

ENGINEEREDWOOD

AUTUMN 2014

Journal



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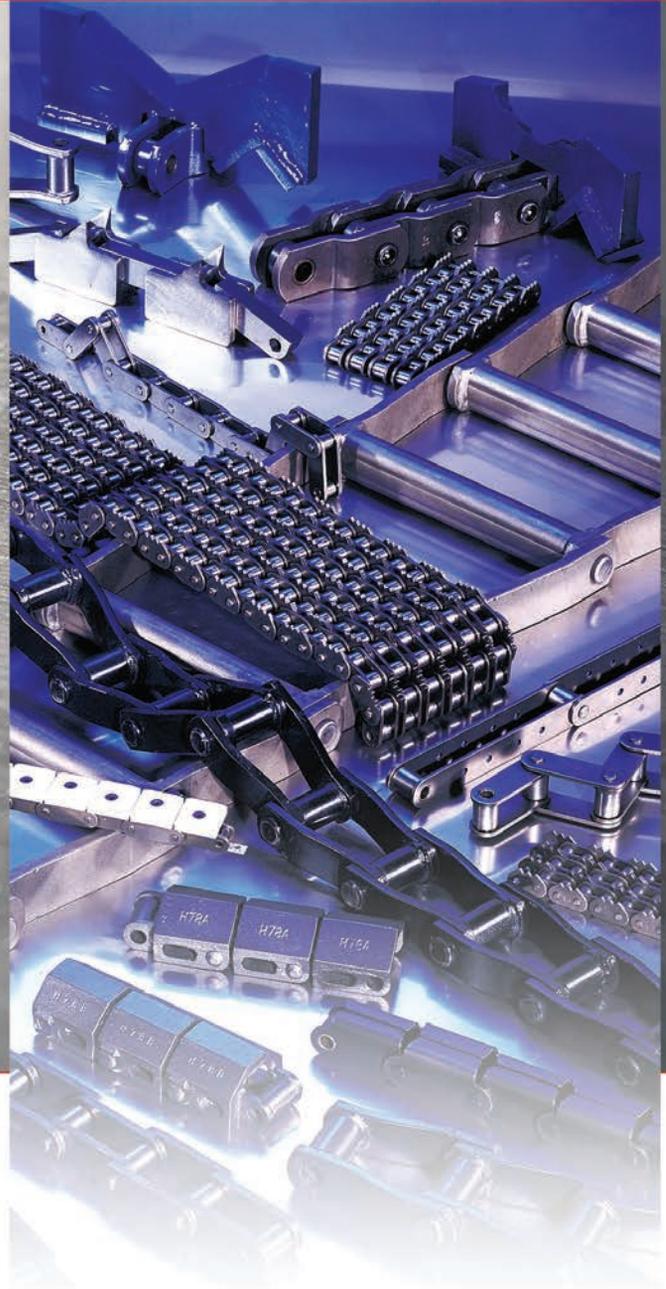


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ENGINEERED WOOD JOURNAL
Volume 17, No. 2, Autumn 2014

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**Engineered Wood
Technology Association**
7011 South 19th Street
Tacoma, WA 98466
Phone: 253-620-7237
ewta@apawood.org
www.engineeredwood.org

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About the Cover Photo:
Cross-laminated timber panels join glulam columns and beams in this hybrid construction project in Quebec City, Quebec, supplied by Nordic. (Image courtesy of Nordic)



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CORRECTION: In the “Better Times Ahead” feature in the Spring 2014 issue of the *Engineered Wood Journal*, RoyOMartin’s Oakdale, La., OSB mill was incorrectly listed in Cordele, Ga. The *Journal* regrets the error.



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PRIME *lines*

Rebuilding Together

As I was preparing feature stories for this issue of the *Engineered Wood Journal*, I was hearing a lot about tall wood structures built with cross-laminated timber: a 32-story wooden skyscraper in Sweden, a 10-story apartment structure in Australia – even talk of a future 42-story wood tower in Chicago. When I got ready to put pen to paper and realized tall wood structures were still years away from becoming a reality here in North America, the wind left my sails. Cross-laminated timber – or CLT – was being used with increasing frequency in mid-rise commercial structures, but how exciting would that be? Incredibly exciting, I found out.

CLT is the newest engineered wood product to hit the market. It's manufactured by alternating layers of timber crosswise at 90 degree angles, with adhesive between each layer. The result is an extremely strong panel that can be used in long spans such as floors, walls or roofs. Because panels can be prefabricated before being brought to the jobsite, construction of buildings using CLT is usually much quicker than concrete or steel.

Two APA-member companies, Structurlam of Penticton, B.C., and Nordic Engineered Wood of Chibougamou, Quebec, are currently producing and selling CLT. Structurlam's fast-growing production capacity of CLT has doubled since the company started producing it three years ago. The company has provided CLT products for the Wood Innovation and Design Centre at the University of Northern British Columbia in Prince George, B.C., and the Earth Sciences Building on the Vancouver campus of the University of British Columbia, and has more CLT projects on the books. Nordic has also jumped into the CLT market, supplying a number of projects with the product. The company even self-performed construction of a four-story condominium building in northern Quebec in just 22 working days, proving CLT's efficiency.

As CLT's popularity grows, the industry responds. APA has recently put considerable effort into creating a set of national standards – detailed in our story on page 12 – that govern the manufacture and use of CLT, and the American Wood Council has simultaneously created the “CLT Design Handbook” that spells out national standards on the design side.

How exciting is that?

100 Members Strong

EWTA's long-standing goal of attaining 100 member companies has become a reality. At press time, membership hovered around 100 – an all-time high for the association. Thank you to the entire EWTA family of companies for supporting the association in achieving this important milestone. Our new and returning members are introduced on page 50, and EWTA's Membership Directory (included in this issue) lists these as well as existing members.

See you at Info Fair!

In less than a month, EWTA and APA members will be gathering in San Antonio for APA's Annual Meeting and EWTA Info Fair. Plans for an informative and enjoyable event are well underway, and we look forward to taking part in the numerous workshops, and events that are scheduled. Read the article about the meeting and Info Fair and check out the list of EWTA member Info Fair exhibitors on page 24.

See you in November!



scain@engineeredwood.org

Weyerhaeuser Plans HQ Move to Seattle's Pioneer Square

Weyerhaeuser announced recently that it plans to move its headquarters and 800 employees from Federal Way, Wash., to Seattle's Pioneer Square neighborhood approximately 20 miles to the north.

In a statement, Weyerhaeuser President and CEO Doyle Simons said the company's current 430-acre campus is too large and expensive for its needs.

Weyerhaeuser said it intends to sell its Federal Way property, which includes 750,000 sq. ft. of office, research and industrial space. The company moved to the campus in 1971. Weyerhaeuser was founded in Tacoma, Wash., in 1900.

The move north is expected to occur in 2016 following the construction of Weyerhaeuser's new 200,000-sq.-ft. Pioneer Square building.

Housing Starts Up In Second Quarter

With the return of more normal weather conditions, housing starts in the U.S. ran at a seasonally adjusted annual rate of 980,000 units, up from an annual rate of 925,000 units in the first quarter, APA announced in July. Second quarter housing starts were also up in Canada, running at an annual rate of 197,300 units compared to 174,700 in the first quarter.

The improvement in new residential construction helped drive North

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American structural panel consumption to 7.52 billion sq. ft. in the second quarter, up 2.6 percent from the second quarter of 2013. Structural panel production totaled 7.76 billion sq. ft., an increase of 4.6 percent from a year ago. OSB led the increase in consumption, as it was up 7.8 percent compared to the second quarter of 2013, while plywood consumption fell 5.3 percent.

Similar to the first quarter of this year, the production pattern of engineered wood products was mixed. Compared to the second quarter of 2013, North American I-Joist and LVL production was up 22 percent and 20 percent, respectively. Glulam production was down 2 percent.

Continuous Sheathing Approved in Moore, Okla.

The City of Moore, Okla., recently adopted an ordinance that amends the city's building code provisions to require more wind-resistant construction systems that will better withstand the force of tornadoes and high winds. The new code provisions, many of which are based on APA's recommendations for continuous sheathed wood structural panel wall systems, were put in place by the city council less than a year after the May 20, 2013, EF5 tornado struck the town and caused extensive damage.

The new code provisions, which also include requirements for plywood or OSB on gable end walls, overlapping wood structural panel sheathing at rim boards, and continuously sheathed portal frames at garage door openings, emphasize the importance of increasing a structure's survivability along the peripheral edges of a large tornado.

Many of the building provisions included in the amended building code for Moore, Okla., are described in APA's guide, *Building for High Wind Resistance in Light-frame Wood Construction*, Form M310. The guide is available for free download from the APA Publications Library at www.apawood.org.



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IN MEMORIAM

Terry L. Christiansen

Terry L. Christiansen, 75, died May 2, 2014, in Fayetteville, Ga. Mr. Christiansen worked for 45 years for Georgia-Pacific Corporation and was vice president of plywood manufacturing when he retired. In 2005, Christiansen was honored as the first recipient of APA's Bronson J. Lewis Award in recognition of his leadership role in the development, expansion and success of the Southern Pine plywood industry. He is survived by his wife, Jeanette Christiansen, of Fayetteville, Ga.; seven sons; eight grandchildren; a sister and a brother.

Mark D. Finn

Mark D. Finn, vice president of sales and marketing for EWTA member company McLube Division/McGee Industries Inc., died April 20 after a long battle with cancer in Kennett Square, Penn. He was 59. Mr. Finn joined McLube's sales team after earning his bachelor's degree at the University of Delaware. He later earned his master's degree from West Chester University. In 2000, Finn was promoted to vice president of marketing and sales. Mr. Finn is survived by his wife Linda, two sons, two daughters and his parents.

Thomas M. Maloney

Thomas M. Maloney, 83, died June 18 at his home in Pullman, Wash. Mr. Maloney had a distinguished career as a professor of mechanical and materials engineering at Washington State University and was a recognized authority on wood composite materials. He served as president of the Forest Products Society and received numerous awards, including APA's Bronson J. Lewis Award. When he received the APA award in 2007, it was noted that he led the WSU Wood Materials Engineering Lab to prominence in providing technological breakthroughs and product evolution that has supported the wood industry's expansion of engineered wood products. Maloney is survived by his wife Donna, a daughter, two sons, a sister and four grandchildren.



