Overview of Engineered Wood Products

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Agenda

- What are Engineered Wood Products?
- Why Engineered Wood Products?
- Manufacturing Engineered Wood Products
- Recognize appropriate applications (uses) for each
What Are Engineered Wood Products?

Panel Products
- WSP – Wood Structural Panels
- Plywood
- OSB – Oriented Strand Board
- Siding
- Specialty Panels
- Radiant Barrier
- Formwork
- Industrial Panels
- Overlaid Panels

Framing Products
- I-Joists
- SCL – Structural Composite Lumber
- PSL – Parallel Strand Lumber
- LVL – Laminated Veneer Lumber
- LSL – Laminated Strand Lumber
- OSL – Oriented Strand Lumber
- Glulam – Glued Laminated Timber

Framing Products or Panel Product
- CLT – Cross Laminated Timber
Why Engineered Wood Products?

- Sustainability
  - Produced from small dimension lumber harvested from managed and sustainable forests
  - Timber resource utilization optimized using a wide range of lumber grades
  - Uses a wide variety of species
  - Manufacturing involves low energy use process
  - Uses low formaldehyde emitting adhesives

Engineered Wood = Green

Why Engineered Wood Products?

Sustainability

- 1 ton wood
- 1.4 ton CO₂
- 1 ton O₂
- 1 ton wood

Source: APA Publication F305
Why Engineered Wood Products?

**Predictable**
- Consistent dimensions
- Straight
- Predictable
- Less Shrinkage
- Less Crowning
- Long Lengths

Why Engineered Wood Products?

**Performance**
- Longer lengths and stronger members

Why Engineered Wood Products?

**Less waste**
- Longer lengths cut to size to reduce jobsite waste
- Engineered wood products are a system
Engineered Wood
Any wood-based building material that has been improved physically by a man-made process.

Manufacturing Engineered Wood Products

Six Steps:
1. Take the log apart
2. Sort the pieces
3. Apply adhesive
4. Arrange the pieces
5. Press/Cure
6. Finishing touches

Manufacturing Engineered Wood Products

Machined into pieces...
• Sawing
  • Glulam
  • CLT
• Peeling
  • Plywood
  • VLYL
  • PSL
• Slicing
  • OSB
  • LSL
  • OSL
Manufacturing Engineered Wood Products

Processed for maximum strength by:
- Drying
- Sorting
- Grading
- Aligning

Manufacturing Engineered Wood Products

Manufactured by...
- Applying Adhesives
- Pressing
- Curing
- Finishing

Panel Products

Plywood v. OSB

Alternating Layer Direction
Moisture Resistant Adhesive
Wet & Dry Structural Performance Tests
Available in Exterior & Structural I Grade

Veneers v. Flakes
Prescriptive Standard v. Performance Standard
Panel Products

Siding and Specialty Panels
- Siding
- Specialty Panels
  - Radiant Barrier
  - Formwork
  - Industrial Panels
  - Overlaid Panels

Framing Products

Framing Products
- I-Joists
- SCL – Structural Composite Lumber
  - LVL – Laminated Veneer Lumber
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Wood I-Joist Anatomy

Flange
- Typically LVL (peeled, dried, aligned, glued, pressed) or MSR lumber (sawn, dried, sorted, graded)

Web
- Typically OSB (sliced, dried, aligned, glued, pressed)

Placing wood fiber where the stresses are greatest
I-Joist Advantages

Engineered design = More Efficient
- Utilizes the wood fiber where needed for strength minimizing use of wood fiber
- 46% less than lumber at 16” vs. I-joist at 19.2”
- 36% less when both are at 16”

Wood placed where stresses are greatest

Wood I-Joist

- Standard Depths
  - 9-1/2”
  - 11-7/8”
  - 14”
  - 16”
  - 18”
- Varied flange widths and depths
- Structural performance varies by manufacturer

Engineered Wood Floors

Nearly 50 Percent of Raised Floor Systems
- Wood Trusses: 17%
- Lumber: 33%
- I-joist: 40%
- Other: 1%

