The University of Maine's Advanced Structures and Composites Center's award winning research staff help clients take a technology from the design state to a commercially viable product. The 100,000 ft² (8,100 m²), $110 million laboratory employs over 180 personnel with expertise in multiple disciplines including large-scale and coupon-level testing, composites manufacturing and analysis, FEA and other modeling techniques, and more. The Center may be hired to jointly develop a product, or solely as a contractor to manufacture and/or test wood composite products.

The UMaine Composites Center has a complete Strand Composites Pilot Line allowing production of up to 4’ x 8’ oriented strand board (OSB), oriented strand lumber (OSL) and laminated strand lumber (LSL) on a near-industrial scale.

Companies may opt for complete manufacturing – from log to panel – or select only certain unit operations, such as stranding, drying and screening. Recent studies include the use of innovative resin systems, wax substitutes and reduced press temperatures.

**STRAND COMPOSITES MANUFACTURING PROCESS:**

**LOG DELIVERY**
Companies may deliver tree length or pre-cut logs with a maximum diameter of 12”.

**LOG CONDITIONING**
Approximately ten 5’ long x 12” diameter logs can be soaked and/or heated at a time to 150°F.

**STRANDING**
A Carmanah 12/48 Lab Strander converts up to 12” diameter logs into strands from 3” to 12” in length for OSB/OSL/LSL production.

A 48” inside diameter ring holds two knives which protrude into the inner face of the ring. Strands are produced by advancing the log through the rotating ring at a specified rate. Projection of the knives in combination with ring speed determine the flake thickness, width is achieved by selection of the appropriate counter knife angle, and strand length through use of scoring knives.

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SCREENING
An Acrowood Trillium™ and Diamond Roll combination screen is used to separate strands into three size fractions. Larger strands pass over the Trillium screen, with the remainder falling through to the Diamond Roll Screen. This material, in turn, is separated into intermediate and fine size fractions. The Trillium screen works well on both dry and green strands, due to the triangular geometry of the discs, which causes increased strand agitation and fine removal. A Gilson screen is available to quantify screening efficiency.

SCREEN SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conveyor Size</td>
<td>21' long, 2' wide, 9&quot; high side rails</td>
</tr>
<tr>
<td>Conveyor speed</td>
<td>VFD controlled, 0-110 fpm</td>
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<tr>
<td>Conveyor feed rate</td>
<td>Approximately 0-12,000 green pounds/hr.</td>
</tr>
<tr>
<td>Trillium shafts</td>
<td>18 shafts, two zones of 9, 3 mm inter roll opening</td>
</tr>
<tr>
<td>Diamond Roll</td>
<td>Variable speed, variable inter roll opening</td>
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</tbody>
</table>

DRYING
Strands are dried on a Koch Bros. in-line conveyor lab dryer. The forced-air dryer is 3' wide x 10' long, with an additional 4' of infeed and outfeed. The dryer can evaporate up to 250 lbs. of water per hour, at a maximum temperature of 325°F and a fan capacity of 7,500 cfm. Moisture content is determined using a Process Sensors Corp. near infrared meter.

A 5,000 board foot, Nyle dehumidification dry kiln is also available bringing strands to within +/- 1% of the target MC, usually within 24 hours.
RESIN BLENDING

Resin is applied to strands using one of two Coil spinning disk atomizing resin blenders (3’ x 6’ and 5’ x 10’). The blender drum can be rotated up to 20 rpm, and the spinning disk atomizer to 15,000 rpm. Either 30 or 120 lbs, for the small and large blender respectively, of dry strands can be blended at a time. The resins (normally pMDI or PF) and waxes are sent to the blender by means of a peristaltic pumps. Wax emulsions are introduced using an air atomizer.

FORMING

Strand mats are hand-formed within deckle boxes of varying sizes (typically 34” x 34” or 4’ x 8’).

PRESSING

Boards are pressed in one of two press systems:

34” x 34” Dieffenbacher steam injection press. This press system is controlled by ARC’s PressMan system. Composite mats can be pressed either with or without steam injection (up to 250 psi steam pressure). Steam injection allows for the pressing of relatively thick strand composites, such as 3.5” thick LSL.

4’ x 8’ Erie Mill & Press 1800 ton hydraulic press (provides 725 psi on a full sized 52”x100” mat). The press is PLC controlled, with complete data collection for printout of press scheduling data and graphs. The press can be controlled in either position (to within 0.003”) or pressure control (within 2 psi). Energy is provided either by hot oil (up to 500°F) heated platens or radio frequency (10 kV, 30 kW Thermex-Thermatron system).
CONDITIONING
Boards/panels are conditioned prior to testing in one of two walk-in environmental chambers.

TESTING
As an ISO 17025 accredited, our laboratory is capable of conducting most wood composites testing including: D1037 - Standard Test Method for Evaluating Properties of Wood-Base Fiber; D5456 - Standard Specification for Evaluation of Structural Composites Lumber Products.

Left: Structural composites lumber (SCL) bending test.
Right: OSB bending test.

Learn more at: composites.umaine.edu