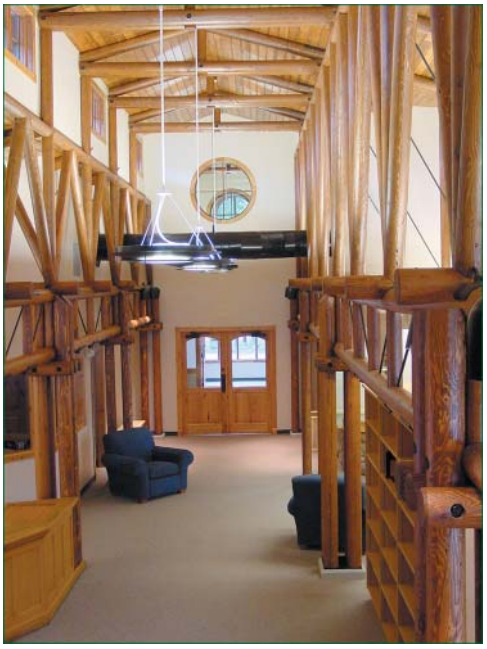
RESEARCH in Progress

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

Structural Product Options from Small-Diameter Lodgepole Pine

Finding higher value uses for small-diameter timbers, especially those growing in overstocked stands, can help pay for treatments needed to reduce fire hazard and can provide new opportunities for economic development of regional businesses. Research has shown that for some species, higher value structural lumber can be cut from small-diameter trees and advanced grading procedures can improve the yield and reliability of round logs for use in roundwood structures. Information is needed on these options for lodgepole pine.



Six-inch-diameter lodgepole pine used in the 5,000-ft² library in Darby, Montana.

Background

Lodgepole pine constitutes the second largest timber volume of species growing in Idaho and Montana (Douglas-fir is first). However, for species growing in over-stocked stands, lodgepole pine constitutes the largest volume—almost 70% more volume than Douglas-fir. The sawmill, post and pole, and log home industries are well established in the Intermountain West and are already using this resource. However, higher production costs in an increasingly competitive market are putting pressure on these industries to seek alternative markets and produce higher value products.

Research completed in 2000 established that lodgepole pine has good potential for production of machine-stress-rated (MSR) lumber for use in trusses and I-joists and that these products can command a premium price over those from visually graded structural lumber. However, this study was of limited scope and did not include grading as lamstock for glulam beams.

Yield of mechanical graded lodgepole pine 2 by 4's from No. 3 and better visual grades

Grade	Yield (board feet)	Yield (%)
2400Fb-2.0E	192	8.2
2100Fb-1.8E	264	11.3
1650Fb-1.5E	1,496	63.8
No.1	304	13.0
No.2	64	2.7
No.3	24	1.0

Objective

The objective of this study is to determine information on yield and properties of lodgepole pine logs:

- Yield of visually graded structural lumber (Light Framing and Structural Light Framing), machine stress rated lumber, and lamination grades (both L-grades and potential tension lam grades) that can be produced from small-diameter logs
- Yield and properties of visually and mechanically graded logs
- Relationships between log and lumber properties by alternative NDT methods

Approach

Logs for this study will come from one or two locations in Idaho and Montana. Both visual and nondestructive

Advanced Housing Research Center
Forest Products Laboratory
Madison, Wisconsin

USDA Forest Service

Forest Products Laboratory

University of Idaho

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quality information will be recorded for all logs in the green condition. This information will be used to sort the logs into three groups:

- Group 1 logs will be sawn into dimension lumber and visually graded as Light Framing, Structural Light Framing, and Stud. Knot information applicable to MSR grades and lam-grades will also be determined. Modulus of elasticity values in transverse vibration will be determined for both green and kiln-dried lumber. The dry lumber will be broken in bending.
- Group 2 logs will be debarked and visually graded for structural use. Log stiffness will be determined in both green and dry conditions using both stress wave and transverse vibration techniques. The logs will be broken in bending.
- Group 3 logs will be "dowelled" to a constant diameter prior to collecting the same information described for group 2.

Expected Outcomes

- Comparison of economic value for utilization alternatives for both sawn lumber and round logs
- Assessment of the effect of dowelling on properties of visually graded logs
- Establishment of a mechanical grading system for lodgepole pine logs
- Comparison of existing data on ponderosa pine and Douglas-fir logs to determine if mechanical log grading can be done on a species-independent basis
- Establishment of procedures for relating log and lumber properties for structural lumber products and comparison of these procedures with available data on other species

Timeline

Sampling for this study is planned for summer 2006, with grading and testing to begin in the fall. Testing will likely take up to one year, with analysis and report preparation likely to begin fall 2008. First reports should be published in 2009.

Cooperators

Cooperators for this study have yet to be established. Cooperators in past studies have included major grading agencies, small businesses in the lumber and log industry, and National Forests. We anticipate a similar array of cooperators in this study.

Contact Information

Dr. David W. Green
USDA Forest Service
Forest Products Laboratory
Madison, Wisconsin
(608) 231-9261, dwgreen@fs.fed.us

Dr. Thomas M. Gorman
Department of Forest Products
University of Idaho
Moscow, Idaho
(208) 885-7402, tgorman@uidaho.edu