A Guide To
Engineered Wood Products

APA


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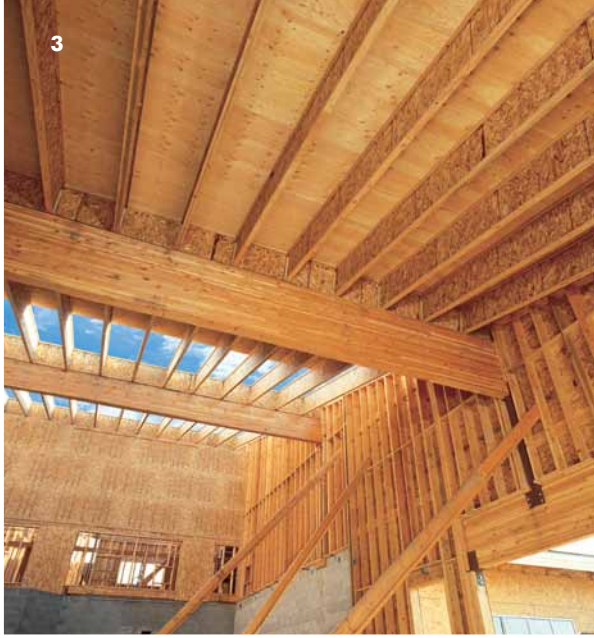
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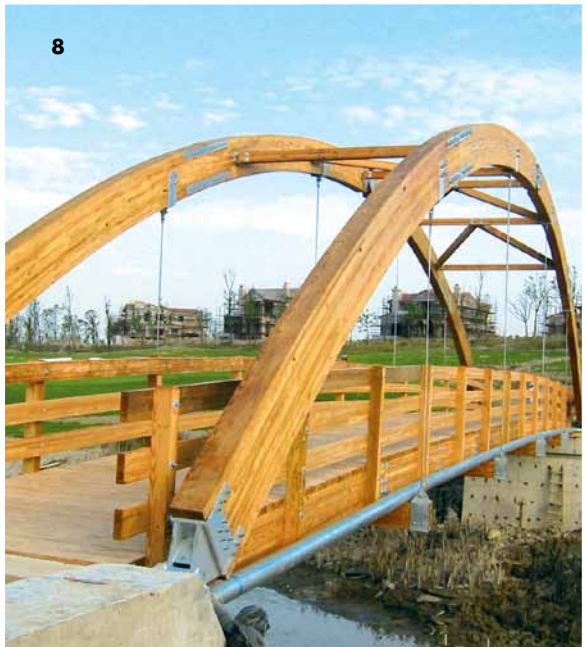
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Today, wood takes on the mantle of new technology with glued engineered building products that maximize the forest resource and deliver optimum design values to the design professional. Engineered wood products are used in a vast range of applications, from home construction to commercial buildings to industrial structures.

Recognized as the voice of the engineered wood products industry, *APA – The Engineered Wood Association* is a nonprofit trade association that has grown and evolved with the product manufacturers it represents. When APA started as the Douglas Fir Plywood Association in 1933, the industry produced only one product – sanded plywood – for three markets: doors, drawer bottoms, and automobile running boards. DFPA's name was changed to the American Plywood Association when the industry grew to include products manufactured from other species, notably southern pine. And, in 1994, the name changed once again to *APA – The Engineered Wood Association* as glued laminated beams (glulam), I-joists, and structural composite lumber (SCL) joined plywood and oriented strand board (OSB) in the product mix.

This brochure describes the engineered wood products covered under the auspices of the APA's quality and technical programs and illustrates a sampling of the building systems to which they can be applied.

