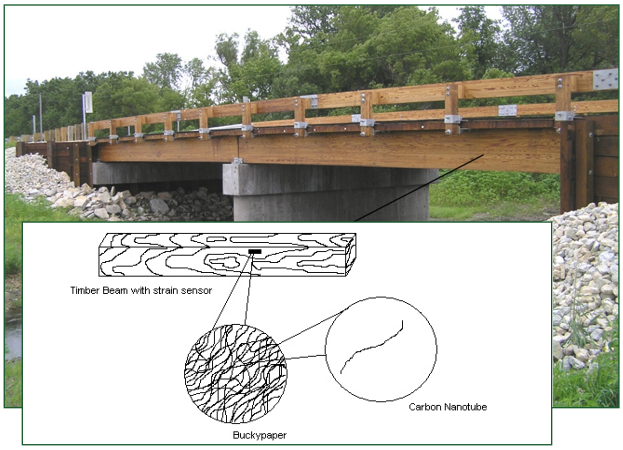
RESEARCH in Progress

NATIONAL CENTER FOR WOOD TRANSPORTATION STRUCTURES

Literature Review and Assessment of Nanotechnology for Remote Sensing of Wood Transportation Structures



Recently, efforts have focused on the development of civil structures that have embedded sensors and onboard data processing capabilities—typically termed "smart structures." The fusion of these smart technologies into infrastructure is intended to give bridge owners and managers better and timelier information on how structures are behaving and when they need maintenance. To this point, most efforts have focused on ways to integrate conventional sensors and the development of data processing algorithms. Almost simultaneously, fundamental research has occurred on what is generally termed "nanotechnology." Nanotechnology can take on many forms but can generally be thought of as very, very small (i.e., nanometer-scale) sensors, machines, devices that are infused within a larger element or system.

Background

Several collaborative efforts have furthered the development of timber-specific smart structure technologies. When completed, these efforts stand to advance timber to being the most technologically advanced material in use in civil infrastructure.

Objective

The objective of this project is to determine the state-of-the-art in nanotechnology and to determine if and how nanotechnology can be implemented in timber and the smart timber bridge concept.

Approach

To accomplish the objectives of this work, research will be conducted in three primary work phases. During the first phase, general literature on the state-of-the-art of nanotechnology will be collected and reviewed. Although the research team has a specific interest in technologies for application in timber, the first phase of work will seek out literature from a wide variety of applications. In the second phase, the identified nanotechnologies will be reviewed to determine if they have potential application in timber structures. Where possible, research needs to adapt or advance a specific technology will be identified. In the final phase of work, a report will be prepared with a section specifically dedicated to recommended next steps. Next step recommendations will very likely include needed research and, where possible, estimates of time and resource needs.

Expected Outcomes

This work will result in a final report containing (1) a comprehensive summary of current state-of-the-art in nanotechnology and associated references; (2) a recommended plan for advancing and adapting promising technologies; and (3) a bibliography.

Timeline

Phase 1 will be completed by August 2010; phase 2 will be completed by November 2010; and phase 3 will be completed by December 2010.

Coalition for Advanced Wood Structures
a university, industry, government partnership

USDA Forest Service

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