Bill Mitchell

Long-time forest products industry specialist William (Bill) Mitchell died May 10 in Boring, Ore. He was 64. Mr. Mitchell had worked with The Beck Group of Portland, Ore., for more than 28 years. Before coming to work as a consultant with Tom Beck, Mr. Mitchell worked in sawmill and plywood operations, including positions at International Paper, Weyerhaeuser and Roseburg Forest Products.

David Parker

David M. Parker, longtime president, CEO and chairman of the board of EWTA member company M-E-C Company, died April 29 in Tulsa, Okla. He was 82. Mr. Parker began his career with ADM in Neodesha, Kan., in 1957. In 1961 he was instrumental in forming M-E-C Company, where he served as president for 45 years, retiring in 2011. After his retirement, Mr. Parker served as chairman emeritus until his death. He is survived by his wife Joan, three children, four grandchildren and two great-granddaughters.

Gary Raemhild

Gary Allen Raemhild, a major figure in the development and implementation of air emissions control technology for the panel industry and a majority owner of Geoenergy International Corp., died March 21 in Seattle. He was 67. In 2002, EWTA member company AH Lundberg Associates purchased the proprietary technology developed by Mr. Raemhild and his business partner from Geoenergy and formed the Geoenergy Division. The two men headed up the division and carried on the business of supplying air pollution control systems to the wood products industry while also branching into other industries. Mr. Raemhild is survived by his wife Meran, three children, a sister and a nephew.

Eugene L. Walters

Eugene "Gene" Lionel Walters, 77, passed away June 2 in Corvallis, Ore. He worked for Setzer Forest Products and Long Bell Lumber in California, North Pacific, Boise Cascade and Willamette Industries, finishing his career as Willamette's western and southern wood products sales manager. He was a member of APA's Marketing Advisory Committee and an active participant at association events. He is survived by his wife Virginia, a daughter, son, four grandchildren and nine great grandchildren. Memorial contributions can be made in his honor to the Michael J. Fox Foundation for Parkinson's Research.





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Standing Tall

Cross-Laminated Timber Use Increasing in Mid-Rise Structures

by Sheila Cain



Image courtesy of Nordic

At the Prochute building in Saint-Lambert, Quebec – an office building for which Nordic supplied CLT and other materials in 2012 – crews used CLT balloon frame panels on a glue laminated timber column and incorporated a beam superstructure that used steel decking and concrete.

Designers and builders of tall and mid-rise structures have a new option in wood design with an innovative product that is gaining attention throughout North America.

While plywood, OSB and wood-framing are still sound options for use in construction of multifamily and mid-rise projects, cross-laminated timber is proving to be a popular material in projects on the taller side. Although the International Building Code limits the height of wood-framed residential buildings in the U.S. to no more than four stories (with some exceptions), local jurisdictions can approve construction of wood buildings outside the prescribed building code on a case-by-case basis. Europe and Australia

have seen dozens of “tall” wood buildings take shape, and cross-laminated timber is now being considered in North American structures that would typically be built with more conventional materials and technologies.

Cross-laminated timber, or CLT, is an engineered wood building product designed for increased dimensional stability and strength in framing systems. It is used most often for long spans in floors, walls or roofs, and can be preassembled in panels for quick construction on the jobsite. CLT panels are manufactured similarly to glulam, but by alternating layers of timber crosswise at 90 degree angles. Adhesive is applied between each layer – usually three, five or seven layers

– and the panel is pressed. CLT panels can be manufactured to a variety of dimensions. Panels are fabricated and cut to size offsite and brought to the jobsite ready to assemble, making construction much quicker than typical steel and concrete construction methods.

CLT in Mid-rise Construction

This past summer, architect Tim McLennan of Faction Projects used cross-laminated timber in the construction of his company’s new mid-rise headquarters building in Kelowna, B.C. (see side story, *Form and Function*). The 14,000-sq.-ft. structure used seven-ply CLT for the building’s floor systems and five-ply CLT for the roof; both manufactured by APA

member Structurlam Products Ltd. of Penticton, B.C. Since the seven-layer floor panels are only 9-1/2 inches thick (about the same thickness as concrete), the designers were able to preserve a high ceiling. Installation was quick and waste was kept to a minimum. The building's 20-ft structural grid flooring system was designed with Structurlam's 10-by-40-ft panels in mind, which meant very little of the 400-sq-ft- panels went unused.

Another mid-rise project that has gained substantial recognition for its use of CLT is the Earth Sciences Building on the Vancouver campus of the University of British Columbia. The five-story, 158,770-sq.-ft. research, teaching and office facility uses wood as its primary structural material; specifically in its north wing. This project is a Canadian Wood Council demonstration project utilized to advance the vision of the Canadian wood products industry. The project used 166 CLT panels in the roof and canopies.

These two mid-rise structures are perfect examples of CLT use in North America – projects that fall within the current height and area restrictions for wood construction in the Canadian codes, yet incorporate a material that is proving to be affordable, easy to use, and arguably more sustainable than steel or concrete.

In Europe and elsewhere, use of CLT is more prevalent. The material has been in use overseas longer than in North America, and owners, designers, builders and municipalities are more comfortable using the product in tall buildings. Back in 2009, the nine-story Murray Grove apartment complex in London was the first building of its kind to use prefabricated CLT panels for its load bearing walls and floor slabs, as well as its stair and elevator cores. Designed by architects Waugh Thistleton of London, the 29-unit building was heralded for its reduction of carbon emissions and – thanks to its use of prefabricated panels – low generation of construction waste. Construction was also extremely fast: the building was completed in just 49 weeks. Other tall wood projects in Germany, England, Austria and Australia have also been completed successfully.



Image courtesy of Structurlam Products LP

The Earth Sciences Building on the Vancouver campus of the University of British Columbia used 166 CLT panels in its roof and canopies.



Image courtesy of Structurlam Products LP

Crews oversee CNC panel cutting of cross-laminated timber panels at Structurlam's Okanagan Falls, B.C., manufacturing facility.

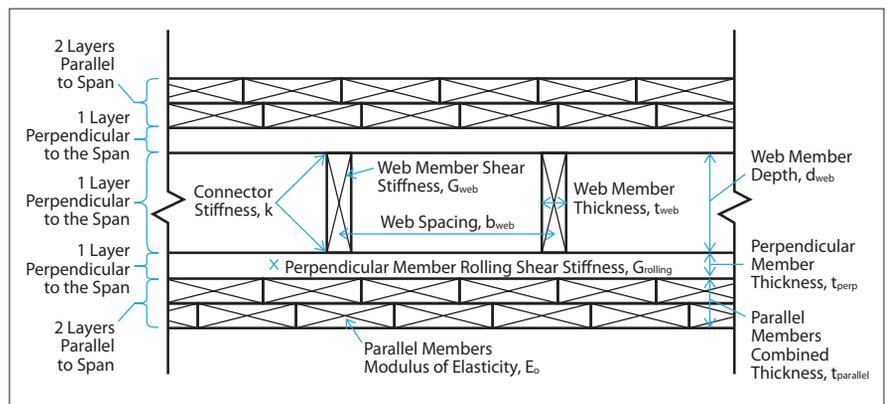


Image courtesy of Clemson University, Wood Utilization + Design Institute

This image shows a cross section of a CLT hollow floor system – a project under study by research students in Clemson University's Wood Utilization + Design Institute in Clemson, S.C.

Even taller wood buildings are in the pipeline or under serious discussion. In Sweden, building officials have approved the construction of a 32-story wooden skyscraper using CLT.

The design and construction of wood buildings taller than four or five stories is slower to catch on in the U.S, but that doesn't mean such structures aren't being considered. Chicago architectural firm Skidmore, Owings & Merrill has gained significant attention for proposing a 42-story tower made of wood. Despite building codes' prescribed limits on wood structures' height and area, owners and designers may be still able to approach local jurisdictions with requests

to construct tall wood buildings based on performance-based design methodologies.

Gaining Approval

For the most part, however, North American builders are working within the currently prescribed height and area limits for wood construction, and they are finding that CLT is an economical, strong and easy-to-work-with wood product. Recent regulatory efforts by APA are helping to pave the way for owners, architects, engineers and contractors to use CLT in their building projects. The association recently wrapped up a four-year effort to create a consensus-

based national standard that governs the manufacture and use of CLT. "ANSI/APA PRG 320" has been adopted by the 2015 IBC. This means CLT is a recognized building material, making it easier for those hoping to use it in projects to gain approval from building departments. Addressed in the standard – which is also recognized by CSA O86-14 Engineering Design in Wood in Canada as well – are the manufacture of CLT, materials used, quality control and trademark issues. The 29-page document is available as a free download on the APA website at www.apawood.org.

While APA has focused on creating a product standard for CLT, the American

Form and Function

B.C. Office Building Early User of CLT

When he set out to design his company's new headquarters building on Lakeshore Road in Kelowna, B.C., architect Tim McLennan of Faction Projects knew quickly that cross-laminated timber was an ideal material. Several of CLT's key attributes, including a slim profile, fire resistance ratings, ease of installation, and beauty, all contributed to the project's success.

Developed, designed and built by Faction's integrated team, the 14,000-sq.-ft. office building – completed this past summer – will also house leased tenants. The site backs up to Mission Creek and a greenway system in Kelowna's Mission neighborhood, also home to resort developments and residential areas.

That setting drove McLennan's overall design direction.

"We wanted to build in a way that didn't overwhelm the low-density neighborhood," he said. "We looked for opportunities to screen views and protect them."

The resulting three-story structure is respectful of its surroundings, with a low profile, yet modern in its angles and appearance. Exposed wood and orange accents offer visual interest and a rustic nod to the Pacific Northwest architecture of the surrounding area.



Image courtesy of APA

To achieve the smaller scale without sacrificing profitable density, McLennan looked to the overall building layout and the structural materials themselves. The building is framed with glulam post and beam, with CLT making up the floor and roof systems.

The team used seven-ply CLT from APA member Structurlam Products Ltd., Penticton, B.C., for the floor systems and five-ply CLT for the roof. Unlike the thicker floor build-up of a wood or steel joist system, the seven-layer panels are only 9 1/2 inches

thick, similar to the thickness of concrete. This allowed the building to have a slightly smaller massing while still preserving high ceilings.

For the roof system, the CLT panels extend beam to beam, eliminating any need for secondary structural supports that would interrupt open-concept offices.

