US CLT Symposium
Program

Wednesday February 27, 2013

5:00 - 6:15 pm	**On-site registration and networking reception** *Includes a light dinner beginning at 5:00 pm and a CLT product showcase*
6:15 - 6:30 pm	**Welcome Presentation** *WoodWorks (US)*
6:30 - 7:00 pm	**CLT Evolution and Development in Europe** *Speaker: Wolfgang Weirer, KLH (Austria)* The Symposium will begin with a personal account of the advent of cross laminated timber from someone instrumental in its development. What inspired the creation of CLT? How was it able to establish commercial viability in the European market? What market demands were involved in its evolution? How did the building climate accelerate the growth of CLT production? Answers to these and other questions will be covered. *Wolfgang Weirer is the founder of the KLH Group, one of the leading European manufacturers of large-scale cross laminated timber panels. He began his career in construction working first for a gravel company and then his father's small sawmill, which he ultimately led. After founding a small timber building company in the early '90s, he partnered with the technical university Graz and Pro Holz Austria to research and develop a new engineered wood building project—now known as cross laminated timber. He closed his sawmill in 1997 and founded KLH.*
7:00 - 8:00 pm	**Creating the World's Tallest Timber Apartment Building: The 10-story Forté** *Speaker: Daryl Patterson, Lend Lease (Australia)* This presentation will give a rarely heard owner/developer perspective on the use of CLT from the company responsible for what is now the world's tallest timber apartment building—the Forté in Melbourne, Australia. An integrated development, design and construction firm, Lend Lease, has spent the last five years investigating the viability of CLT. Focusing on both the process and outcome related to the Forté, topics will include technical challenges, authority approval processes, commercial feasibility, market perceptions, reactions and acceptance, government response, industry response and the design and build processes. *Daryl Patterson is Head of Operational Excellence for Lend Lease's development business, and is responsible for overseeing operational performance across Australia. Lend Lease's Development businesses span multiple sectors including greenfield subdivision, commercial office towers, high-rise apartments, retirement and aged care facilities and major mixed use urban redevelopments. Starting his career in architecture, Daryl progressed into construction, project management and ultimately the development of complex landmark projects. Most recently, he has overseen Lend Lease's effort to develop and construct Australia's first cross laminated timber building, which is the world's tallest apartment building of its kind.*

Thursday February 28, 2013

Please note – The program divides into Engineering and Designer/Contractor education tracks from 10:00 am until noon and 1:00 pm until 2:45 pm.
With the exception of those times, sessions are for all attendees.

6:30 - 7:30 am	**Check-in and continental breakfast with open CLT product showcase**
7:30 - 7:45 am	**Cross Laminated Timber's Role in North American Construction** Speaker: *Erol Karacabeyli, PE, FPInnovations (Canada)* In the context of wood-based building systems, cross laminated timber has a unique position. This session will examine the role of CLT in North American construction and provide an overview of the newly released US version of the CLT Handbook. *Erol Karacabeyli is Manager of the Building Systems Department at FPInnovations (formerly Forintek), where he oversees a staff of more than 30 scientists, engineers, research associates and technologists. Erol is a well-known and influential member of the wood building systems research field nationally and internationally, and serves on numerous codes and standards committees. He is the Chair of ISO Technical Committee on Timber Structures, and an Adjunct Professor in the Civil Engineering Department of the University of British Columbia. An award-winning researcher, Erol has made significant contributions to the wood building systems field. His findings have been published in over 100 publications.*

