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Structural Testing of Wood and Wood-Based Products

Advanced Structures & Composites Center, University of Maine

Structural Testing of Wood and Wood-Based Products

Maine's economy has always drawn upon its forests. Our wood composites research not only follows this tradition, it allows future generations to do so, as well. International timber competition has forced Maine to become smarter about the lumber goods it produces, which is why the UMaine Advanced Structures and Composites Center has been working with industry to produce value added wood products since its inception in 1996. Focus areas have included FRP-reinforced glulam, structural composite lumber, wood-plastic composites, wood and bio-based panels, nanocellulose, and mass timber construction.

About the UMaine Composites Center

The UMaine Composites Center has a diverse list of industrial clients on state, national, and international levels – ranging from small, start-up companies to large, Fortune 500 corporations. Our capacity for industrial cooperation has led to more than 500 product development and testing projects as well as leading awards for innovation in the composite materials and civil engineering fields.

Sample of Wood Products Testing Capabilities

ASTM D143	Testing Small Clear Specimens of Timber
ASTM D198	Static Tests of Lumber in Structural Sizes
ASTM D245	Structural Grades and Related Allowable Properties for Visually Graded Lumber
ASTM D905	Strength Properties of Adhesive Bonds in Shear by Compression Loading
ASTM D1037	Evaluating Properties of Wood-Base Fiber and Particle Panel Materials
ASTM D1101	Integrity of Adhesive Joints in Laminated Wood Products for Exterior Use
ASTM D1990	Establishing Allowable Properties for Visually-Graded Dimension Lumber from In-Grade Tests of Full-Size Specimens
ASTM D2395	Specific Gravity of Wood and Wood-Based Materials
ASTM D2339	Strength Properties of Adhesives in Two-Ply Wood Construction in Shear
ASTM D2555	Establishing Clear Wood Strength Values
ASTM D2559	Standard Specification for Adhesives for Structural Laminated Wood Products
ASTM D3165	Lap Shear Strength Properties of Adhesives
ASTM D3737	Establishing Allowable Properties for Structural Glued Laminated Timber
ASTM D4442	Direct Moisture Content Measurement of Wood and Wood-Base Material
ASTM D4761	Mechanical Properties of Lumber and Wood-Base Structural Material
ASTM D4933	Moisture Conditioning of Wood and Wood-Base Materials
ASTM D5456	Evaluation of Structural Composite Lumber Products
ASTM D6815	Duration of Load and Creep Effects of Wood and Wood-Based Products
ASTM E72	Conducting Strength Tests of Panels for Building Construction
ASTM E564	Static Load Test for Shear Resistance of Framed Walls for Buildings
ASTM E2126	Cyclic (Reversed) Load Test for Shear Resistance of Vertical Elements of the Lateral Force Resisting Systems for Buildings
ANSI A190.1	Standard for Wood Products- Structural Glued Laminated Timber
ANSI/APA PRG 320	Standard for Performance-Rated Cross-Laminated Timber (Except Section 6.3)
AITC Test T107	Shear Test
AITC Test T110	Cyclic Delamination Test
AITC Test T119	Full Size End Joint Tension Test
BS EN 408	Timber structures-structural timber and glued laminated timber - determination of some physical and mechanical properties

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For more information, visit: composites.umaine.edu

Case Study: Norway spruce tested at UMaine approved for construction-grade lumber

Project Overview

On Oct. 20, 2016, the American Lumber Standards Committee (ALSC) approved the inclusion of Norway spruce in the Spruce-Pine-Fir South grouping of wood species for home construction and industrial applications. This announcement was the result of structural testing and analysis conducted at the UMaine Advanced Structures and Composites Center.

Introducing Norway spruce into the market marks a nearly once-in-a-lifetime occasion, says Jeff Easterling, president of the Northeastern Lumber Manufacturers Association (NELMA).

"This is a momentous occasion for the building industry," he says. "The addition of a new species hasn't happened in almost a century, and it's been a very exciting year as we've worked to shepherd it through testing and bring it into the mainstream."

Landowners, loggers, lumber mills, retailers and builders all are expected to benefit from being able to utilize lumber from some of the millions of Norway spruce trees, many of which the Civilian Conservation Corps planted in the United States during the Great Depression.

From October 2015 to February 2016, a team of staff and students at the UMaine Composites Center, led by Russell Edgar, wood composites manager, tested 1,320 pieces of lumber milled from Norway spruce grown in Maine, Vermont, four regions of New York and Wisconsin.

The team then derived allowable design values (including bending, tension, shear and compression) for the species and wrote the final report that NELMA submitted to ALSC.

"It is exciting to be involved in this type of research, which has immediate and direct economic impacts for the state and region. This is exactly why our center exists," says Edgar.

For complete information on the impact of Norway spruce on the building products and design industry, as well as additional details on history, grading and the mill perspective, visit nelma.org/norwayspruce.

For more information about this project, visit: https://umaine.me/2hAGmNv

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