On the exterior, CLT's cantilever capabilities add key façade features. On the east-facing side, 5-ft balconies serve as a sunscreen as well as a tenant amenity. On the west-facing side, an angled roof over-

Wood Council has been pursuing the CLT design standards. The AWC's national design standards will be published later this year and have been included in the 2015 IBC along with the CLT product standards. The "CLT Design Handbook" has been developed and published by a consortium of five organizations: FPInnovations, APA, American Wood Council, U.S. Department of Agriculture Forest Products Laboratory (USDA FPL) and WoodWorks. It was funded by \$1.3 million from the USDA FPL, the Binational Softwood Lumber Council, CLT manufacturers, British Columbia's Forestry Innovation Investment and industry associations. The 12 chapters



CLT studies at Clemson University's Wood Utilization + Design Institute in Clemson, S.C., include testing the performance of structural adhesive between the flanges and the web of a specimen. Image courtesy of Clemson University, Wood Utilization + Design Institute

in the handbook address all aspects of CLT design, such as connections, vibration, lateral design and acoustics. The handbook is available for free download at www.masstimber.com.

CLT Studies

A number of CLT research studies address the feasibility of CLT use, including three currently underway at Washington State University's Composite Materials and Engineering Center (CMEC) in Pullman, Wash. Two are federally funded: a high-performance CLT study backed by the USDA and a seismic CLT study funded by the National Science Foundation. The goal of a third, industry-funded

hang ranging from 10 ft. to 5 ft. enhances the entryway while protecting it from the elements.

Structurlam, which also manufactured the glulam columns, produces its CLT product in accordance with ANSI/APA PRG-320 Standard for Cross-Laminated Timber, the standard which provides requirements and test methods for qualification and quality assurance of CLT. The standard includes seven stress classes and custom product options covering major wood species in North America.

Simplified Installation

Like other wood products, CLT provides a familiar material for contractors and elimi-

nates much of the hassle related to cast-in-place concrete: panels arrive ready to install with traditional tools. McLennan estimates the entire frame was erected in about three weeks, significantly less than the time required for concrete. In addition, the panels are one-sixth the weight of concrete.

Simplifying installation even further, the architect designed the floor system in a 20-ft. structural grid. Since Structurlam's CLT is manufactured in 10-by-40-ft. panels, this meant that very little of the 400-sq.-ft. panels was wasted.

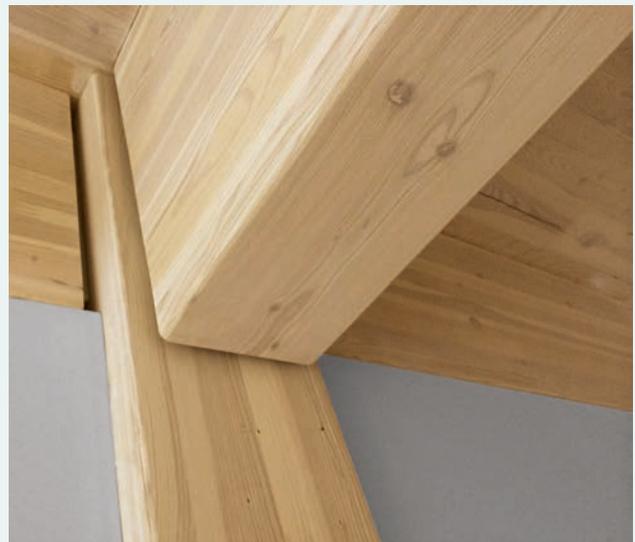
McLennan specified off-the-shelf Pitzl connectors from Germany, a fully concealed and shop installed connector, to further

streamline interior appearance. On-site installation is also more efficient, resulting in reduced crane and crew costs. All glulam and CLT panels were fabricated on CNC machines. These innovative connectors have very tight tolerances, which Structurlam accounted for when manufacturing the CLT panels and glulam beams and columns.

A layer of architectural-grade Douglas-fir on the exposed CLT serves as built-in finish for the ceilings – another key selling point.

"That helped us with leasability," McLennan said. "They see it and it's beautiful from floor to ceiling."

Story courtesy of APA



Images courtesy of APA



Image courtesy of Nordic

Nordic has supplied CLT for a number of “hybrid” projects that feature other building materials such as glulam panels and steel connectors, including the six-story District 03 condominium project in Quebec City, Quebec, built in 2013.

research project is to encourage the manufacturing of CLT in Washington State. All three research projects are integrated into a larger mass timber initiative that includes a year-long integrated design studio for structural engineering and architecture students, helping to expose the future professional practitioners to mass timber systems.

The two-year high-performance CLT study at WSU’s CMEC began in January and is looking at innovative ways to advance mass-customization in the production of CLT, said Todd Beyreuther, an assistant research professor involved with the study. For example, researchers are designing ways to create structural composite cores for CLT panels through subtractive (milling) and additive (3D printing with wood fiber) processes that tune the structural and hygrothermal properties at the material scale and enable a higher level of integration of structural, mechanical, electrical and plumbing components at the panel assembly scale.

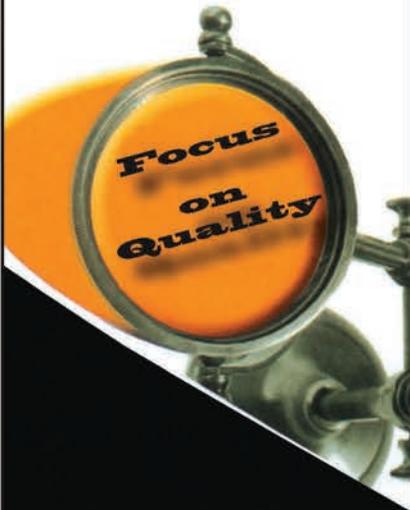
A primary goal of the study is to enable more control of integrated project teams over the design and manufacturing of CLT to meet performance-based requirements, especially regarding seismic and environmental performance. In addition to novel, next-generation assemblies for CLT, direct outcomes of the project include the development of plug-ins for BIM and parametric modeling programs that more deeply connect architects, engineers, contractors and building operators with the numerous design parameters across a complete CLT supply chain – from forest resource to manufacturing.

Also studying and promoting the uses of CLT are students at Clemson University in Clemson, S.C. The university recently launched its Wood Utilization + Design Institute, which aims to create new markets for wood-based construction materials. A team of civil engineering, architecture, forestry and construction science students has already performed extensive testing of CLT, according to Scott Schiff, PhD, profes-

sor of civil engineering at the university. A USDA-sponsored research project is studying the use of Southern Pine lumber to create CLT panels, looking at both a long-span floor system for commercial buildings and a shear wall system for resisting lateral loads.

The long-span floor system uses CLT panels to form the top and bottom flanges and traditional glulams for the webs of a multi-cell hollow floor panel. The research investigated the direct connection of the flanges to the web using either structural adhesives or long-length wood screws. The research indicates that effective connections can be made that allow this system to span roughly 40 feet with a design live load of 100 psf and satisfy strength, stiffness and vibration design criteria. The voids allow for the possibility to incorporate mechanical/electrical/plumbing conduit within the floor systems.

The shear wall research will investigate the use of panel-to-panel connections using steel connectors that can



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provide energy absorption capability during an earthquake and also be replaceable if damaged, said Schiff. Shear wall testing will be initiated towards the end of the fall semester and continue into the spring semester.

The USDA Forest Products Laboratory in Madison, Wis., is conducting the fire test for the WU+D using small CLT panels constructed with Southern Pine lumber and various structural adhesives. The goal of this fire testing is to gain a better understanding of the effective

char rate of CLT utilizing a variety of adhesives in the construction of Southern Pine panels.

CLT Success

European annual production capacities of CLT is estimated at 22 million cu. ft. Numbers are much lower in North America, but manufacturers are monitoring the building codes and developments in technology, such as the research that is underway at Washington State and Clemson. Two APA-member manufacturers,

Nordic Engineered Wood in Chibougamau, Quebec, and Pentiction, B.C.'s Structurlam, are currently manufacturing CLT.

Nordic's interest in CLT began back in 2009 when the lumber and engineered wood manufacturer was the supplier of heavy timber for a six-story office building in Quebec City. The success of the FondAction CSN building – which won a Forest Stewardship Council Greenbuild Award in 2010 – proved to the company that the market would support more commercial heavy timber structures.

“We already had the glulam capacity and the ability to perform timber framing and decking,” said Jean-Marc Dubois, Nordic's director of business development. “This was the next step and it made a lot of sense. We did our research and decided to jump in.”

Nordic later supplied the CLT and self-performed the construction of Nordic's first CLT building in northern Quebec – a four-story condominium structure built with only five laborers and an erection crew in just 22 working days in the middle of winter.

“It was all premanufactured with no retrofitting onsite,” said Dubois. “It went together like a model kit.”

Nordic has supplied CLT for a number of “hybrid” projects that feature other building materials such as glulam, steel and concrete – not unusual in CLT construction. The six-story District 03 condominium project in Quebec City, built in 2013, incorporated CLT panels and slabs with glulam products and simple connection details using nails and self-tapping screws, steel angles and steel plates.

At the Prochute building in Saint-Lambert, Quebec – an office building for which Nordic supplied CLT and other materials in 2012 – crews used CLT balloon frame panels on a glue laminated timber column and incorporated a beam superstructure that used steel decking and concrete.

Nordic is often called in by architects to discuss proper integration and connection of materials, said Dubois. In fact, Nordic recently acquired a steel manufacturing firm that creates custom connectors for jobs that blend several material types.



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Competition to Award \$2 Million for Tall Wood Projects

The U.S. Department of Agriculture in March announced a \$1 million prize competition to encourage the use of wood in the design and construction of high-rise wood demonstration projects.

The prize competition, expected to begin later this year, is open to developers, institutions, organizations and design teams. They will compete to demonstrate the architectural and commercial viability of using sustainable wood products in high-rise construction.

The department is planning to invest up to \$1 million to launch the competition. One non-profit partner, the Binational

Softwood Lumber Council, has committed an additional \$1 million for the competition. Organizers hope the competition will help spur increased sustainability in construction. Priority will be given to applicants that source materials from rural domestic manufacturers and domestic, sustainably-managed forests.

Also announced were plans for a new training program to train architects, engineers and builders about the benefits of advanced wood building materials. This program includes a \$1 million investment from the USDA Forest Service and will be coordinated in partnership with WoodWorks through the Wood Products Council, a non-profit organization that provides technical support, education, and resources related to the design of modern wood buildings for architects, engineers and developers.

Like Nordic, Structurlam has had great success with its CLT product. The company's core product has been – and remains – glulam, but its CLT production has doubled every year since its manufacture began, said Kris Spickler, heavy timber specialist with the company. It has been producing CLT at its Okanagan Falls, B.C., mill – built specifically for the manufacture of the product – for the past three years.