7:45 - 8:15 am	**CLT Manufacturing** *Speaker: BJ Yeh, PE, APA – The Engineered Wood Association (US)* Summarizing Chapter 2 of the US CLT Handbook, this presentation will discuss the manufacturing process of CLT and the development of the ANSI/APA Product Standard. In addition, the standard CLT grades, design properties and certification requirements will be discussed. Topics will include the current state of production and how specifiers can use available Product Reports. *Dr. Borjen ("B.J.") Yeh, PE, is Director of the Technical Services Division for APA – The Engineered Wood Association. He is chair of the ASTM D07.02 Subcommittee on Lumber and Engineered Wood Products, and ASTM task groups on E72 and E2126 standards, the project leader for ISO TC 165 Timber Structures, and an active member of numerous technical committees and professional societies. He is the secretariat for ANSI/APA standards on Cross-Laminated Timber, Structural Insulated Panels, Engineered Wood Rim Boards, and Engineering Wood Panel Siding. Yeh earned his MS at Iowa State University and PhD at the University of California, Berkeley, and is a registered professional engineer in the State of Washington.*
8:15 - 9:00 am	**Fire Research and Testing** *Speaker: Christian Dagenais, Eng, MSc, FPInnovations (Canada)* This presentation will introduce the criteria for fire resistance design as well as the results of recent fire testing completed in North America and presented in Chapter 8 of the US CLT Handbook. Important issues regarding adhesive performance and its effect on char rate will be examined as will the use of CLT assemblies, fire effects on connections, and flame spread related to exposed CLT. *Christian Dagenais is a fire scientist at FPInnovations, where his main research topics are structural fire performance of wood structures, performance-based design, fire modeling and fire safety. Christian spent eight years as a product engineer for various structural engineered wood products companies and nearly five years as a Codes & Standards technical advisor at cecobois, a technical support organization for non-residential wood constructions in Quebec. He actively participates on numerous Codes & Standards technical committees and working groups and also co-leader of Theme III within the NEWBuildS research network on Fire, Acoustic and Vibration Serviceability.*
9:00 - 9:45 am	**Fire Design** *Speaker: Michelle Kam-Biron, PE, SE, American Wood Council (US)* This presentation continues exploring Chapter 8 of the Handbook with an emphasis on practical implications of recent CLT fire testing for US designs. Topics will include an overview of possible CLT applications under the life safety section of the building code, and examples of actual fire resistance calculations and their relation to the existing *National Design Specification® for Wood Construction (NDS®)* methodology. *Michelle Kam-Biron is a California licensed structural engineer and Director of Education for the American Wood Council (AWC). Before joining AWC, she was Senior Technical Director – National Lead Mid-rise/Multi-family Construction for WoodWorks. She has over 20 years of experience managing and designing a wide range of projects in various structural materials as well as Division of State Architect contract plan review. Ms. Kam-Biron is a graduate of Cal Poly, San Luis Obispo with a BS in Architectural Engineering. She is an active member and past Director of the Structural Engineers Association of Southern California and a volunteer on the Cal Poly State University, San Luis Obispo Architectural Engineering Advisory Board.*
9:45 - 10:00 am	**Break**
10:00 am - noon	
Engineering Track	**Structural Design** *Speaker: Loren Ross, EIT, American Wood Council (US)* This presentation will acquaint engineers with the vertical design methodology from Chapter 3 of the US CLT Handbook. Discussions will include how to analyze the composite section, account for shear deformation, and understand how CLT performs resisting loads in or out of its plane. *Loren is a Manager of Engineering Research at the American Wood Council. He graduated with his Masters from Washington State University under Dr. Don Bender. He spent a short time designing in Washington State with PCS Structural Solutions and the Army Corp of Engineers before joining AWC in 2010. At AWC, he has focused on structural and energy issues by being the primary author of the structural section of the US CLT Handbook and serving on ASHRAE's 90.2 committee.*

Lateral Design

Speaker: Marjan Popovski, PhD, FPInnovations (Canada)

Summarizing Chapter 4 of the Handbook, this presentation will include an overview of the latest information on the seismic performance of CLT structures, major findings from research conducted in the US and around the world, and suggestions for seismic design of CLT structures. Included will be the preliminary recommendations on the seismic response factors for CLT structures under the *International Building Code (IBC)* and the connection design principles to support these factors. Basics on determining the shear capacities for CLT shear walls and diaphragms will be introduced, along with some comments on lateral design for wind loads.

Dr. Popovski is a Senior Scientist and Quality Manager in the FPInnovations Building Systems Department. He has over 20 years of research experience related to experimental and analytical investigation of the performance of structural components, assemblies, connections and structural systems under various loading conditions, of which 14 years specialized in the performance of wood structures. He is author of over 80 journal papers and other publications in the field of structural and wood engineering, and was a member of the team that developed the APEGBC technical bulletin for mid-rise wood-frame buildings.