Floor Home Innovations Research Labs, 2013 Builder Practices Survey
Framing Products

Fire Protection

- Webinar: Fire Protective Assemblies for Wood I-Joist Floors
  - www.apawood.org/i-joist-fire-assemblies
- Publications
  - Designing to Meet IRC Fire Protection Provisions for I-Joist Floor Systems, Form R425
- CAD Details
  - www.apacad.org/cad-details/?f=Fire-Rated-Systems

Structural Composite Lumber

Laminated Veneer Lumber (LVL)
- Common uses
  - Beams
  - Headers,
  - Rafters
  - Scaffold planking
  - All grain parallel to length
Structural Composite Lumber

Laminated Veneer Lumber (LVL)
- Standard Depths:
  - 9-1/2''
  - 11-7/8''
  - 14''
  - 16''
  - 18''
- Common stiffness ratings:
  - 1.5E
  - 1.8E
  - 2.0E
- Common thicknesses:
  - 1-1/2''
  - 1-3/4''
  - 3-1/4''
  - 3-1/2''

Laminated Strand Lumber (LSL)
- Flaked strand length-to-thickness ratio is around 150
- Common uses: studs and headers

Oriented Strand Lumber (OSL)
- Flaked strand length-to-thickness ratio is around 75
- Common uses: studs
Structural Composite Lumber

Parallel Strand Lumber (PSL)
- Manufactured from veneers clipped into long strands in a parallel formation and bonded together
- Strand length-to-thickness ratio is around 300
- Common uses: headers, beams, load-bearing columns
- Specs are published on a proprietary basis by the manufacturer and recognized in evaluation reports.

Standard Depths
- 9 1/2”
- 11 7/8”
- 14”
- 16”
- 18”

Common stiffness ratings:
- 2.0E
- 2.1E
- 2.2E

Glued Laminated Timbers (Glulam)

Dimension lumber laminations
- Wood laminations bonded together
- Wood grain runs parallel to the length
- May or may not be homogeneous
- Common uses: beams, headers and columns
**Glued Laminated Timbers (Glulam)**

- **Standard Depths**
  - 9-1/2’
  - 11-7/8’
  - 14’
  - 16’
- **Common thicknesses**
  - 3-1/2’
  - 5-1/2’
  - 6-3/4’
- **Common stiffness ratings:**
  - 1.8E
- **Lengths up to 48’**

**High Strength Glulam Beams**

- **LVL Hybrid Glulam with LVL Outer Laminations**
  - Full length with no finger joints required
  - LVL has greater tensile strength compared to lumber
  - 30F-2.1E stress level achieved
  - Direct substitute for many SCL products

**Glued Laminated Timbers (Glulam)**

- **Fire-Retardant-Treated Structural Glued Laminated Timber**
  - APA Technical Topic TT-127 issued May 2020
  - Joint pilot study
  - APA – The Engineered Wood Association
  - USDA Forest Products Laboratory
  - Comparison of the bending properties of untreated Glulam and FRT glulam
  - Use in Type III construction
  - Research in Progress for FRT LVL

Photo courtesy of Anthony Forest Products
Wall Framing

Headers

Wall Framing

Photo courtesy of Pacific Woodtech Corporation
Wall Framing

- Tall wall applications
- Headers
- Beams
- Columns
- Studs

Wall Framing

Code Recognized

Proprietary v. Non-Proprietary
- Lab Tested
- ES Reports
- I-Joists
- Structural Composite Lumber (SCL)

- Lab Tested
- Code Design Values
- Plywood
- Oriented Strand Board
- Glulam
- Cross-Laminated Timber (CLT)
APA Product Reports

- Report indicates that product meets the intention of the listed codes when used as stated and within the specified limitations.
- Design properties are included.
- Available for download at www.apawood.org/publications

APA Resources

- Help Desk
- Engineered Wood Specialist

www.apawood.org/staff-contacts
APA Resources

- Help Desk
- Field personnel located around North America
- Websites
  - www.apawood.org
  - Directory
  - Literature
  - www.apacad.org

Questions?
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Overview of Engineered Wood Products

Survey