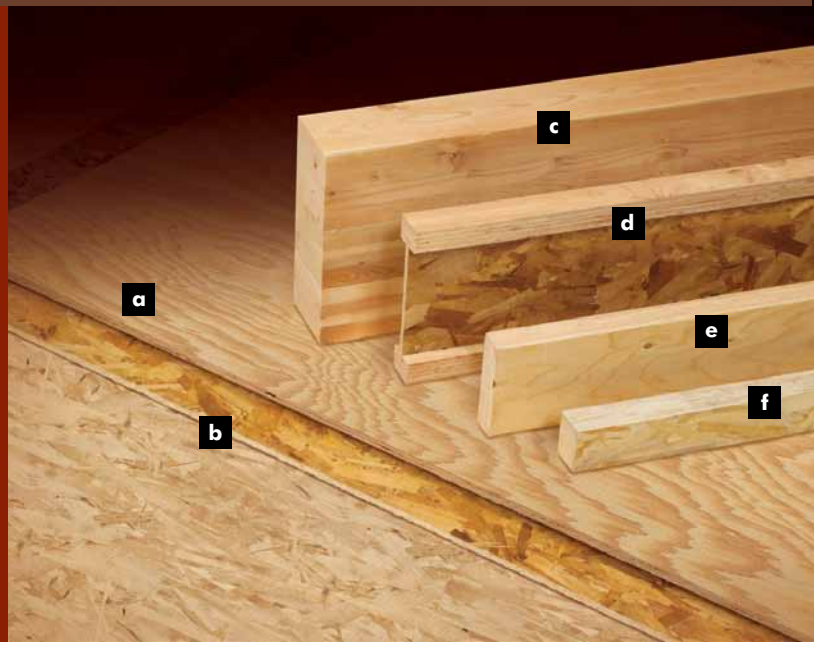
PHOTO DESCRIPTIONS

1. Fully sheathed OSB walls provide superior racking and shear strength to this church.
2. Plywood and OSB wood structural panel sheathing and roofing products deliver strength and safety to residential structures.
3. Large commercial buildings, such as this school, incorporate engineered wood systems for efficient, fast and strong construction.
4. I-joist-compatible glulam beams are designed to match the depths of I-joists used in residential construction, allowing ceilings to be framed flush with no need for extra furring.
5. I-joist-compatible LVL beams are designed to match the depth of the I-joist.
6. This commercial building in incorporates OSB for strong construction.
7. Industrial products, such as plywood shipping crates and containers, also benefit from the use of wood structural panels.
8. Treated glulam products can be used in exposed applications like bridges, utility poles and crossarms, and docks.
9. For commercial developments, such as this hotel, plywood offers maximum design flexibility while maintaining structural integrity.

ENGINEERED WOOD PRODUCTS FOR SUPERIOR PERFORMANCE

Engineered wood products manufactured by APA members include:

- **a.** Plywood
- **b.** Oriented Strand Board (OSB)
- **c.** Glued Laminated Timber (Glulam)
- **d.** I-joist
- **e.** Laminated Veneer Lumber (LVL)
- **f.** Oriented Strand Lumber (OSL)



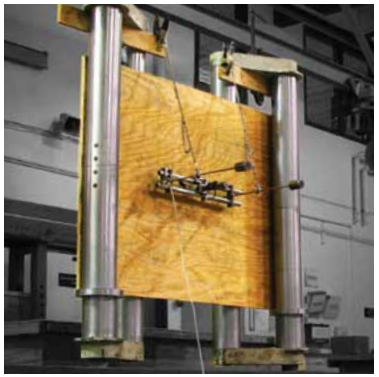
Plywood

THE ORIGINAL ENGINEERED WOOD PRODUCT

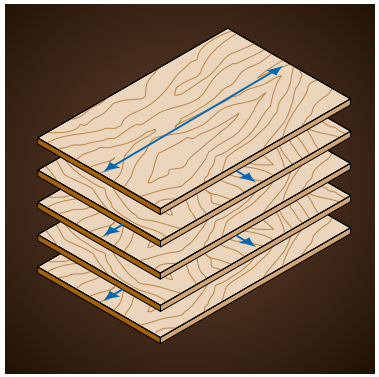
Plywood is manufactured from sheets of cross-laminated veneer and bonded under heat and pressure with durable, moisture-resistant adhesives. Engineered for superior strength, stiffness and versatility, plywood has been one of the most ubiquitous building products for decades.

Plywood manufactured by APA member mills is available in a wide variety of grades ranging from smooth, natural surfaces suitable for finish work and underlayment to more economical grades used for wall sheathing, subfloors and siding. With more than a dozen common thicknesses and over twenty different grades, it's easy to specify the right plywood panel for the job.

Several thin sheets of wood, or veneers, are laminated together under heat and pressure to produce plywood.