Vibration Considerations

Speaker: Lin Hu, PhD, FPInnovations (Canada)

A summary of Chapter 7 of the US CLT Handbook, this presentation will cover both the importance of controlling CLT floor vibrations and design methodologies. Special cases such as light and heavy weight toppings, suspended ceilings and multi-span panels will be discussed and a design example will be included.

Lin Hu has been a research scientist at FPInnovations since 1993. She specializes in vibration control of wood floors and buildings, sound insulation of wood buildings, and non-destructive evaluation and quality control of wood and wood products using modal test, stress wave and X-ray scanning techniques. She has a PhD from the University of New Brunswick in Structural Vibrations.

Designer/Contractor Track

Acoustic Design

Speaker: Lin Hu, PhD, FPInnovations (Canada)

Focusing on Chapter 9 of the Handbook, this session will include an overview of tested assemblies meeting IBC Sound Transmission Class (STC), Impact Insulation Class (IIC), Field Sound Transmission Class (FSTC) and Field Impact Insulation Class (FIIC) requirements. Best practices will be covered and include how to minimize flanking, go beyond IBC requirements, and conduct field measurements on completed buildings.

Lin Hu has been a research scientist at FPInnovations since 1993. She specializes in vibration control of wood floors and buildings, sound insulation of wood buildings, and non-destructive evaluation and quality control of wood and wood products using modal test, stress wave and X-ray scanning techniques. She has a PhD from the University of New Brunswick in Structural Vibrations.

Building Envelope

Speaker: Sam Glass, PhD, USDA Forest Products Lab (US)

This presentation will examine the Enclosure Chapter of the US CLT handbook. A review of strategies for managing water, air, vapor and heat will be followed by insulation methods and recommended wall and roof assemblies. Additional topics will include CLT's contribution to thermal mass, use of preservative treatment and controlling moisture during construction.

Sam Glass is a scientist at the USDA Forest Products Laboratory (FPL) in Madison, Wisconsin. He leads a team that conducts laboratory, field and modeling research on building envelope performance, durability of energy-efficient construction, moisture transfer in wood and wood-based materials, and corrosion of metal fasteners in wood. Dr. Glass is a member of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) and participates in technical committees and the development of standards related to building envelope performance and moisture control. Prior to joining FPL in 2005, Dr. Glass completed a PhD in physical chemistry at the University of Wisconsin-Madison.

Environmental Performance

Speaker: Blane Grann, FPInnovations (Canada)

A preliminary life cycle assessment (LCA) study was completed for a mid-rise, CLT apartment building, and the results are presented in Chapter 11 of the US CLT Handbook. This seminar will provide updated results for the CLT building from a peer reviewed study comparing a mid-rise CLT apartment building to a concrete platform alternative. An overview of LCA and the environmental metrics used for the study will be presented, and discussion will include how this information can be used for sustainable design.

Blane is a Scientist in the Environment and Sustainability group at FPInnovations. Driven by a sense of adventure, a deep interest in environmental systems thinking, and inspiration from the adoption of life cycle thinking to address environmental issues at the European policy level, he recently pursued his master's degree at the Norwegian University of Science and Technology in the field of Industrial Ecology. Earlier in his academic career, he received a multidisciplinary BSc in Environmental Science, Economics, and Physics from Dalhousie University, and, while considering a career in health care, a BHK specializing in exercise science from the University of British Columbia.

Innovative Uses for CLT
Speaker: Jana Foit, Architect AIBC, LEED AP BD+C, Perkins + Will (Canada)
This presentation will focus on the use of CLT and its integration with other massive timber systems in the Earth Sciences Building (ESB) at the University of British Columbia (UBC)—which is the largest application of panelized wood products to date in North America. Discussion will focus on the engineered wood solutions featured in the building and the architectural lessons learned.

Jana is an Associate and Higher Education Market Sector Leader for the Vancouver office of Perkins+Will. For the past three years, she has been leading the new Earth Sciences Building project at UBC. Involved since the beginning of schematic design, she has been a primary supporter of the wood solutions in the project and has gained a great deal of knowledge in the successful application of wood products from design through construction. Prior to the ESB, Jana managed the renovation of the Buchanan building, a 185,000-square-foot arts classroom complex, also at UBC.