Demand for CLT is such that Structurlam is poised to bring on a second CLT production line in the near future, said Spickler, even though ongoing efficiency improvements have already doubled the capacity of the existing line.

Structurlam's market is mid-rise commercial structures; primarily in Canada and the Pacific Northwest region in the U.S. Structurlam's projects that have used CLT range from one with a simple CLT roof structure on a metal frame structure to buildings like the Wood Innovation and Design Centre at the University of Northern British Columbia in Prince George, B.C. The Design Centre, at seven stories, is touted as the world's tallest modern wood building and features CLT throughout.

It's been a sprint ever since Structurlam began producing CLT, said Spickler, and he doesn't expect to see its demand slow anytime soon. He also expects that taller CLT buildings will become more mainstream, but not until building codes catch up.

"We'll walk before we run," Spickler said. "We'll definitely see more five and

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six story CLT buildings, but jumping over that threshold of the building code that limits height and size is still going to take some time.”

Supporting CLT

Aside from its intense efforts in the creation of a CLT ANSI standard, APA is supporting CLT by providing information on the product on its website and publishing and publicizing case studies on projects that use APA-member CLT products.

“CLT is an innovative product with a lot of potential in both residential and commercial construction,” said APA Market Communications Director Marilyn Thompson. “As the research community continues to address manufacturing technologies and design recommendations that will help CLT gain broader acceptance in the building codes, we look forward to working with the producers as they bring this new product to the North American markets.”

CLT information will be included in APA product and design guides, Thompson said, and on the association’s website. CLT projects are also being featured in case studies and publicity outreach. 

Sheila Cain (scain@engineeredwood.org) is communications director of the Engineered Wood Technology Association and editor of its Engineered Wood Journal.

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DEFINING THE NEW FRONTIER

APA Annual Meeting and Info Fair Preview

amidst news reports of an improving economy and the hope of better times ahead, APA is hosting its Annual Meeting Nov. 8-11. The meeting theme: Defining the New Frontier.

The Annual Meeting – along with EWTA's Info Fair – will be held at the JW Marriott San Antonio Hill Country Resort and Spa in San Antonio, Texas. APA and EWTA members will hear from speakers and attend programs that address the new business climate as the industry continues its recovery from the recession.

Two EWTA committees – the Adhesives and Technical Subcommittee as well as the Advisory Committee – meet Saturday. EWTA welcomes attendees at a Western themed reception that evening.



Monday's general session kicks off with a presentation from Thomas Stewart, the former managing editor of *Harvard Business Review* and current chief marketing and knowledge officer of Booz & Company, a global management consulting firm. As the session's keynote speaker, Stewart will address "Business Strategies, Trends and the New Frontier."

Stewart will provide insights into the emerging business world and discuss the specific capabilities leaders and organizations need to cope with pressing universal challenges.

The Safety and Health Workshop, which runs Monday from 10:30 a.m. to 5 p.m., kicks off with a special presentation: *Spotlight on Safety Culture*. Attendees will



Thomas Stewart
Chief marketing and
knowledge officer of
Booz & Company



Shawn Galloway
President of
Pro-Act Safety Inc.

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Schedule of Events

(As of publication. Check the APA meeting agenda for latest schedule.)

hear from Shawn Galloway, president of Pro-Act Safety Inc., a company that helps companies with safety goals and programs. Based on his book, *STEPS to Safety Culture Excellence*, Galloway's talk will emphasize how safety goals should not be focused on the creation of safety culture, but rather on strategically improving and managing the one that exists. Throughout the day, the Safety and Health Workshop will feature presentations on critical safety topics.

The Roundtable Discussion will focus on how environmental regulations are impacting the industry and how associations and manufacturers are responding. Immediately following the Roundtable is the Marketing Advisory Committee meeting, which will include updates on the year's activities, plans for the 2015 marketing program and a report on the opportunities in the Texas construction market. APA Market Research Director Joe Elling will present his latest market forecast.

EWTA's Info Fair, which will be open during the receptions Sunday and Monday, as well as during Monday's lunch (see schedule on this page and full list of exhibitors on page 24) will feature booths from dozens of equipment manufacturers, product suppliers and service providers.

The Chairman's Dinner wraps up the Annual Meeting Monday evening and will honor APA members who have made significant advances in mill safety. Winners of EWTA's Supplier and Innovation Awards will also be honored during the dinner.

As always, the Annual Meeting allows plenty of time for networking and socializing. Attendees can choose to participate in the annual tennis tournament and cripple coot shoot, as well as the Mike St. John Memorial Golf Tournament. The hotel's spa features 32 treatment rooms along with a fitness center with weight and group exercise classes. This year's Spouse's Program features a trip to the San Antonio River Walk; a network of walkways that are lined by restaurants, shops and galleries.

Registration for the Annual Meeting begins at the JW Marriott Saturday, Nov. 8 at 10 a.m. See the schedule of events at right for the complete meeting agenda. 

NOTE: Some select subcommittee and committee meeting are closed; attendance by APA members only. See below for details.

SATURDAY, NOV. 8

10 a.m. to 5:30 p.m.	APA Registration Desk open
10:30 a.m. to noon	EWTA Adhesives and Technical Subcommittee (open meeting)
11 a.m. to 1 p.m.	International Market Subcommittee (closed meeting)
12:30 to 3 p.m.	Glulam Management Committee
2 to 3 p.m.	Info Fair Exhibitor meeting (open to exhibitors only)
3 to 4 p.m.	EWTA Advisory Committee meeting
3 to 5 p.m.	I-Joist Management Committee meeting
4 to 5:30 p.m.	Industrial Market Subcommittee meeting
4:30 to 5:30 p.m.	Chairman's Reception (Invitation only)
5:30 to 7 p.m.	EWTA Welcome Reception (Western theme)

SUNDAY, NOV. 9

7 a.m. to 1 p.m.	Cripple Coot Shoot
7:30 a.m. to 1 p.m.	Golf Tournament
9 to 11 a.m.	Tennis Tournament
11 a.m. to 5:30 p.m.	APA Registration Desk open
2:30 to 4 p.m.	Nonresidential Market Subcommittee
5 to 7:30 p.m.	Info Fair and Reception

MONDAY, NOV. 10

7 to 8:30 a.m.	Buffet Breakfast
8 a.m. to 5 p.m.	Registration Desk open
8:30 to 10:15 a.m.	General Session
	Keynote: Thomas Stewart, Defining the New Frontier
10:30 to 11:30 a.m.	Special Presentation: Spotlight on Safety Culture
10:30 a.m. to 5 p.m.	Safety and Health Workshop
10:30 a.m. to noon	Residential Market Subcommittee
10:30 a.m. to 3:30 p.m.	Spouses' Program
Noon to 1:30 p.m.	Info Fair and buffet lunch
1 to 2 p.m.	Roundtable Discussion: Environmental Regulations
2 to 4:30 p.m.	Marketing Advisory Committee
5:30 to 7 p.m.	Info Fair and Reception
7 p.m.	Chairman's Dinner; Safety Awards Recognition and Supplier Awards

TUESDAY, NOV. 11

6:30 a.m.	Board of Trustees Breakfast
7:30 to 11 a.m.	APA Board of Trustees meeting



INFO FAIR, held annually in conjunction with the APA annual meeting, is sponsored by the Engineered Wood Technology Association (EWTA), APA's related nonprofit supplier organization. Meeting and event sponsors are highlighted.

The **2014 EXHIBIT FLOOR PLAN** with booth numbers is shown on page 31.

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Fax: 253-572-9672

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Email: daniel.gonzalez@hbfuller.com

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9 Crozerville Road
PO Box 2425
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Contact: Linda Finn
Phone: 610-459-1890
Fax: 610-459-9538
Email: linda@mcLube.com
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Contact: John Quick
Phone: 620-325-2673
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Contact: Daniel Uskoski
Phone: 509-332-7526
Fax: 509-332-0845
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Contact: Mike Selby
Phone: 513-794-4285
Fax: 513-793-2504
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Email: dave@millmachinery.net
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Phone: 610-323-7670
Email: jnester@nestec.com
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Phone: 334-834-1170
Fax: 334-834-4525
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Panel World magazine is published six times per year and covers the domestic and international veneer, plywood, OSB and composite board industries.

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1149 SE 60th Avenue
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Contact: Robert Landau
Phone: 503-475-1199
Email: robert.landau@poyry.com

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Madison, WI 53726-2398
Contact: Karen L. Martinson
Phone: 608-231-9450
Fax: 608-231-9508
Email: klmartinson@fs.fed.us
The Forest Products Laboratory (FPL) is the national research laboratory of the United States Forest Service, which is part of USDA. Since its opening in 1910, the FPL has provided scientific research on wood, wood products and their commercial uses in partnership with academia, industry, tribal, state, local and other government agencies. The focus of the Forest Products Laboratory is to promote healthy forests and forest-based economies through the efficient, sustainable use of the nation's wood resources.



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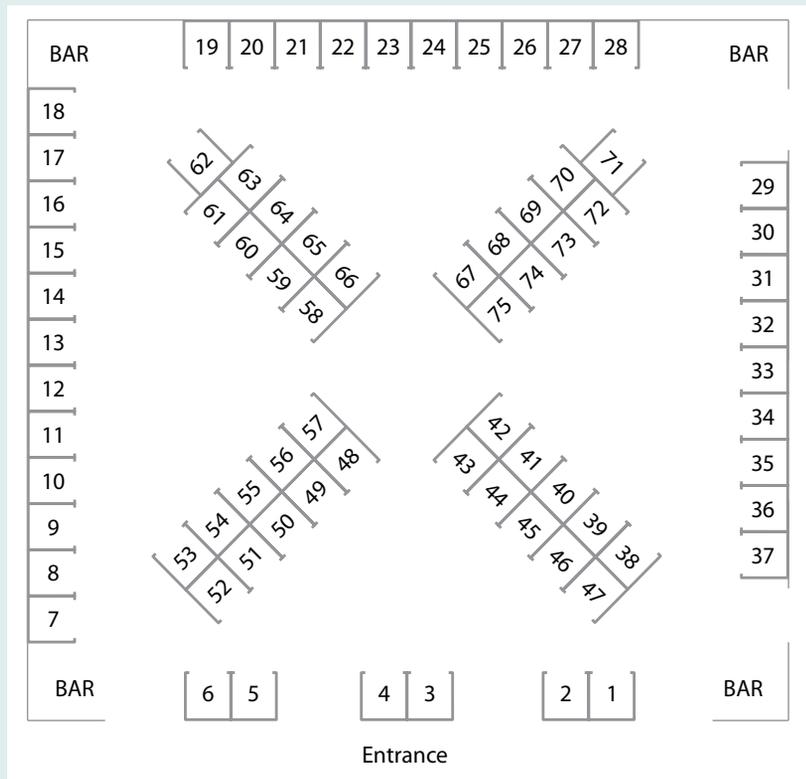
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Contact: Jeremy Clark
Phone: 318-232-1400
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Contact: Mark Bradley
Phone: 610-291-3717
Email: mark@yantaiamericas.com
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SUPPLIER AWARDS 2014

Supplier of the Year and Innovation Award Entrant Highlights

The 2014 EWTA Supplier of the Year and Innovation of the Year winners will be announced at the APA Annual Meeting in San Antonio in November, as well as in the Spring 2015 issue of the *Engineered Wood Journal*.