APA-trademarked wood structural panels are manufactured under one of the most stringent quality assurance programs in North America.



By alternating the grain direction of the veneers from layer to layer, or "cross-orienting", panel strength and stiffness in both directions are maximized.

PANEL PERFORMANCE CATEGORIES:
5/16, 3/8, 15/32, 1/2, 19/32, 5/8, 23/32, 3/4, 7/8, 1, 1-1/8.

PANEL SIZES:
4' x 8', 4' x 9', 4' x 10'.

COMMON USES:
Floor, wall and roof sheathing, siding, concrete forms, furniture, boats, industrial containers and pallets.

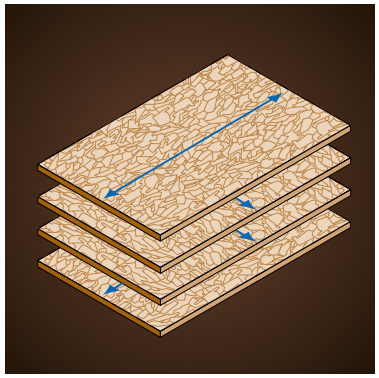
Oriented Strand Board (OSB)

UNLIMITED APPLICATIONS

OSB is manufactured from rectangular-shaped strands of wood that are oriented lengthwise and then arranged in layers at right angles to one another, laid up into mats, and bonded together with moisture-resistant, heat-cured adhesives. This results in a structural engineered wood panel that shares many of the strength and performance characteristics of plywood. OSB is a solid panel product of consistent quality without laps, gaps or voids.

OSB is produced from thin rectangular-shaped wood strands that are formed in a mat.

Quality inspection and testing are important APA functions.



Cross-oriented layers provide strength and stiffness to OSB panels.

PANEL PERFORMANCE CATEGORIES:
5/16, 3/8, 7/16, 15/32, 1/2, 19/32, 5/8, 23/32, 3/4, 7/8, 1, 1-1/8.

PANEL SIZES:
4' x 8', 4' x 9', 4' x 10' (manufactured in 8' x 24' or larger panels which can be custom-cut by most manufacturers).

COMMON USES:
Floor, wall and roof sheathing, furniture and industrial containers.

I-Joist

A HIGH-PERFORMANCE ADVANTAGE

I-joists are "I"-shaped engineered wood structural members designed for use in floor and roof construction. The product is prefabricated using sawn or structural composite lumber flanges and OSB webs, bonded together with exterior-type adhesives. The flanges resist common bending stresses while the web provides outstanding shear performance.

I-joists intended for use in residential floors are typically limited to an L/480 maximum live load deflection, a criteria that provides superior floor performance. APA introduced the PRI-400 family of Performance Rated I-Joists to simplify the specification, purchase, and installation of I-joists in residential floors. Residential I-joists are typically available in four depths: 9-1/2, 11-7/8, 14, and 16 inches.

Most manufacturers supply I-joists to distributors and dealers in long lengths (up to 60 feet) that are then cut to commonly used lengths for shipment to the jobsite. This makes it easy to handle and install the joists and results in less waste.

APA trademarked I-joists adhere to the quality guidelines set by industry and building code jurisdictions.

Consistent performers, I-joists are manufactured to specific depths commonly used in residential construction.

I-joists provide a high-performance alternative to dimension lumber joists for residential and light commercial floor applications.

COMMON DEPTHS:
9-1/2", 11-7/8", 14", 16". Flange widths vary from 1-1/2" to 3-1/2"; long lengths are readily available.

COMMON USES:
Floor and roof framing.

Glued Laminated Timber

OVER 100 YEARS OF STRENGTH, BEAUTY AND RELIABILITY

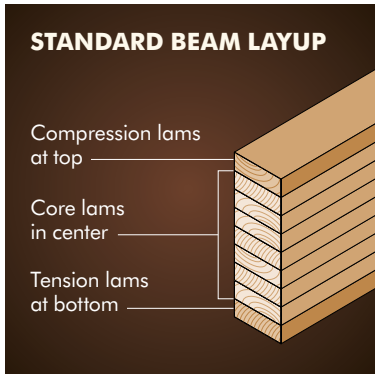
Glued laminated timber, or glulam, is a highly innovative and versatile construction material with many end uses, ranging from simple beams and headers in residential construction to soaring glulam arches for domed stadium roofs spanning more than 500 feet.

