

# INLAND NORTHWEST FOREST PRODUCTS RESEARCH CONSORTIUM

Leonard R. Johnson

## CONSORTIUM PARTNERS

**University of Idaho**

Forest Products Department

**University of Montana**

Bureau of Business and Economic Research

**Washington State University**

Wood Materials and Engineering Laboratory

## PROJECT AREAS

Industry Analysis

Timber Harvesting Options

New and Enhanced Products

Marketing Opportunities and Challenges

## EXPERTISE OF UNIVERSITIES

Timber Harvesting / Forest Engineering

Business and Marketing of Forest Products

Wood Materials and Technology

Forest Products Manufacturing

Structural Design and Engineering

Wood Composites and Chemistry

## CURRENT PROJECTS

### Analysis of the Inland Northwest Wood Products Industry

Involves development of several databases containing extensive information on the primary and secondary wood products industries in the Inland and Pacific Northwest. Information archived in these databases has been analyzed and used to publish research articles and periodic reports and respond to inquiries.

### Assessment of the Relationship Between Softwood Lumber and Material Substitution Behavior

The direct result of a tightening raw material supply has been higher softwood lumber prices, increased price volatility, and a general perception of declining softwood lumber quality. These factors have led to an increase in the use of substitutes for softwood lumber in the residen-

tial-construction industry. A survey of residential contractors in the United States will be conducted to collect data regarding structural framing material use and perceptions. Analysis results will be used to develop utility models for various softwood lumber attributes and to assess the effect that price changes have on the overall perception of softwood lumber quality.

### Operability: Timber Harvesting and Logger Education

A Statewide Logger Accreditation Oversight Committee made up of representatives from wood products companies in Idaho suggested that a "business for loggers" module be developed and offered to loggers in Idaho as part of the Idaho Pro-Logger Program. In harvesting operations, production studies have been completed on harvesting systems designed to work in small timber. The results include harvesting production and cost estimates with regression models that describe cycle times. A family of computer simulators is being developed to allow testing of a wider variety of harvesting systems.

### Operability: Ecosystem Restoration and Fire Treatment Prescriptions

Forest restoration prescriptions were focused on frequent fire interval forest types in Montana. They show that alternative treatments (ex: thin-from-below vs. comprehensive/restoration) differ dramatically in their ability to reduce fire hazard, improve ecological conditions, and yield revenue from timber harvested. A specific research project showed that high quality structural lumber could be produced by curve sawing small diameter, conifer trees harvested under various ecosystem- restoration / fire-treatment prescriptions. Results also showed that very small diameter conifer trees (6 to 7 inches d.b.h.) at modern high-speed, small-log, curve sawing sawmills have positive value.

### Engineered Lumber Products from Inland Northwest Species

Project involves evaluation of the feasibility of utilizing Inland Northwest softwood species for manufacturing oriented strand lumber and other engineered composite products. It addresses questions such as: Can certain Inland Northwest softwood species, such as ponderosa pine and lodgepole pine, be used in place of aspen for composites such as oriented strand lumber (OSL) or oriented strand board (OSB)?

### Screening of Hybrid Poplar Clones for New Industrial Uses

Mechanical and shrinkage properties were different among clones, indicating an opportunity to genetically

engineer trees for targeted structural products. OSB panels made from hybrid poplar displayed excellent strength and stiffness properties, and exceeded product performance standards. Product opportunities for hybrid poplar include OSB, composite strand lumber, pallets, and molding.

### **Modeling of Structural Insulated Panels**

Structural insulated panel (SIP) is an engineered composite product composed of an insulating foam core sandwiched between two face materials. SIPs are used for load bearing walls, floors, and roofs. The increased popularity of SIPs is due to energy efficiency, ease and speed of construction, and cost effectiveness. Although increasing in popularity, SIPs make up a very small proportion of building products used in residential and light commercial buildings because they do not have widespread building code acceptance within the U.S.

### **Warp and Grade of Structural Lumber from Small Diameter Logs**

One hundred twenty small diameter interior Douglas-fir logs were grouped into three sweep categories. All logs were curve sawn, and the resulting 2x6-inch 16-foot lumber was dried in a commercial dry kiln, planed, and measured for bow, crook, twist, MOE, and grade. These findings indicate that high-quality structural lumber can be produced through curve sawing small diameter Douglas-fir logs. These findings also challenge traditional thought that straight logs are superior to logs with sweep for the production of structural lumber.

### **Energy Consumption and Quality Implications of High-Temperature Kiln Schedules and Restraint on Inland Grand-fir Studs Sawn from Small Diameter Trees**

Although high-temperature drying of structural lumber is not new, its use with curve-sawn lumber from small diameter grand fir trees is. The cost of high-temperature drying, the effects of high-temperature upon warp and case-hardening, and the impacts of certain kiln parameters are largely unknown for grand fir lumber. Since Hem-fir (largely grand fir) lumber currently accounts for one third of all lumber produced in the region, improvements in lumber drying techniques will improve the long-term viability of the region's sawtimber resource and the stability of the wood-based economy.

### **VOC Characterization and Emission Rates from Lumber Dry Kilns**

As lumber is dried, VOCs are emitted into the atmosphere. The 1990 Amendments to the Clean Air Act placed more stringent VOC emission standards on many wood product facilities. The actual emission rates of different VOCs from wood product facilities are mostly unknown. This research addresses this problem by applying new tools to the measurement of VOC emissions.

### **Stress-Wave Analysis of Standing Trees to Predict Mechanical Properties of Wood Products**

Twelve longitudinal and eight transverse stress-wave speed measurements were made on each tree. Once scanned, the trees were felled, and a 16.5-foot butt log from each tree was sawn into 2x6 lumber. The lumber was air dried to a uniform Moisture Content. Dynamic MOE was measured and visual grades were assigned by a Western Wood Products Association lumber inspector. Results indicate that intensive stress-wave scanning of standing Douglas-fir trees can improve the correlation with dynamic MOE of lumber sawn from the trees, but good correlation was achieved in only those trees with little variation in growth features.

### **FUTURE CONSORTIUM ACTIVITIES**

*Continue balance of*

Applied and Basic Research

Outreach Efforts

*Continue focus on*

Harvesting, Manufacturing, and Marketing

New and Enhanced Products

### **Author**

Leonard R. Johnson  
Professor of Forest Engineering  
College of Natural Resources  
University of Idaho  
Moscow, ID 83844  
208-885-7941  
ljohnson@uidaho.edu