Annual Meeting and Info Fair attendees will have a chance to view posters of the entries before the winners are announced at the Chairman's Dinner Nov. 10.

Below is a preview of the Innovation Award entries (in alphabetical order by company), and a list of the Supplier of the Year Award candidates (sorted by member type).

INNOVATION OF THE YEAR AWARD ENTRIES

ENTRY A

Energy Management Information System

Entered by: ADM Systems Engineering Ltd.

Description:

ADM worked together with its client Flakeboard to develop a product design and execution approach. Metering requirements were determined and specified. The two main electrical transformers at the mill are sub-metered by approximately 40 power quality meters. In addition, 14 oil meters, seven gas meters and more meters for water and compressed air were added in and combined with production rates, temperatures and other factors used to determine the overall performance of each EAC.

Once developed and implemented, targets were developed for each of Flakeboard's 48 Energy Account Centres (EACs) so that operators and managers can understand their goals and measure achievements.

Tying the entire system together is RtEMIS, which divides the company into corporate, site, department and EAC so that it can illustrate detailed energy targets for each EAC and identify savings and losses, both in dollars as well as energy.

Using RtEMIS, each user is able to get a near real-time snapshot of day-to-day energy consumption, relative achievement of targets, how much energy has been used and the cost or savings that have been realized. The data is pulled from each PLC or HMI station and brought together into one interface, which can be accessed from any site via RtEMIS' web client.



ENTRY B

Forward Integration

Entered by: AkzoNobel Wood Adhesives

Description:

Forward Integration replaces old generic mixing charts and estimations used in the manufacturing of laminated beams, decking and CLT panels. It measures the board temperature, planned assembly time and estimated pressing time to calculate the mix ratio and/or spread rate for optimal production parameters.

The press time optimizer decreases pressing time while maintaining the safety margin set by the operator. Shorter pressing times lead to lower power consumption and high productivity from existing labor schedules.

The glue amount optimizer sets the system for optimum glue savings while reducing waste through lower squeeze-out. Combine this with the separate ribbon spreader, and glue waste is virtually eliminated.

The safety guard provides real-time monitoring of the gluing parameters for each board in the assembly. The gluing parameters can be logged and tagged with the plant identification of each assembly for thorough quality control documentation.

Wood Finishes and Adhesives

Forward Integration 7

Creating the right bond

ENTRY C

MPERIA: Performance Controlled Marking & Coding

Entered by: Matthews Marking Systems

Description:

MPERIA not only controls various print technologies and either single or multiple production lines, but it can be controlled on-site or via remote access, making changeovers simple. It also:

- Connects with peripheral devices like vision systems, bar code scanners, HMI and PLCs
- Simplifies product labeling/identifying, changeover and setup from one central location
- Imports databases into message construction
- Uses bar code scanner to select print job files
- Utilizes remote access capability for remote supporting of equipment
- Has an ethernet distributed printing system; simple connections using common protocols and hardware



ENTRY D

Easy Shift Synchronous Control

Entered by: USNR

Description:

Precise and synchronously metering of large volumes of oil to the press main cylinders improves product quality, increases production volume and creates a safer work place. Accurately metering large volumes of oil flow and delivering simultaneously to each of the four pre-fill valves for the main cylinders provides control of the bottom platen vertical movement that was previously impossible both in the opening and closing of the press.

Easy Shift delivers:

- 1) precise flow of oil despite temperature-induced change in viscosity
- 2) precise flow of oil despite lapse in hydraulic hygiene and oil contamination due to mechanical wear
- 3) precise pressure, no hydraulic overshoot or significant pressure spikes
- 4) a control system that obsoletes dash-pots located underneath the press and the means to digitally trim from the control room
- 5) a safer and cleaner work environment by removing much of the previously required press pipe and eliminating leaks caused by ruptured pipe fittings

Precise shifting of the press pre-fill valves eliminates inadvertent hydraulic stress imposed previously on press columns, crowns and bottom platens; significantly reducing premature structural failure and unplanned outage events.

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- Reduces Shock
- Synchronizes Prefill Valves
- Eliminates Hydraulic Valving
- Reduced Cycle Time
- Eliminates Pilots from Jack Circuit



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At a Glance:

Supplier of the Year and Innovation Awards

The EWTA Supplier Awards Program is an annual event that honors both EWTA member companies as well as some of the more innovative technologies, products or services they provide to APA members.

Supplier of the Year Awards are given to EWTA member companies and chosen by votes of APA members. The awards are based on quality, service and delivery of EWTA member products, equipment and services provided to APA members. Awards are presented in each of EWTA's three membership categories: Equipment/Tooling, Materials/Supplies, and Consulting/Services.

Innovation of the Year Awards recognize a company providing a new technology, product or service that has been shown to reduce production costs, increase productivity, improve product quality, or in some other way provide a bottom line benefit to APA members. APA members also vote for the winners of these awards as well.

SUPPLIER OF THE YEAR AWARD CANDIDATES

APA members will choose Supplier of the Year winners in three categories (Consulting/Services, Equipment/Tooling, and Materials/Supplies) based on quality, service and delivery. Below is a list of the candidates (all EWTA members):

Consulting/Services		Materials & Supplies
ADM Systems Engineering Ltd.	Hunt Guillot & Associates	AkzoNobel Wood Adhesives
Allnorth Consultants Limited	IBC, International Bar Coding Systems & Consulting Inc.	Albany International
ALTEC Integrated Solutions	IES - Integrated Environmental Solutions	Arclin
B&W MEGTEC	KTC Panelboard Engineering	Ashland Performance Materials
CMA Engineering Inc.	Nondestructive Inspection Service	BASF - The Chemical Company
Daqota Systems	Panel World Magazine	Bayer Material Science LLC.
Eagle Project Services LLC	Pöyry Management Consulting	Casey Industrial, Inc.
Evergreen Engineering Inc.	University of Tennessee, Center for Renewable Carbon	Chem-Trend LP
H.B. Fuller Company		Clarke Veneers and Plywood
The HT Group		Columbia River Staple & Lumber Wrap
		Engineered Coated Products
		Engineered Polyurethane Patching Systems
		Georgia-Pacific Chemicals LLC
		Guardian Chemicals Inc.
		Huntsman
		Idemitsu Lubricants America Corporation
		Interwrap Inc.
		JAX Inc.
		McLube Division
		Michelman
		Momentive Specialty Chemicals
		Norjohn Limited
		OCI Melamine
		Paneltech Products
		Paslode
		Permapost
		Purbond Inc.
		Pur Polymeric LLC
		Samuel Strapping Systems
		Sasol Wax North America Corp.
		Stratachem Solutions Group LP
		US Borax
		Valspar Corporation
		Wanhua Chemical Company
		Willamette Valley Company
		Zelam Ltd.
Equipment/Tooling		
Andritz Inc.	Metriguard Inc.	
ARGOS Solutions AS	Mill Machinery LLC	
Automation Industries	NESTEC Inc.	
Baumer Inspection	Nicholson Manufacturing Ltd	
BIELE S.A.	Pallmann Industries, Inc.	
Clarkes Industries Inc.	Process Combustion Corp.	
Coil Manufacturing Ltd.	Raute	
Connexus, Industries Inc.	REA Jet	
Con-Vey Keystone Inc.	Scheuch Inc.	
Dieffenbacher Inc.	Siempelkamp LP	
Electronic Wood Systems N.A.	Signode Packaging Systems	
Flamex Inc.	Spar-Tek Industries	
Globe Machine Mfg Co.	Spraying Systems Co.	
GreCon Inc.	Standex Engraving Group	
Grenzbach Corporation	Steinemann Technology USA	
HAWE Hydraulics/Pac Fluid Sys	Sweed Machinery Inc.	
IMAL-PAL Group	TIP The Industry Pivot Ltd.	
IMEAS	TSI	
Itipack Systems	USNR	
Kadant Carmanah Design	Venango Machine Company	
Kimwood Corporation	Veneer Services LLC	
Lundberg	Ventek Inc.	
Matthews Marking Products	Westmill Industries USA Corp.	
M-E-C COMPANY	WPS Industries Group	

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MDI SAFETY

Best Practices for Composite Wood Product Manufacturers

by Michael F. Adams and John F. Bebak

Technological advances and a rapidly changing regulatory climate have led some composite wood panel (CWP) manufacturers to consider alternatives to traditional formaldehyde-based resins. Mills that convert to methylene diphenyl diisocyanate (MDI)-based resins are realizing that MDI requires a different set of industrial hygiene standards and best practices.

Your MDI supplier can be a vital partner to help you navigate these new waters. An ongoing industrial hygiene partnership benefits both the supplier and manufacturer. The supplier ensures that their products are properly used by eliminating unsafe practices, which helps meet the shared goals of keeping employees safe and facilities within compliance.

By working together, suppliers and manufacturers can establish industrial hygiene programs that helps mills achieve:

- Fewer occupational illnesses and injuries, leading to an improved quality of life;
- A safer and cleaner workplace;
- Increased production and less disruption;
- Better relations with regulatory bodies and site community leaders, including unions, elected officials and local authorities.

This process begins with an assessment process, careful analysis to turn data into action and regular check-ups to ensure continuous improvement.

Getting Started with MDI

Long before the first panel rolls off the line, an industrial hygiene team should be deployed to perform an assessment of both greenfield and existing facilities that are transitioning from formaldehyde-based resins to MDI. This assessment addresses engineering elements, administrative controls and personal protective equipment (PPE) to prepare the site for MDI use.



