Steam-Pressed Scrim Lumber (SPSL): A developing new material for bridges

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History
TimTek Technology Development....... A Cooperative Effort Between

Timtek

Forest and Wildlife Research Center

Mississippi Agricultural and Forestry Experiment Station

Mississippi State University

Mississippi State University Research Technology Corporation

State of Mississippi

CSIRO

Val Jule
Plantation Forests etc....
Construction of Research Facility at Mississippi State
Serial #1 Machine Centers

March 15, 2003 at Shuqualak, MS
First Scrim made in Mississippi – March 19, 2003
August 8, 2003 – Moving to MSU
Development and Mechanical Properties
Data Collected on over 200 Test Beams

Current monitor and cycle that has brought consistency to the process at MSU
Performance Improvements

MOE hit targets early!

Fb – has steadily climbed!
Property Testing Results

- Design values for southern pine SPSL
- Basic mechanical properties for SPSL from ponderosa and lodgepole pines
X-ray useful in determining low density areas
Design values for southern pine SPSL have been established depending on depth and span:

- $\text{MOR} = 19.3 - 28.4 \text{ MPa}$
- $\text{MOE} = 15.4 - 17.7 \text{ Gpa}$

for bending stress
Bending Stress Design Value

![Bar chart showing MOE (GPa) and MOR (MPa) for different depth x span combinations: 6.4 x 129.5, 8.9 x 175.3, 18.4 x 346.7, 28.6 x 529.6.](image)
Tensile Strength Design Values

![Diagram showing tensile strength values for different gauge lengths.](image)
Compressive Strength Design Values

![Bar chart showing compressive stress values for Edgewise and Flatwise compression levels. The chart indicates higher compressive stress values for Flatwise compression compared to Edgewise, with values peaking at 18 MPa for Flatwise and 12 MPa for Edgewise at a compression level of 1 mm.]
Southern Pine Results

- MOE and MOR design values meet or exceed commercially available products

- Tensile and compressive strength values are comparable to commercial products
Mechanical Properties of SPSL from western species
Results with western pines

- Fire-killed material does not scrim well; low MC is culprit
- NDE testing with a sonic E device may prove useful but requires more work
- Low MOE values due to blows but other values seem reasonable
Increase durability for various potential uses
Additives to Increase Durability

- Water repellents
- Dimension stabilizers
- Fungicides &/or insecticides
- Fire Retardants
- Corrosion inhibitors
Limitations on Additives

- Negative effect on adhesive
- Decompose at press temperatures
- Corrosive to fasteners
- Hygroscopic
- Pigmented
- Cost
Blended with Adhesive (Resin) Prior to Application to Scrim
Added to Wood Furnish (scrim) prior to Drying
Added to Wood Furnish (Scrim) after Drying but Prior to Pressing
Added to Pressed Material Prior to Cooling
Penetration of Topically – Applied Additives (Spray or Dip) is Facilitated by Air within the EWP cells Contracting as it Cools
Added to Cooled TimTek Products
Summary

☐ Mechanical properties have been achieved

☐ When to add Durability –
  ■ Enhancing Additives to EWP Depends on
    ☐ Their Physical and Chemical Properties
    ☐ Degree of Enhancement Required

☐ Commercial facility is being constructed in Mississippi
THANKS...