



Overview of Engineered Wood Products


May 11, 2021

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Training Objectives

Objectives

- Identify various types of engineered wood products (EWP)
- Understand significant features and benefits
- Distinguish significant characteristics
- Recognize appropriate applications (uses) for each



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Agenda

- What are engineered wood products?
- Why engineered wood products?
- Manufacturing engineered wood products
- Recognize appropriate applications (uses) for each



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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





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What Are Engineered Wood Products?

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




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What Are Engineered Wood Products?

**Framing Product...
or Panel Product**



- CLT – Cross-Laminated Timber



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Why Engineered Wood Products?

- ✓ Sustainable
- ✓ Predictable
- ✓ Performance
- ✓ Less Waste



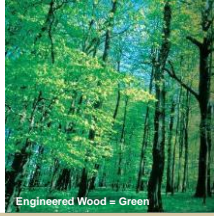
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Why Engineered Wood Products?

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

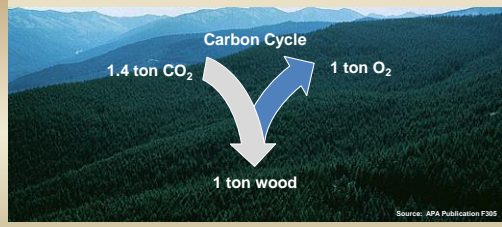


Engineered Wood = Green

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Why Engineered Wood Products?

Carbon Cycle



1.4 ton CO₂

1 ton O₂

1 ton wood


Source: APA Publication F305

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Why Engineered Wood Products?

Predictability

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





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Why Engineered Wood Products?

Performance

- Longer lengths and stronger members



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Why Engineered Wood Products?

Less waste

- Longer lengths cut to size to reduce jobsite waste
- Engineered wood products are a system





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Manufacturing Engineered Wood Products

Engineered Wood

Any wood-based building material that has been improved physically by a man-made process.



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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





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Manufacturing Engineered Wood Products

Machined into pieces

- Sawing
 - Glulam
 - CLT
- Peeling
 - Plywood
 - LVL
 - PSL
- Slicing
 - OSB
 - LSL
 - OSL



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Manufacturing Engineered Wood Products

Processed for maximum strength by

- Drying
- Sorting
- Grading
- Aligning



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Manufacturing Engineered Wood Products

Manufactured by

- Applying Adhesives
- Pressing
- Curing
- Finishing




The image shows a long, light-colored engineered wood product being processed in a factory. A smaller inset image shows a close-up of the manufacturing process, with a piece of wood being pressed between rollers.

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Wood as a Building Material

Natural properties of wood

- Grain orientation impact
- Moves with moisture content changes
- Stronger when dry
- Strength-reducing growth characteristics



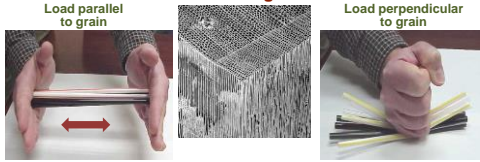
The image shows a small APA logo in the bottom right corner of the slide.

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Wood as a Building Material

Wood has a strength direction

Load parallel to grain



Load perpendicular to grain

Stronger

Weaker



The image shows two hands holding a piece of wood. The left hand is pulling the wood apart along its length, with a red double-headed arrow indicating the direction of force. The right hand is pulling the wood apart across its width, with a red double-headed arrow indicating the direction of force. The text 'Stronger' is written below the first image and 'Weaker' is written below the second image.



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Panel Products

Siding and Specialty Panels

- Siding
- Specialty Panels
 - Radiant Barrier
 - APA Plyform®
 - Industrial Panels
 - Overlaid Panels



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Framing Products

Framing Products

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


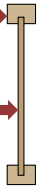


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Wood I-Joist Anatomy

Flange →
Typically LVL or MSR lumber

Web →
Typically OSB

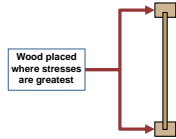


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I-Joist Advantages

Engineered design = More efficient




- 46% less than lumber at 16" vs. I-joist at 19.2"
- 36% less when both are at 16"

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Wood I-Joist

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

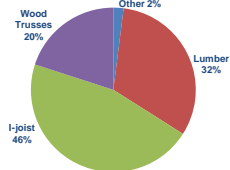


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Engineered Wood Floors

I-joist Market Share, 46% of Raised Floor Systems



Product	Market Share
I-joist	46%
Lumber	32%
Wood Trusses	20%
Other	2%

Source: Home Innovations Research Labs, 2019 Builder Practices Survey

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Framing Products



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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*
 - *APA System Report: Fire Protection of Floors Constructed with Prefabricated Wood I-Joists, Form SR-405*
- **CAD Details**
www.apacad.org/cad-details?f=Fire+Rated+Systems



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Why Engineered Floor Systems?