Mills converting to methylene diphenyl diisocyanate (MDI)-based resins may want to consider an alternate set of industrial hygiene standards and best practices. Image courtesy of Huntsman

The process assessment determines required engineering controls in areas of the mill that will use MDI. In the panel-making process, exposures can stem from:

- Vapors;
- Inhaling resin-coated wood fiber;
- Aerosol droplets; and/or
- Skin contact

Most of these exposures can be eliminated or greatly reduced by installing or upgrading engineering controls such as sealing of conveyors and formers, improving local ventilation, ensuring dust collection systems are adequately sized and – most importantly – ensuring a detailed maintenance program is developed and followed.

From an administrative control perspective, up-to-date work procedures will detail PPE and training needed to complete the required task and minimize exposure.

Exposures are most often addressed with equipment design or modification, but if that is not possible, then proper PPE is recommended. This may include gloves, protective clothing or respiratory protection. Employees receive PPE training in addition to function-specific training; for instance, associates are trained in the safe offloading of bulk MDI from rail cars and trucks containing MDI. Training support materials are available from your MDI supplier. Additional resources include The Center for the Polyurethanes Industry (CPI) of the American Chemistry Council (www.polyurethane.americanchemistry.com) and the International Isocyanate Institute (www.diisocyanates.org).

After the initial recommendations are implemented, the industrial hygiene team conducts a periodic survey in accordance with standard industrial hygiene practices to verify the effectiveness of the mill's engineering controls. Sampling should be conducted using methods fully validated by organizations, such as the National Institute for Occupational Safety and Health (NIOSH) (www.cdc.gov/niosh) and/or the Occupational Safety and Health Administration (OSHA) (www.osha.gov). All samples should be analyzed by a laboratory accredited by the American Industrial Hygiene Association (AIHA) (www.aiha.org).

Turning Data into Action

Once the samples are tested and analyzed, the team provides a written report that includes reinforced recommendations or additional recommendations as necessary. Taking measurements is the first step, but this reporting puts your data to work by addressing root causes. For instance, improved ventilation may be needed.

Industrial hygiene specialists make it their goal to work closely with customers to formulate specific, targeted and achievable objectives in order to improve



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Image courtesy of Norbord

MDI long-term area sampling takes place at an OSB blender at a mill in Inverness, Scotland.



Image courtesy of Spanolux

"SureSpot" airborne MDI sampling is underway at an MDF press in Vielsalm, Belgium.



Image courtesy of Smartply

MDI air sampling takes place at an OSB press in Waterford, Ireland.

workplaces and to ensure compliance with applicable exposure limits. Regulatory exposure limits published by OSHA are legally enforceable. Exposure limits published by the American Conference of Governmental Industrial Hygienists (ACGIH) (www.acgih.org) are recommended limits generally adopted by industry as a best practice.

Check Ups

In a jointly beneficial industrial hygiene program, the supplier and manufacturer work together to develop mutually acceptable product stewardship improvement goals, so that technical environmental health and safety issues can be mutually addressed. An industrial hygiene team should be regularly deployed to existing MDI mills to check on goal progress. These periodic check-ups (usually on an annual basis) evaluate engineering controls to determine if they are performing as designed, and to monitor personnel exposures to help keep them within allowed limits.

Suppliers may also provide continuous training to management and staff to improve safe use and handling of MDI products. Due to employee turnover, including retirees leaving the market, this MDI refresher training should be offered on an ongoing basis.

Your MDI supplier can be a tremendous resource when it comes to implementing a robust industrial hygiene program. Whether you operate an individual mill or a multi-national corporation, suppliers offer the testing, analysis and support needed to use their products safely. 

Huntsman Polyurethanes Commercial Director Michael F. Adams and CWP Business Manager John F. Bekak have more than 40 years of combined experience in the CWP industry. Adams can be reached at michael_f_adams@huntsman.com; Bekak can be reached at john_f_bekak@huntsman.com.

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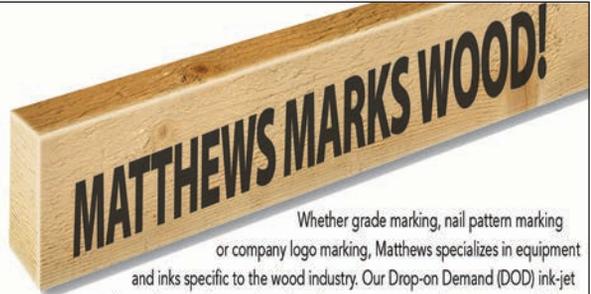
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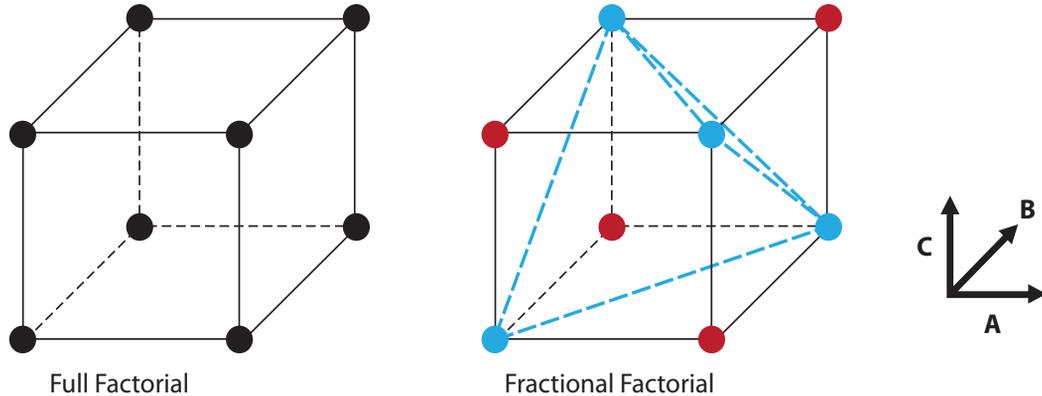


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DESIGNED EXPERIMENTS

Is Industry Ready for DOE Methodology?

by Timothy M. Young



Full factorial designs provide analysts with the most information, but are also the most conservative and expensive type of designs. Many investigators use fractional factorials (relying on the principle of orthogonality) to reduce the number of experimental runs. Fractional factorials provide good scientific insight on direction towards optimization and are easily repeated.

Design of Experiments (DOE) methodologies have led to many accomplishments in science and manufacturing since their original inception by R.A Fischer in agricultural experimentation in England in the 1920s. Generally defined, DOE is the design of any information-gathering exercises where variation is present, enabling designers to determine simultaneously the individual and interactive effects of many factors that could affect the output results in any design.

George Box, the famous statistician that studied under Fischer, was the genesis for the application of DOE in industrial experimentation in the 1980s. The contributions of Genichi Taguchi in the 1980s and 1990s using Robust Product Design were significant. The acceptance of the “Six Sigma” approach in the 21st century – which seeks to improve the quality of process outputs by identifying and removing the causes of errors and minimizing variability – embraced DOE as the core statistical concept for continuous improvement.

The acceptance and success of DOE methodologies throughout recent history make it a feasible approach for use by engineered wood panel producers. Statistical software packages for DOE have become very affordable with excellent graphic capabilities offering many basic and advanced DOE techniques.

DOE has many potential benefits that may provide a competitive advantage for a company. Many manufacturers conduct short-term trials or pre-studies to test new resin formulations, moisture levels, density combinations or time-to-final position, for example. However, such pre-studies offer limited value to manufacturers and are generally not repeatable. Even though pre-studies are useful for helping find an initial direction, they do not have the same benefits as DOE. DOE is an accepted scientific approach to study the data space or response surface very methodically with replication and experimental error. DOE provides opportunities to study interactions between factors, provides a balanced approach to moving through the data space, promotes optimization, and offers expanded inference on study outcomes (i.e., minimizes the chances of being wrong in decisions).

Conscious Consideration

Some engineered panel manufacturers are reluctant to use DOE as an improvement tool. Many manufacturers shy away from DOE given the many “nuisance” factors that can influence a DOE (e.g., unexpected raw material changes, operator over-adjustment, unstable moisture variation, unstable weight variation, etc.). However, many of the modern designs account for nuisance factors by using blocking, split-plots, study of covariates, etc. The Taguchi Robust Product Design – or TRPD method – uses nuisance as a design strategy to make products more robust to uncontrollable sources of variation.

While the prevailing perception is that statistical software packages are expensive, many manufacturers are finding that they can be very affordable and user-friendly. Many leading companies in the U.S. rely heavily on statistical analyses to improve product value.

Traditional Factorial Design

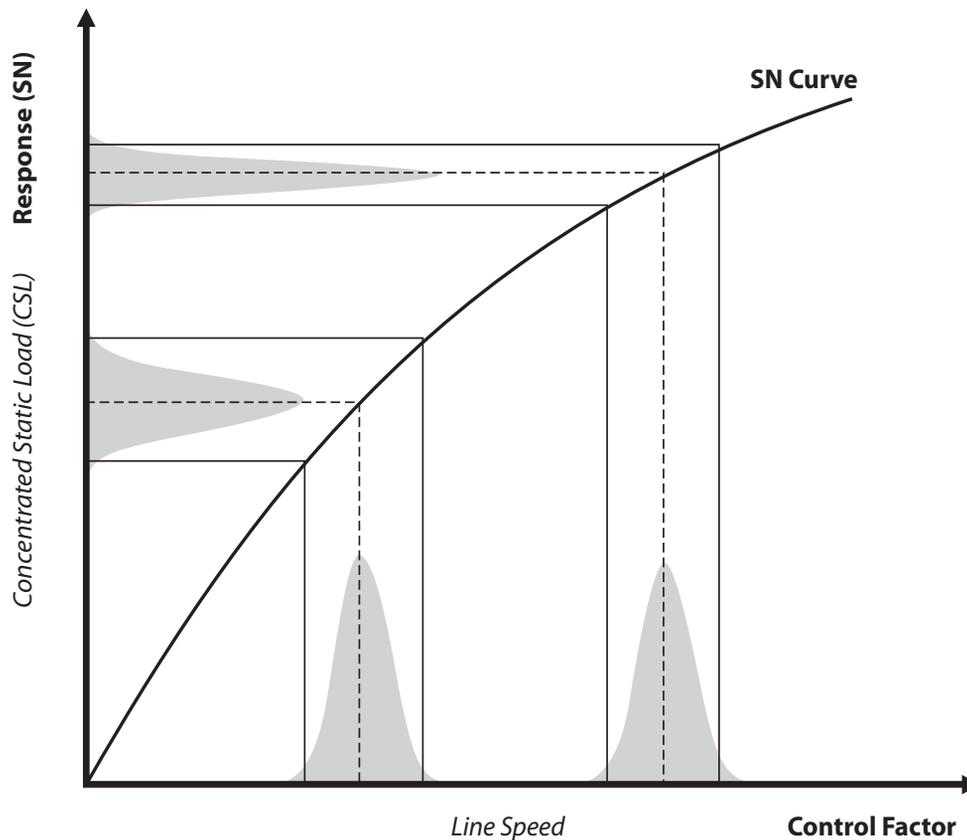
Traditional DOE – or “factorial design” – is a very balanced and thorough approach to conducting a designed study. The full factorial design has one or more factors where each factor has at least two levels in which samples (replications) are taken at all of the possible locations in the data space. Full factorial designs provide analysts with the most information, but are also the most conservative and expensive type of designs. Many investigators use fractional factorials (relying on the principle of orthogonality) to reduce the number of experimental runs. Fractional factorials provide good scientific insight on direction towards optimization and are easily repeated. A plethora of possibilities exists within the concept of full and fractional factorials for reducing the influence of nuisance variation by the use of blocking, split-plots, nested designs, etc.

