



# CROSSINGS



NEWSLETTER OF THE NATIONAL TIMBER BRIDGE INITIATIVE

Editor - Tinathan Coger

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## ENGINEERED WOOD PRODUCTS MANUFACTURED BY TRUS JOIST MACMILLAN

**T**rus Joist MacMillan (TJM) is a leading producer of Engineered Wood Products in the world. It utilizes a variety of wood species in the form of veneer or strands and combines them with exterior-type structural adhesives to produce structural wood products that are much more consistent than other forms of wood.

The company produces three forms of engineered wood, known collectively as Structural Composite Lumber (SCL). The oldest and most widely known material is Laminated Veneer Lumber (LVL), sold by Trus Joist MacMillan under the trade name of MICRO=LAM® Lumber. A second product manufactured by TJM is called Parallam® Lumber, a Parallel Strand Lumber (PSL) product. The newest SCL technology from TJM has resulted in a Laminated Strand Lumber (LSL) called TimberStrand Lumber™. A brief description of the three materials follows.

### MICRO=LAM® LVL

MICRO=LAM Lumber uses structural grade species such as Douglas-fir and southern pine in veneer form in its construction. The veneer comes in sheets eight feet in length and either 27" (685mm) or 51" (1295mm) widths. It differs from plywood in that the grain in all of the veneer sheets are oriented parallel to the length of the finished

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## NATIONAL TIMBER BRIDGE DESIGN COMPETITION

**T**he winners of the nation's first timber bridge student competition award have been announced by the Southwest Mississippi Resource Conservation and Development Executive Board.

The award selections were made by a select panel of judges which included Dan W. Miller, Design Engineer, Bridge Division of Mississippi Department of Transportation; Richard B. Ward, Structural Engineer with the Federal Highway Administration, and Stephen C. Quintana, Program Director of the Timber Bridge Information Resource Center.

The student competition, begun on January 15, 1993, was initiated to "familiarize engineers of the future" with the engineering capabilities of wood and its potential as a principal structural material for highway bridges and related transportation structures. The competition was opened to civil engineering, agricultural engineering and forestry students throughout the U.S.

The 1993 national competition received favorable responses from various colleges and forest products groups. A total of 15 sent entry forms, and eight of these submitted design and test results for final competition. Many other schools and colleges were unable to participate.

The Southwest Mississippi Resource Conservation and Development, Inc., with assistance from the Department of Civil Engineering at Mississippi State University (the host university), coordinated the initial competition.

### Awards

First Place and \$600 was awarded to the University of Alabama. Their timber bridge consisted of three (3) enclosed box stringers made of Southern Pine and 1/2" decking.

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## Engineered Wood ... continued from page 1

product. The veneer is bonded together with phenol formaldehyde adhesives under heat and pressure in a continuous process to produce a block or "billet" of wood typically 1 1/2" (38mm) or 1 3/4" (44mm) in thickness, two or four feet (0.6-1.2m) in width, and in lengths up to eighty feet (24m).

### Parallam® PSL

Parallel Lumber is a similar product to MICRO=LAM Lumber, but it utilizes strands rather than sheets of peeled veneer in its construction. It, too, uses species such as Douglas-fir and southern pine in combination with phenol formaldehyde adhesives, but microwave energy is employed to cure the compressed billet. The manufacturing process of Parallam Lumber creates a billet much larger in cross section than that of MICRO=LAM LVL, as large as 12" by 24" (300 x 600mm), in lengths of up to 66 feet (20m). Because of the large sectional sizes available directly from the press, this material is the primary product being utilized by Trus Joist MacMillan for bridge structures.

### TimberStrand™ LSL

TimberStrand Lumber is significantly different from the preceding two products. It does not rely on high grade structural species for wood fiber, but instead uses more readily available and often underutilized species such as Aspen. Strands of wood, 0.030" (0.8mm) thick by 1/2" (13mm) wide and 12" (300mm) in length are obtained from a log, coated with polyurethane adhesives, oriented and pressed with steam cure to produce a billet up to 5 1/2" (140mm) thick, eight feet (2.4m) wide, and 35 feet (10.7m) long.

All three forms of SCL that Trus Joist MacMillan manufactures have attributes that make them attractive for use in bridge applications. They all employ the concept of defect dispersion in their composition, wherein knots, slope of grain, low density material, etc., are either eliminated or dispersed throughout the material, minimizing their effects on the end product. This affords greater consistency and predictability of the material and the ability to assess significantly higher design values than solid sawn lumber. The nature of SCL's composition also allows for very thorough treatment with pressure-introduced wood

preservatives, greatly increasing the long-term durability of the materials in exterior exposure applications such as bridge structures. In addition, because the products are manufactured in a controlled plant atmosphere, they can be secondarily laminated into a variety of structurally efficient shapes such as tee or box beams, pre-cambered in lengths that can span from support to support without the need for splices.

Use of Structural Composite Lumber in bridge applications has been limited to date due to the lack of recognition by the governing code body for traffic bridges, the American Association for State Highway and Transportation Officials (AASHTO). This situation is changing, however, and inclusion of SCL into the AASHTO Specifications appears likely within the next couple of years.