Noon - 1:00 pm **Lunch**

1:00 - 2:45 pm

Engineering Track

CLT Connections
Speaker: Loren Ross, EIT, American Wood Council (US)
This presentation will review Chapter 5 of the US CLT Handbook. Included will be a discussion of how existing NDS provisions can be applied to CLT, how the use of proprietary connectors should be approached, and calculation examples for different connection designs including shear, uplift and overturning.

Loren is a Manager of Engineering Research at the American Wood Council. He graduated with his Masters from Washington State University under Dr. Don Bender. He spent a short time designing in WA with PCS Structural Solutions and the Army Corp of Engineers before joining AWC in 2010. At AWC, he has focused on structural and energy issues by being the primary author of the structural section of the US CLT Handbook and serving on ASHRAE's 90.2 committee.

Advanced Engineering Concepts
Speaker: Eric Karsh, MEng, PEng, StructEng, MIStructE, Ing, Equilibrium Consulting (Canada)
This presentation will demonstrate how engineers can take full advantage of CLT as a structural system by using advanced structural techniques such as folded diaphragms, progressive collapse studies, and 3-D structural analysis.

Originally from Québec, Eric Karsh began his consulting career in Ottawa in 1987 with Adjeleian Allen Rubeli Limited, designers of the Toronto SkyDome. He has extensive experience in all common building materials, but since his arrival in British Columbia in 1993 has developed a unique expertise in timber engineering and construction. In 1998, Eric helped found Equilibrium Consulting Inc., which is recognized internationally for work on projects such as the Raleigh-Durham Airport expansion and the Art Gallery of Ontario Dundas Façade by Architect Frank Gehry.

Designer/Contractor Track

Exploring Architectural Limits
Speakers: Jim Dow, Schuchart/Dow (US); Les Eerkes, AIA, Olson Kundig Architects
In this session, a builder and architect of architecturally significant residences will share the results of a recent building adventure in Washington State. By experimenting with different applications of CLT, they intended to explore the flexibility of the solid timber plate. Discussion will focus on how these new construction methods proved to be a departure from traditional heavy timber construction, and revealed an opportunity to explore uncharted territory in architectural expression.

Jim Dow is a founder and managing partner of Schuchart/Dow. He began his career as a laborer at age 13 before starting his own construction business at 18. He earned a BA in biology and teaching credentials from Pacific Lutheran University, but after a year of teaching high school returned to construction. A defining moment in his career was when he had the opportunity to work with one of the foremost architects of our time, Christopher Alexander, author of "The Pattern Language." This experience confirmed his commitment to working on projects of real architectural merit, as well as the value of collaboration among the builder, architect and client.

Les Eerkes joined Olson Kundig Architects in 1994, becoming a principal in 2010. His interest in building technology led to the firm's adoption of Building Information Modeling (BIM) systems and collaboration with manufacturers for direct-to-fabrication workflows, evolving the firm's longstanding tradition of exploring craft in design. He co-designed the Carraig Ridge Passive House, which will be featured in an upcoming Princeton Architectural Press book on passive house design. His work has been recognized with a variety of design, civic and industry awards. Earkes is a frequent design critic for university architectural programs, and has served on a number of AIA design juries.

US Lessons from an Italian Hotel Experience
Speaker: Jens Hackethal, Styxworks
One of the largest CLT structures in Europe, Hotel Aqualux is a three-story boutique hotel on the shores of Garda Lake in Bardolino, Italy. This presentation will examine why CLT was ultimately chosen over what was originally envisioned as a concrete structure, as well as the iterative planning process and optimized construction solutions that drastically reduced construction time and cost. Topics will also include how architectural elements of design and lessons learned in construction could be applied in the US.

Growing up in a timber construction family, Jens Hackethal was exposed to the German carpentry tradition at a young age. He completed his certified timber technician degree from the Fachschule Rosenheim in Germany in 1998, gained experience as a production manager and engineering designer, and went to work for Rasom Wood Technology, a heavy-timber and CLT construction company. In 2007 he founded Timberline, a virtual timber design and construction management consulting company with an emphasis on CLT. Deciding to bring his CLT experience to the North American market, he co-founded Styxworks, LLC based in Montana.