Advanced Design Concepts

Many DOE analysts progress towards “response surface designs” for optimization of the response variable. Response surface designs also minimize the number of experimental runs using the principle of fractional factorials, but sample from locations in the data space that may or may not be on the edges. Such designs typically use center points to fit a non-linear function through the surface of the response variable. It is not possible to give a detailed overview of response surface designs in this article, but many response surface designs exist, such as, central composite, Box-Behnken, Plackett-Burman, etc.

Taguchi Robust Product Design

Taguchi Robust Product Design is not considered a statistical method but rather an engineering method for improving products and processes by making them more robust to uncontrollable sources of variation. TRPD is well suited for the engineered panel industry, given that it is inundated with uncontrollable sources of variation both in manufacturing processes and product application. The key metric of TRPD is the “signal-to-noise” (SN) ratio which is optimized based on the type of optimization desired (e.g., minimization of thickness swell, maximization of concentrated static load, nominal sand-off). The underlying premise of the TRPD method is that products are designed to have less variation in SN, thus making them more robust in application and minimizing costs to the organization based on the premises of the



Full factorial designs provide analysts with the most information, but are also the most conservative and expensive. This image illustrates the signal-to-noise ratio for CSL and line speed using the Taguchi Robust Product Design method.

Taguchi “Loss Function” (i.e., minimizing variation around the target minimizes overall cost due to variation). TRPD has a limitation in that the analyst must have a good knowledge of the process of both controllable and uncontrollable sources of variation by selecting the proper factors and level values. However, the advantages of TRPD outweigh its shortcomings. In the past decade, the Taguchi method has been recognized as an essential tool for finding optimized parameters with the fewest number of experiments.

Scientific Decision Making

DOE and TRPD are a set of statistical and engineering methods that can help the engineered wood panel industry continuously improve processes and products. Applications of these methods are generally underutilized by this industry. Without DOE, it is not possible to study the influence of interactions, and inference is limited for correctly choosing a direction towards optimization. Applications of DOE and TRPD can

lead to high return on investment with improved product value and lower costs of manufacturing.

Design of Experiments methodology is a proven set of statistical and engineering methods that make decision making more scientific. 

Timothy M. Young, Ph.D., is a professor at the University of Tennessee’s Center for Renewable Carbon. He can be reached at tmyoung1@utk.edu.

Further Reading

Additional information on Design of Experiments methodologies can be found in the following books.

Traditional factorial design

Design and Analysis of Experiments, 8th edition, by D.C. Montgomery
DOE Simplified – Practical Tools for Effective Experimentation by M.J. Anderson and P.J. Whitcomb

Advanced design concepts

Empirical Model-Building and Response Surfaces by G.E.P. Box and N. R. Draper

Taguchi Robust Product Design method

Robust Engineering – Learn How to Boost Quality while Reducing Costs and Time to Market by G. Taguchi, S. Chowdhury, S. Taguchi



STRENGTH THROUGH Connections



MEMBERS
100 members strong are supporting the association and the engineered wood products industry and networking with customers and potential customers in 2014.



EXHIBITORS
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SPONSORS
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STAYING SAFE

APA Names 2013 Safety Award Winners



APA has announced the winners of its 2013 Safety and Health Awards, a program that encourages and recognizes safety and operational excellence in the North American structural panel and engineered wood industry. Abitibi-LP Engineered Wood and Norbord won Safest Company Awards in their respective categories, while the Innovation in Safety Award went to two winners: LP of Sagola, Mich., for equipment-based innovation, and Weyerhaeuser of Elkin, N.C., for process-based innovation.

Norbord, a North American manufacturer of structural wood panels, earned top honors among companies with four or more mills, with a 2013 average Weighted Incident Rate (WIR) of 2.55. Abitibi-LP, which produces I-joists, won its award in the category for companies with three or fewer mills. The company posted a perfect 0.00 WIR for 2013.

The Sagola LP mill's original "Log Jam Pusher" equipment innovation and the Elkin Weyerhaeuser mill's "Summer Safety Blitz" program took top honors out of 30 Innovation in Safety Award entries.

Seventy-seven APA member structural wood panel and engineered wood product facilities in the U.S., Canada, and abroad participated in the 2013 program. A total of 21 facilities representing eight APA member companies – Abitibi-LP Engineered Wood, Ainsworth Lumber Co. Ltd., Anthony Forest Products Co.,

INNOVATION IN SAFETY AWARD

LP – Sagola, Michigan

Equipment-Based Innovation Winner:

Log Jam Pusher

Weyerhaeuser – Elkin, North Carolina

Process-Based Innovation Winner:

Summer Safety Blitz

SAFEST COMPANY AWARDS

Abitibi-LP Engineered Wood

(Companies with three or fewer mills)

AVERAGE WIR

0.00

AVERAGE TIR

0.00

Norbord

(Companies with four or more mills)

2.55

0.64

ANNUAL SAFETY AND HEALTH HONOR ROLL

Division I (Under 400,000 Hours)

WIR

TIR

1st Place **LP – Lautaro, Chile**

0.0

0.0

2nd Place **LP – Hanceville, Alabama**

0.0

0.0

3rd Place **LP – Panguipulli, Chile**

0.0

0.0

Division II (Over 400,000 Hours)

WIR

TIR

1st Place **LP – Hayward, WI**

0.00

0.00

2nd Place **Louisiana-Pacific Canada Ltd. – Golden, British Columbia**

0.43

0.43

3rd Place **Norbord – Cordele, Georgia**

4.13

0.83

THREE-YEAR SAFETY AWARD (2009-2011)

Division I (Under 400,000 Hours)

AVG. WIR

AVG. TIR

LP
Carthage, Texas

0.00

0.00

Division II (Over 400,000 Hours)

AVG. WIR

AVG. TIR

Louisiana-Pacific Canada Ltd.
Golden, British Columbia

0.65

0.65

SAFETY IMPROVEMENT AWARD

Division I (Under 400,000 Hours)

LP – Lautara, Chile

100% Improvement

2011 WIR

2012 WIR

2013 WIR

2011 TIR

2012 TIR

2013 TIR

11.77

5.76

0.00

1.18

0.58

0.00

Division II (Over 400,000 Hours)

Louisiana-Pacific Canada Ltd. – Golden, British Columbia

56.66% Improvement

2011 WIR

2012 WIR

2013 WIR

2011 TIR

2012 TIR

2013 TIR

0.99

0.54

0.43

0.99

0.54

0.43

Louisiana-Pacific Canada Ltd., LP, Norbord, Roseburg Forest Products Co., and Weyerhaeuser – earned awards in various competition categories. Some of the mills were multiple award winners.

In addition to the Safest Company and Innovation awards, other competition categories include Safety Improvement, Annual Safety and Health Honor Roll, Three-Year Safety Award, and Incident Free Honor Society. Twenty mills achieved a zero incident rate for the year and thus were named to the Incident Free Honor Society.

While the program awards are limited to APA members, data is collected from both member and non-member mills in order to provide a broad-based industry performance benchmark. A total of 77 mills reported data for 2013. The 2013 industry Total Incident and Weighted Incident Rates were 2.05 and 10.05, respectively.

The winning facilities and companies will be recognized and their safety accomplishments celebrated during the Chairman's Dinner at APA's annual meeting November 10 in San Antonio, Texas. Award plaques also will be presented to the winning mills by APA management staff.

The 2013 Safety and Health Awards program was the sixth year of the program under a revitalized safety effort spearheaded by an APA Safety and Health Advisory Committee, comprised of APA member company safety professionals. 

INCIDENT FREE HONOR SOCIETY	Product	WIR	TIR
Abitibi – LP Engineered Wood <i>Larouche, Quebec</i>	IJ	0.00	0.00
Abitibi – LP Engineered Wood <i>Saint Prime, Quebec</i>	IJ	0.00	0.00
Ainsworth Lumber Co. Ltd. <i>Barwick, Ontario</i>	OSB	0.00	0.00
Anthony Forest Products Co. <i>Washington, Georgia</i>	Glulam	0.00	0.00
LP <i>Carthage, Texas</i>	OSB	0.00	0.00
LP <i>Hanceville, Alabama</i>	OSB	0.00	0.00
LP <i>Hayward, Wisconsin</i>	OSB	0.00	0.00
LP <i>Houlton, Maine</i>	LSL	0.00	0.00
LP <i>Lautaro, Chile</i>	OSB	0.00	0.00
LP <i>Newberry, Michigan</i>	OSB	0.00	0.00
LP <i>Panguipulli, Chile</i>	OSB	0.00	0.00
LP <i>Sagola, Michigan</i>	OSB	0.00	0.00
LP <i>Wilmington, North Carolina</i>	LVL	0.00	0.00
Norbord <i>Guntown, Mississippi</i>	OSB	0.00	0.00
Norbord <i>Jefferson, Texas</i>	OSB	0.00	0.00
Norbord <i>La Sarre, Quebec</i>	OSB	0.00	0.00
Norbord <i>Nacogdoches, Texas</i>	OSB	0.00	0.00
Roseburg Forest Products Co. Engineered Wood Products <i>Riddle, Oregon</i>	IJ / LVL	0.00	0.00
Weyerhaeuser <i>Elkin, North Carolina</i>	OSB	0.00	0.00
Weyerhaeuser <i>Hudson Bay, Saskatchewan</i>	OSB	0.00	0.00

APA Safety and Health Advisory Committee Members

Mike Wacker, Chairman
Plum Creek

Greg Ellisor, Vice-chairman
Weyerhaeuser

Terry Evans
Boise Cascade Company

Keith Harned
LP

Mary McGreal
Potlatch Corporation

Dwight Midles
Olympic Panel Products LLC

Tom Natsch
Roseburg Forest Products Co.