For further information, contact:

Trus Joist MacMillan  
Attn: Christopher Meyer  
R & D Product Development Center  
P.O. Box 8047  
Boise, ID 83707  
Phone: 208-343-7771

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## SEBASTICOOK RIVER SNOWMOBILE BRIDGE COMPLETED

Hardly had the last nail been pounded when snowmobiles lined up to cross the Sebasticook River Snowmobile Timber Bridge located in Hartland, Maine. This bridge has a main suspension of 190 feet so the shoreline would not be disturbed during the construction of the east side pylon footing. Double deck sections were added adjacent to the pylon columns at each end of the bridge to provide a stopping/passing location in the event two snowmobiles entered the opposite end ramps at the same time. Approaches to the on-ramps cannot be clearly seen from opposite sides of the river due to terrain, bush and tree growth. The bush and tree growth were left undisturbed in order to meet environmental constraints. A 16 foot high structural steel main cable



## SOFTWARE DEVELOPED FOR TIMBER BRIDGES

### STRESLAM

Considerable research completed in the United States has provided design, construction, and inspection guidelines for stress-laminated deck bridges. In West Virginia, 56 timber bridges have been built following design specifications developed at the Constructed Facilities Center (CFC) of West Virginia University. The CFC is actively cooperating with other researchers in the development of design guidelines for stress-laminated timber bridges to be adopted by AASHTO.

The Computer program STRESLAM for the design of stress-laminated T-system timber bridges is available on diskette from: Constructed Facilities Center, College of Engineering, West Virginia University, Morgantown, WV 26506-6101. The program will be provided at a nominal cost. Inquire at: Phone: (304) 293-7608 Ext. 632; FAX (304) 293-5024.

### SLAM - Microcomputer Program for Stress-Laminated Wood Deck Design

SLAM is a user friendly program developed by the Department of Civil, Agricultural, and Geological Engineering, New Mexico State University, for Jornada and Black Range Resource Conservation and Development groups, Elephant Butte Irrigation District, and the USDA Forest Service. The program is intended to provide bridge engineers who are already familiar with the design procedures for stress laminated wood decks, with a powerful tool to speed up the design process.

For bridge engineers who are unfamiliar with procedures, this program along with the design procedures outlined by the American Association of State Highway Officials in the "Guide Specifications for the Design of Stress Laminated Wood Decks" will allow the bridge designer to quickly learn the design procedures.

SLAM is an easy program to use. Everything the user needs to enter is outlined on the computer screen. In other words, the program runs in DOS and is menu-driven.

The program can be ordered by contacting Stan Bulsterbaum or Vicky Milne, Jornada Resource Conservation and Development, Inc, 1065 S. Main, Suite B-3, Las Cruces, NM 88005; Phone: 505-526-1424 or Wade Worrell, Black Range Resource Conservation and Development, Inc., 223 East Spruce, Deming, NM 88030; Phone: 505-546-2062.



### Snowmobile Bridge ... *continued from page 2*

termination bridge truss assembly and supporting intermediate pylons had to be added on the west side of the river to move the main cable deadman structure 38 feet closer to the primary west side pylon footings. The change in location of the deadman was necessary to reduce disturbance to the shoreline from the main cable deadman. The Sebasticook River Snowmobile Timber Bridge is definitely a critical link in the State's growing snowmobiling trail network.





## Design Competition ... continued from page 1

Second Place and \$300 was awarded to West Virginia University. Their timber bridge consisted of two (2) glue laminated arches with a cable suspended deck made of Yellow Poplar, Southern Pine and 1/4" plywood and decking materials.

Third Place (tie) and \$100 to each university was awarded to the University of Maine and the University of Oklahoma. The University of Maine's timber bridge entry was a space truss made of Southern Pine. The University of Oklahoma's timber bridge entry was a design using two (2) laminated stringers made of dense Yellow Pine, Utility Douglas Fir, Purple Heart, and Red Oak with a prestressed deck.

Special Award for Most Cost-Competitive Design and \$400 went to Mississippi State University. The timber bridge consisted of 2 main trusses and 3 secondary stringers made of #2 dense Southern Pine with decking at a cost of \$102.71.

Special Award for Most Innovative and Creative Concept and \$200 went to West Virginia University.

There were additional entries from University of Florida, University of Mississippi and Merrimack College. Although each of these entries was considered and ranked highly by the panel, the panel could only make awards under the rules of the competition.

### National Sponsors

The National Timber Bridge Design Competition was sponsored by the Southwest Mississippi Resource Conservation and Development, Inc.; Mississippi State

University, Department of Civil Engineering; and the U.S. Forest Service Timber Bridge Information Resource Center. Additional assistance was provided by Tom Williamson of the American Plywood Association representing the National Forest Products Association Timber Bridge Task Force.

### Enter Next Year's Student Timber Bridge Award Competition

The sponsors realize that many other bridges and concepts could have been entered, but the limited time did not allow for many universities or colleges to enter. If you are interested in the 1993 Fall competition or wish to be a sponsor please contact: Southwest Mississippi RC&D, Inc.; 114 Industrial Park Drive; Brookhaven, MS 39601-2148; Phone: (601) 833-5539

### "Answers to Often Asked Questions About Treated Wood"

Get the answers to these and other often-asked questions about treated wood. Topics include: Alternative Products, Applications, Consumer Information and Tips, Disposal, Environment, Health, Preservative Depletion, Origin of Preservatives, and Wood Preserving in General. You will get over 90 pages of useful information about treated wood products. Get your copy by enclosing a check or money order in the amount of \$35.00 for each copy made payable to American Wood Preservers Institute and mailing to: American Wood Preservers Institute, "Often Asked Questions", c/o ABJ Marketing, 1323-C Shepard Drive, Sterling, VA 20164; Phone: (703) 450-1843, FAX: (703) 450-1864.

Article contributions, questions or comments may be sent to Stephen C. Quintana, Program Director, P.E. or Ms. Tinathan A. Coger, Information Assistant; USDA Forest Service; 180 Canfield Street; Morgantown, WV 26505; Phone: 304-285-1591 or 304-285-1596; or FAX: 304-285-1505; DG: S24L08A.

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