Glulam is composed of individual wood laminations, or "lams", specifically selected and positioned in the timber, based on their performance characteristics, and bonded together with durable, moisture-resistant adhesives. Glulam is available in depths from 6 to 72 inches or greater and in lengths up to 100 feet and longer.

Glulam is the only engineered wood product that can be produced in curved shapes and is available in a range of appearance characteristics to meet end-use requirements. Regardless of the appearance characteristics specified, the end use structural performance will be the same for a given grade.

Glulam has greater strength and stiffness than comparable dimensional lumber and, pound for pound, is stronger than steel.

Glulam beams, which can be manufactured in virtually any size or shape, offer unlimited design flexibility.



Wood laminations, or "lams", are bonded together with moisture-resistant adhesives to produce glulam.

COMMON SIZE RANGE:
Widths from 2-1/2" to 10-3/4", although virtually any member width can be custom manufactured in nearly any depth or length.

COMMON USES:
Purlins, ridge beams, floor beams, headers, complex arches, commercial roof systems, bridges and utility poles.

Structural Composite Lumber

MAKING THE BEST USE OF RESOURCES

Structural composite lumber (SCL) is a family of engineered wood products created by bonding layers of dried and graded wood veneers or strands with moisture-resistant adhesive into blocks of material known as billets that are cured in a heated press. The manufacturing process enables large billets to be made from the strongest fibers of relatively small trees of many species, providing an efficient utilization of wood fiber resources.

SCL is typically available in various dimensions and is easily worked in the field using conventional construction tools. Members of the SCL family, which includes laminated veneer lumber (LVL), parallel strand lumber (PSL), laminated strand lumber (LSL) and oriented strand lumber (OSL), are solid, highly predictable and uniform engineered wood products that are sawn to consistent sizes and are virtually free from warping and splitting.

COMMON SIZE RANGE:
3/4" to 3-1/2" thick; depths and lengths to match the end use.

COMMON USES:
Headers, beams, rafters, studs, joists, columns and I-joist flange material

Wall studs are just one of the many applications of LVL, the most widely used SCL product.

Highly predictable and uniform LVL is used as a floor beam.

SCL is manufactured from the fibers of many species of trees to maximize the advantage of wood's natural strengths.

Samples of LVL undergo duration of load testing at APA's 42,000-square-foot Research Center in Tacoma, WA.

Rim Board®

AN INTEGRAL SYSTEM COMPONENT

APA Performance Rated Rim Board® is a specially designed component that is engineered to work in concert with wood I-joists to deliver a complete engineered wood framing solution. Rim Board can be made from plywood, OSB, glulam or SCL. Conventional solid-sawn lumber rim boards typically do not match the depths of the new generation of wood I-joists.

APA Performance Rated Rim Board closes the space between the sill plate and the bottom wall plate, or between the top plate and bottom plate in multi-floor construction. In addition to closing the void, rim board is an integral structural component that transfers both lateral and vertical forces. To function properly, the rim board must match the depth of framing members, and have similar dimensional change characteristics.

COMMON SIZES:
1", 1-1/8" thick; depths to match I-joists (9-1/2" to 24"); lengths up to 24' for some products.

COMMON USE:
Rim board in floor systems.

An APA Performance Rated Rim Board sample is evaluated for structural performance at the APA Research Center.

Typical OSB rim board bears fully on the mudsill and is face-nailed into the I-joist flange end and toe-nailed to the sill plate.

An engineered floor system is a cost-effective solution for residential and light commercial applications.

Engineered Wood

CONSTRUCTING A GREEN FUTURE FOR THE ENVIRONMENT

Wood is a natural, renewable, and sustainable building material, and engineered wood products are a naturally superior environmental choice. In a world rife with green labels, standards and guidelines, it's a challenge to sort fact from fiction.

FACT: We're not running out of trees in North America. Forest growth in the U.S. has continually exceeded harvest since the 1940s. Today, forest growth exceeds harvest by 47 percent, despite an ever-growing population and steady demand for wood and paper products. Thanks in large measure to steady regeneration efforts, North America's forests have grown in volume by roughly 20 percent since 1970 and are about the same size as they were 100 years ago.

