our Eastern forests.

Approach

A comprehensive review of the current state-of-the art in nondestructive evaluation of wood will be completed to identify potential applications of existing technologies and research needs. Based on results of this review, research and development work will be initiated to address high-priority needs.

Use of acoustic nondestructive testing tools to evaluate the quality of logs.

Expected Outcomes

Anticipated outcomes will find application in several areas:

- Standing timber assessment technologies for use by the Forest Service in its Forest Inventory and Analysis Program

- Technologies to locate decay in urban trees

- Industrial applications for evaluating structural performance potential of logs, veneer, lumber, and timbers

- Inspection of historic covered timber bridges

- Inspection of historic artifacts and structures

Timeline

This project will begin in July 2016 and be completed by June 2017.

Cooperators

USDA Forest Service, Forest Products Laboratory

Michigan Technological University

Standing timber being evaluated with a nondestructive testing tool that utilizes ultrasound, lasers, and vibrational characteristics.

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