Sam Newbill
Hood Industries, Inc.

Peter Quosai
Norbord

Randy Schillinger
Pacific Woodtech Corp.

Terry Secrest
RoyOMartin

Curtis Swindell, Jr.
Abitibi-LP Engineered Wood

Several Mills Approved For APA Membership

APA recently approved four Canadian plywood mills and one mill from Medford, Ore., for membership.

Canadian mills Richmond Plywood Corporation Ltd. (Richmond, B.C.), LP (Golden, B.C.), Canoe Forest Products Ltd. (Canoe, B.C.) and Thompson River Veneer Products Ltd. (Kamloops, B.C.) were accepted into membership, effective Aug. 1.

“We are pleased that these producers have given APA a vote of confidence, and we look forward to bringing them the full value of APA services,” said Ed Elias, APA president.

With the addition of these four mills, APA membership will represent about 60 percent of Canada’s plywood production.

The addition of the new Canadian mill members comes at the same time the Canadian Plywood Association (CANPLY) and its affiliated CertiWood Technical Centre ceased operations. CANPLY represented and certified plywood manufacturers primarily in British Columbia. It was founded in 1950 as the Plywood Manufacturers’ Association of British Columbia and had operated for more than 60 years as a not-for-profit industry trade association, a press release said. The group provided third party testing and global certification; product and standards development; and programs for product promotion and market support.

CANPLY and the technical centre ceased operations July 31.

Also recently joining APA is Timber Products Company of Medford, Ore. The company began transitioning to APA’s certification program in September. Founded in 1918, Timber Products Company is a diversified manufacturer of panel, veneer and solid wood products.

“We are pleased to welcome the Medford mill of Timber Products Company back to APA membership,” said Elias. “They have been a respected former member of the association and we look forward to working with them again as they become more active in the softwood plywood industry.”

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Tolko Reopens Athabasca OSB Mill

Tolko celebrated the reopening of its Athabasca oriented strand board mill in Slave Lake, Alta., on June 19. Approximately 200 people, including city, provincial and First Nation dignitaries, attended the opening ceremonies. APA President Ed Elias represented APA at the festivities. Brad Thorlakson, Tolko president and CEO, and Jim Baskerville, vice president, oriented strand board, spoke at the event.

In his speech, Thorlakson thanked everyone for the continued support of the mill and Tolko during the economic downturn and looked forward to a prosperous future for the Athabasca operation.

"We've carefully evaluated economic forecasts in the building products industry, and we're confident that this is the right time to reopen," Thorlakson said. He also noted that reopening the mill has

provided approximately 150 direct and indirect jobs in the community, including salaried and hourly positions at the mill; contractors and suppliers; and related community employment opportunities.

The APA-member mill, which opened for a short time in 2008 before curtailing operations due to poor market conditions in 2009, has the longest continuous press in North America and is capable of producing a wide variety of products in varying lengths and thicknesses.

LP Sells Athens Mill To Pellet Producer

Louisiana-Pacific Corp. has sold its mothballed Athens, Ga., OSB mill to a wood pellet manufacturer. It was acquired by Waycross, Ga.-based E-Pellets Group LLC, which will convert the former mill to a 450,000 tonne/year wood pellet manufacturing facility.

The mill once had a rated capacity of 375 million sq. ft. per year of OSB. LP

permanently closed it at the end of 2009, although it had already been indefinitely curtailed for a year by that time for market reasons.

APA Outlook Forecasts Double-Digit Growth

APA's recently released 2014 Market Outlook predicts gradual, steady growth in wood product sectors over the next several years. North American production of OSB and plywood is expected to increase 8 percent year-over-year to 32.2 bsf in 2014, and 31 percent growth in structural panels is expected over the next four years. Growth of 40 to 45 percent is anticipated in other engineered wood products.

Industry historical data and the 2014 market forecast are provided in APA's 2014 Structural Panel & Engineered Wood Yearbook, Form MKOE180. The report can be purchased for \$250 on APA's website at www.apawood.org.

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LP Names New Vice President of OSB

Louisiana-Pacific Corp. announced recently in a press release that it has named Jamey Barnes as vice president, OSB manufacturing. Barnes joined the company in 2006 as Eastern Region OSB manager.

In his new role, Barnes will oversee manufacturing at LP's 13 OSB facilities operating in North America.

APA Announces Field Staff Transition

APA's Field Services staff has completed the transition and training time for coordination of the Complaint Observation Service. Karyn Beebe, engineered wood specialist in California, is now the Member Services Liaison and the primary contact for APA members wishing to enlist APA's assistance in observing jobs

where product complaints have arisen. Bob Clark, an engineered wood specialist with APA who previously served as the

liaison, continues to represent APA in the Midwest and also now serves as the Residential Market Coordinator.

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EWTA Hits 100

New, Returning Companies Join EWTA Membership Ranks

Several companies serving or supplying the engineered wood products industry have joined or returned as EWTA members since the Spring Journal was published, bringing the current membership count to around 100 companies. They are:

- **REA Jet** (www.reajetus.com) of Frankfurt, Germany (U.S. operations located in Peachtree Corners, Ga.), a supplier of products that allow for contact-free industrial coding and marking. Marketing Manager Nicole Richie can be reached at nrichie@reajetus.com.
- **Bayer Material Science LLC** (www.bayer.com) of Pittsburgh, Pa., a supplier of high-tech polymer release materials. Tim Thiel, the company's industrial marketing manager, can be reached at tim.thiel@bayer.com
- **Baumer Inspection** (www.baumerinspection.com), a Konstanz, Germany-based supplier of automated vision inspection systems for the wood-based panel industry. Tim Battke can be reached at tbattke@baumer.com
- **M-E-C Company** (www.m-e-c.com), based in Neodesha, Kan., a returning EWTA member whose principal business is the design, manufacture, installation and service of industrial dryer systems, combustion systems, storage bins and pneumatic and mechanical conveying systems for the engineered wood products industry. Marketing Coordinator Linda Caputo can be reached at lcaputo@m-e-c.com.
- **CMA Engineering Inc.** (www.cmaeng.com) of Timmins, Ontario, Canada, offering conceptual design, engineering, equipment procurement, project management, construction management and startup of OSB, particleboard and MDF plants. Claude Malette can be reached at admincma@cmaeng.com.
- **Zelam Ltd.** (www.zelam.com) of New Plymouth, New Zealand, a development-based specialty chemical company supplying protectants to the engineered wood products industry. The company's technical/research manager, André Siraa, can be reached at asiraa@zelam.com.
- **Process Combustion Corp.** (www.pcc-sterling.com) of Pittsburgh, Penn., a designer, supplier and servicer of combustion, heat transfer and pollution control systems. Business Development/Marketing Manager Michael Foggia can be reached at mffoggia@pcc-sterling.com.



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Dieffenbacher Fields Several Equipment Orders

Several companies have placed orders for equipment from Dieffenbacher, the company announced in a press release. Russia's Taleon Terra Group, headquartered in St. Petersburg, ordered an entire OSB system. Dieffenbacher will supply all the equipment for the production line. Thailand's Green River Panels is investing in a second particle board plant from Dieffenbacher. It will be installed next to the existing Dieffenbacher plant at the company's Hat Yai location. The scope of supply includes a drum dryer; forming and press line; and a twin diagonal saw. Dieffenbacher is also supplying a THDF system – which includes a CPS 265-28 press – to Hubei Yijia in the Hubei province.

Metriguard Offers New Test Equipment

Metriguard recently announced a new rail shear tester for evaluating edgewise shear in panel products. The Model 840 Rail Shear Tester, suited for testing I-joist web stock, allows users to simulate shear stress in wood I-joist members.

MEGTEC Acquired By Babcock & Wilcox

MEGTEC's global businesses became a subsidiary of Babcock & Wilcox Power Generation Group, MEGTEC announced in June.

The group's parent company, The Babcock & Wilcox Company, is an international provider of clean energy technologies and services.

B&W MEGTEC's engineered products business – including drying, coating and material handling equipment – provides new growth opportunities for B&W, the company said in a press release.

Raute Promotes Martin Murphy

Raute's former vice president of sales for North America, Martin Murphy, has been appointed the company's North American region's senior vice president, the company announced recently in a press release.

Murphy has been with Raute for 28 years, serving as vice president of sales and marketing, area sales manager, and field services engineer/automation. Murphy's responsibilities will be to improve on all Raute's business segments with a major focus on customer support services.



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- 15-16** Southern Oregon Occupational Safety & Health Fair, Medford, Ore., www.orosha.org
- 15-17** Timber Processing and Energy Expo, Portland, Ore., www.timberprocessingandenergyexpo.com
- 22-23** Greenbuild International Conference and Expo, New Orleans, La., www.greenbuildexpo.com

NOVEMBER

- 8-11** APA - The Engineered Wood Association Annual Meeting and EWTA Info Fair, San Antonio, Texas, www.apawood.org, www.engineeredwood.org
- 18-20** North American Building Materials Distribution Association Annual Meeting, Dallas, Texas, www.distributorconvention.org

DECEMBER

- 3-6** Western Pulp, Paper, and Forest Products Safety and Health Conference, Portland, Ore., www.orosha.org

2015

JANUARY

- 20-22** National Association of Homebuilders International Builders' Show, Las Vegas, Nev., www.buildersshow.com

MAY

- 14-16** American Institute of Architects Annual Convention, Atlanta, Ga., convention.aia.org
- 5/31-6/3** Composite Panel Association Spring Meeting, Bonita Springs, Fla., www.compositepanel.org

JUNE

- 10-12** Southern Forest Products Association 33rd Forest Products Machinery & Equipment Exposition and Forest Products Society 69th Annual International Convention, Atlanta, Ga., www.sfpaexpo.com, www.forestprod.org

SEPTEMBER

- 13-15** Composite Panel Association Fall Meeting, Banff, Alberta, Canada, www.compositepanel.org

To contact our editorial department:

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 Phone: 206-784-5989
 Fax: 253-620-7245
 E-mail: scain@engineeredwood.org

For rate or other advertising information, contact:

Melinda Lilley
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mlilley@engineeredwood.org

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For EWTA membership information:

Contact Terry Kerwood, 253-620-7237, terryk@engineeredwood.org.

For Info Fair exhibiting information, contact:

Melinda Lilley
 253-620-7493
mlilley@engineeredwood.org

For APA member product questions or assistance:

Contact the APA Product Support Help Desk, 253-620-7400, help@apawood.org.

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