FACT: Forests and the wood products that come from them are a positive force in the emerging climate change debate. Forests clean the air by removing pollutants, absorbing carbon dioxide and releasing oxygen. Trees incorporate the absorbed carbon into their wood, and the products made from that wood, such as plywood and engineered wood products, continue to store that carbon indefinitely.

FACT: Manufacturing processes associated with wood products require less fossil fuels than other building materials, and are responsible for far fewer greenhouse gas emissions than recorded in the manufacture of steel, concrete, and plastics. Forest and mill residues and other woody biomass can be used as fuel to produce clean bioenergy, further reducing emissions.

FACT: Wood's environmentally superior nature makes it an ideal material to use when building green. Green building incorporates building design, construction and maintenance systems to complete an energy-efficient, environmentally-friendly, and sustainable building. Engineered wood products offer both the versatility and strength to work well in advanced and innovative building systems that optimize both sustainable materials and long-term performance.

FACT: Engineered wood products – including plywood, OSB, glulam, I-joists, structural composite lumber, and Rim Board – make more efficient use of the available resource today than ever before. Engineered wood can be manufactured from fast-growing, underutilized, and less expensive wood species grown in privately managed forests. That helps safeguard older forests that as a society we have chosen to preserve. Engineered wood also eliminates many of the natural defects found in wood, thereby improving upon many of the material's inherent structural advantages.

SOURCES AND MORE INFORMATION

- *Tackle Climate Change – Use Wood,* BC Forestry Climate Change Working Group and the California Forestry Association, in cooperation with WoodWorks.
- ATHENA Sustainable Materials Institute, www.athenasmi.ca
- *U.S. Forests Facts & Figures 2001*, American Forest & Paper Association, www.afandpa.org
- *Evergreen Magazine*, www.evergreenmagazine.com

What's in a Trademark Stamp?

Always insist on panels bearing the mark of quality – the APA trademark. Your APA panel purchase or specification is your highest assurance of quality.

Some plywood panels are manufactured under the detailed manufacturing specifications or under the performance testing provisions of Voluntary Product Standard PS 1 for Structural Plywood, developed cooperatively by the plywood industry and the U.S. Department of Commerce. Other plywood panels, as well as OSB panels, are manufactured under the provisions of APA PRP-108, Performance Standards and Qualification Policy for Structural-Use Panels, or under Voluntary Product Standard PS 2, Performance Standard for Wood-Based Structural-Use Panels, that establish performance criteria for specific construction applications.

APA I-joists are manufactured in accordance with Performance Standard for APA EWS I-Joists, PRI-400, or applicable building code provisions. APA Rim Boards are manufactured in accordance with American National Standard for Performance-Rated Engineered Wood Rim Board, ANSI/APA PRR-410, Performance Standard for APA EWS Rim Boards, PRR-401, or applicable building code provisions.

Glulam beams are certified with the APA EWS trademark. The mark signifies that the manufacturer is committed to a rigorous program of quality verification and testing and that products are manufactured in conformance with American National Standard for Structural Glued Laminated Timber ANSI/AITC A190.1. The APA and APA EWS trademarks are recognized by all major model building codes.

APA at Your Service

APA offers a comprehensive set of services and tools to serve the engineered wood industry. In addition, APA's resources help design and construction professionals properly specify APA engineered wood products and building systems. If you're looking for detailed product information, training material, or technical assistance, APA can help.

TAP INTO APA'S EXTENSIVE KNOWLEDGE AND RESOURCES:

- A comprehensive web site, offering a wealth of technical information for architects, builders, code officials, engineers, specifiers, manufacturers, and others in the trade (apawood.org)
- More than 600 free downloadable publications and CAD details featuring product information and design recommendations
- Training materials and assistance, including Wood University, APA's online portal for engineered wood education (www.wooduniversity.org)
- Free technical assistance from the Product Support Help Desk: call (253) 620-7400 or e-mail help@apawood.org
- Field representatives in many major U.S. cities and in Canada

For additional information on wood construction systems, contact APA, 7011 So. 19th St., Tacoma, Washington 98466, or visit www.apawood.org. For a list of additional APA publications, request or download the APA Publications Index, Form B300.

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