Architectural Design – The 10-story Forté
Speaker: Daryl Patterson, Lend Lease (Australia)
The architectural design of the 10-story Forté apartment building in Melbourne, Australia will be presented in more detail, with an emphasis on what CLT assemblies and detailing were used and how they affected the overall outcomes of the project.

Daryl Patterson is Head of Operational Excellence for Lend Lease's development business, and is responsible for overseeing operational performance across Australia. Lend Lease's Development businesses span multiple sectors including greenfield subdivision, commercial office towers, highrise apartments, retirement and aged care facilities and major mixed use urban redevelopments. Starting his career in architecture, Daryl progressed into construction, project management and ultimately the development of complex landmark projects. Most recently, he has overseen Lend Lease's effort to develop and construct Australia's first cross laminated timber building, which is the world's tallest apartment building of its kind.

2:45 - 3:00 pm	**Break**
3:00 - 3:25 pm	**Lifting, Handling and Transportation** *Speaker: Sylvain Gagnon, Eng., FPInnovations* In this seminar, a variety of lifting systems used in the construction of CLT structures will be discussed. Basic theory and techniques will be shown, as will the tools and accessories commonly required. Issues related to the transportation of CLT assemblies from factory to building site will also be explained. *Sylvain is the Associate Research Leader for Advanced Building Systems and Structural Performance for FPInnovations. As such, he provides support to members with regard to the development and performance of special building systems projects. He is experienced in wood design as well as the industrial manufacturing and standardisation of structural wood products, and has extensive experience with other materials. He worked for numerous years as project leader in consulting engineering for SNC-Lavalin and Tecsult. He also participated in the start-up of a Québec-based engineered wood plant and was an engineering instructor in Timber Design at Université Laval. Sylvain holds a Bachelor degree in Civil engineering from Université Laval in Québec City.*
3:25 - 4:30 pm	**Constructability and Assembly** *Speaker: John Boys, Nicola LogWorks* This seminar will examine what happens when design meets the realities of a job site. Presented by a contractor involved in the construction of multiple North American CLT buildings, it will focus on four projects: the Earth Science Building at the University of British Columbia (UBC), Duthie Pump House in Burnaby, BC, Airport Terminal Building in Fort McMurray, BC, and Jesse Garlic Retreat in Oroville, WA. Topics will include pre-planning, logistics and constructability, as well lessons learned—both from these projects and the use of CLT in Europe over the past 25+ years.

John Boys is President of Nicola LogWorks, a producer of log and heavy timber structures in Merritt, BC. John discovered a passion for log construction while attending the Allan Mackie School of Log Building in the early '80s. As his expertise in heavy log and timber construction developed, so did his interests in work methods and procedures, jigs and tool development, and custom machine fabrication. Over the last decade his work has evolved into larger commercial structures of log, timber, glulam and CLT. He is a member of the International Log Builders' Association and the Timber Framer's Guild. His credits include the ILBA publication, "A Boy's Big Book of Jigs," and he contributed to the FPInnovations book, "The Illustrated Guide to Log Home Construction – From Log Shell to Finished Home" by Dalibor Houdek.

4:30 - 5:30 pm

Solid Panel Construction and Designing for Cost-effectiveness

Speaker: Eric Karsh, MEng, PEng, StructEng, MIStructE, Ing, Equilibrium Consulting (Canada)

Learn from one of the foremost pioneers in his field about the role of solid panel construction in today's building industry. Using various real-life project examples, discussion will focus on how to best utilize cross laminated timber in projects to achieve maximum performance and cost efficiency.

Originally from Québec, Eric Karsh began his consulting career in Ottawa in 1987 with Adjeleian Allen Rubeli Limited, designers of the Toronto SkyDome. He has extensive experience in all common building materials, but since his arrival in British Columbia in 1993 has developed a unique expertise in timber engineering and construction. In 1998, Eric helped found Equilibrium Consulting Inc., which is recognized internationally for work on projects such as the Raleigh-Durham Airport expansion and the Art Gallery of Ontario Dundas Façade by Architect Frank Gehry.