Engineered design = Better systems

- **Flatter surfaces, stronger, quieter floors, fewer problems**





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More I-Joist Advantages

Engineered design = Greater flexibility

- Web material can be removed for ductwork

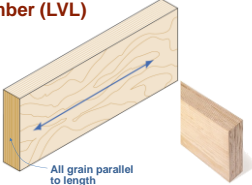



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Structural Composite Lumber

Laminated Veneer Lumber (LVL)

- Common uses
 - Beams
 - Headers
 - Rafters
 - Scaffold planking



All grain parallel to length

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Structural Composite Lumber

Laminated Veneer Lumber (LVL)

<ul style="list-style-type: none"> Standard Depths <ul style="list-style-type: none"> 9-1/2" 11-7/8" 14" 16" Common stiffness ratings: <ul style="list-style-type: none"> 1.5E 1.8E 2.0E 	<ul style="list-style-type: none"> Common thicknesses <ul style="list-style-type: none"> 1-1/4" 1-1/2" 1-3/4" 3-1/2" 5-1/4" 7"
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Photo courtesy of Pacific Woodtech Corporation



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Structural Composite Lumber

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




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Structural Composite Lumber

Laminated Strand Lumber (LSL) & Oriented Strand Lumber (OSL)

▪ Standard depths	▪ Common stiffness ratings:	
▪ 3-1/2"	▪ 1.3E	
▪ 5-1/2"	▪ 1.5E	
▪ 7-1/4"	▪ Common thicknesses	
▪ 9-1/2"	▪ 1-1/4"	
▪ 11-7/8"	▪ 1-1/2"	
▪ 14"	▪ 1-3/4"	
▪ 16"	▪ 3-1/2"	




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Structural Composite Lumber

Parallel Strand Lumber (PSL)

- Common uses: headers, beams, load-bearing columns
- Veneers clipped into long strands
- Parallel strand placement
- Strand length-to-thickness ratio = 300
- Specs are published on a proprietary basis by the manufacturer and recognized in evaluation reports.





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Structural Composite Lumber

Parallel Strand Lumber (PSL)

- Standard Depths
 - 9-1/2"
 - 11-7/8"
 - 14"
 - 16"
 - 18"
- Common stiffness ratings:
 - 2.0E
 - 2.1E
 - 2.2E
- Common thicknesses
 - 1-3/4"
 - 3-1/2"
 - 5-1/4"
 - 7"


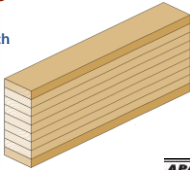


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Glued Laminated Timbers (Glulam)

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



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Glued Laminated Timbers (Glulam)

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




Photo courtesy of Anthony Cantor



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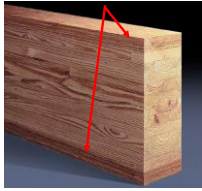
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High Strength Glulam Beams

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

LVL Laminations



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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


APA Technical Topics

Fire-Retardant-Treated Structural Glued Laminated Timber



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Floor Framing





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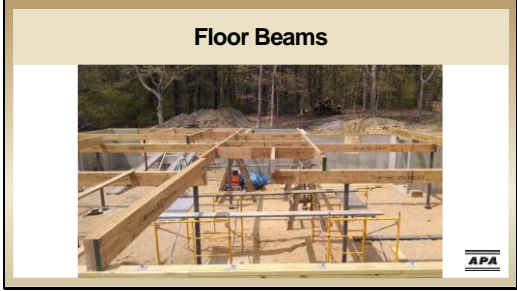
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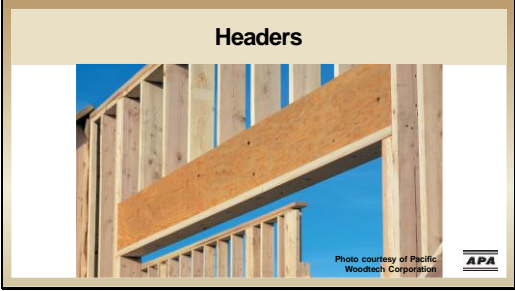
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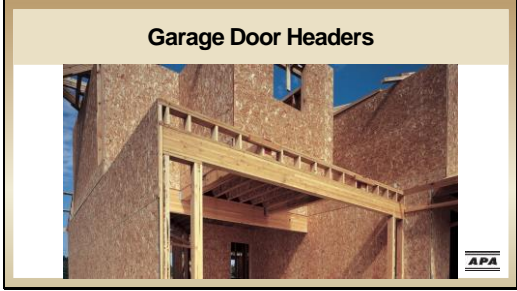
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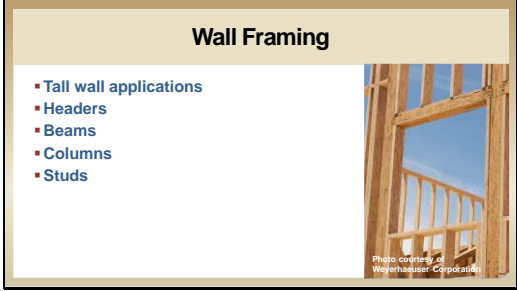
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Code Recognized

Proprietary v. Non-Proprietary


▪ Lab Tested	▪ Lab Tested
▪ ES Reports	▪ Code Design Values
▪ I-Joists	▪ Plywood
▪ Structural Composite Lumber (SCL)	▪ Oriented Strand Board
	▪ Glulam
	▪ Cross-Laminated Timber (CLT)



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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







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Why Engineered Wood Products?

- ✔ **Sustainable**
 - Small dimension lumber
- ✔ **Predictable**
 - Less shrinkage
- ✔ **Performance**
 - Lighter and longer lengths
- ✔ **Less Waste**
 - Efficient use of the wood fiber in manufacturing

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Questions?



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APA Update Newsletter
(www.apawood.org)

November 2020

APAUPDATE
PUBLICATIONS, VIDEOS, CAD DETAILS AND MORE



Now, due to COVID-19 related measures, we are unable to fulfill orders of printed publications at the time. These publications are available as downloadable PDFs.

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OnDemand Webinars

21 new webinars offer credits. Topics include learning to maximize and minimize construction, sustainability of engineered wood products, and more.

Webinars

Webinars: Engineered Wood Details and Design of Wood Connections. Offer up to 30 CEUs through AIA, ASCE, ICC, and IBC®.






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