UMass 2007 Wood Structures Symposium

November 1 - 2, 2007 · UMass Campus Center, Amherst, MA

Building with wood is building for the future

Contemporary wood architecture demonstrates ingenuity and new direction. In the quest for sustainable building materials, life-cycle analysis studies consistently show wood as having top environmental benefits: it is energy efficient in production and operation; it absorbs and stores the greenhouse gas carbon dioxide; and it is renewable, recyclable, and sustainable. As a result, wood is becoming a material of choice in award winning environmentally green structures as well as a prominent building material used in showcase projects at world expositions.

This two-day meeting will discuss and illustrate the latest innovations in wood architecture, engineering and construction. Topics include: contemporary wood architecture world-wide, wood and the environment, technological advances in green buildings, digital fabrication with wood and detailing of engineered wood products. A full day workshop by the American Wood Council on the design of Wood Frame Buildings is included. Speakers are from the United States, Canada and Europe.

Contact conference organizer Prof. Peggi Clouston if you have any questions regarding this event.

Program - First Day (Nov. 1):

TIME	TOPIC
8:00am – 9:00am	Registration / Exhibit booths* / Light Breakfast
9:00am – 9:10am	**Welcome and Introduction** Professor Peggi Clouston, UMass
9:10am – 10:00am	**The Timberframe Revival: A bridge to the past or the future?** Tedd Benson, Benson Woodworking, New Hampshire Over the past 35 years, there has been a remarkable resurgence of the ancient craft of timberframe building in North America. Except for occasional barns built in the Amish communities, in 1970 timberframing as a building method had been completely abandoned. Today, there are over 500 companies building many thousands of timberframe homes and light commercial buildings each year. The unknown story of this effort is that in order to renew

	interest in an old way of building, it has been necessary to create methods and systems that are new. We look steadfastly backwards for guidance and inspiration, but also are pulled to develop forward because the both the market and contemporary building requirements require that our processes, systems and structures have practicality and relevance in the present and future. In the timberframe industry, this tension between the past and the future is palpable and leads to some lively discussions, but the ultimate result of a focus both backwards and forwards has more than balanced the imitations with innovations.
10:00am – 10:50am	**Challenging Designs and Innovative Solutions in Heavy Timber Construction** David Moses, Equilibrium Engineering, Toronto, Canada Timber engineering is a rare specialty in much of the world. This is surprising given that timber is a hi-tech material and the only truly sustainable construction material. Over the past five or six years in North America, we have seen significant progress in the development and use of sophisticated timber engineering technologies. These include changes in materials, use of CNC (Computer Numerically Control) machines as well as a number of new connection systems and construction methods. This presentation will briefly review this state-of-the-art technology, and show examples of projects including the new expansion of the Art Gallery of Ontario and the installation of long-span timber trusses in Raleigh-Durham airport.
10:50am – 11:10am	Coffee Break / Exhibit Booths*
11:10am – 12:00pm	**CAD Solutions for Wood Design** Alexander Schreyer, University of Massachusetts, Amherst The designer of wood structures - be they residential light-frame structures, commercial glulam structures or wide-spanning trusses - needs the ability to create a digital model of said structure, whose use can then span from architectural design variations and structural design through material lists to fabrication. A range of CAD-based software options is available today and many offices and manufacturers use these or are planning to switch to those in the near future. This talk intends to show the range of possibilities and disentangle the maze of available options by giving an overview of available CAD systems for building with wood.
12:00pm – 1:00pm	Complimentary Lunch / Exhibit Booths
1:00pm – 1:50pm	**Energy Efficient Housing** Peter Yost, BuildingGreen Inc., Brattleboro, VT and Adjunct Professor, UMass Amherst Architects and hvac engineers/trade contractors need to work together to optimize building performance by way of building envelope performance, framing layouts (exterior walls and floor assemblies), location of HVAC runs and equipment. At the same time, related trades--framing, drywall, and HVAC--can support or diminish high performance design and specification as they go about their highly sequenced work. We will use actual examples from high performance home builders to show how systems integration can be expressed in the work of the architect, the HVAC engineers, and the trades who express the work of both.
1:50pm – 2:40pm	**Green Technologies for Structural Retrofit and Prefabrications with wood** Professor Leander Bathon, University of Applied Sciences, Germany

	This presentation shows a system approach to retrofit existing timber floors in historical buildings as well as a variety of applications of prefabricated building elements using wood-concrete-composite (wcc) technologies. The retrofit of existing timber floors using wcc-technologies allows for an increase in structural capacities under vertical and lateral loading conditions. First of all, it allows for an increase in bending strength and stiffness of approximately 400 percent. At the same time it provides a diaphragm that creates a substantial increase in lateral stiffness due to wind and seismic loading. The prefabricated wcc-technology holds a whole world of innovative building elements. These include applications in floors, walls and roofs. All solutions presented show a balance design approach using timber and concrete in order to achieve a green building solution. The presenation will show a number of examples of prefabricated wcc-elements in Europe.
2:40pm – 3:00pm	Coffee Break / Exhibit Booths*
3:00pm – 3:50pm	**Environmental Aspects of Engineered Wood in Commercial Applications** Tim Svarczkopf, I Level by Weyerhaeuser, USA Commercial construction relies heavily on concrete and steel to create the structure required to support often large and complicated buildings. Engineered wood can often meet the needs of the specifiers and clients with a substantial cost savings, as well as favorable environmental effects. We will explore the benefits and limitations of using engineered wood in commercial structures.
3:50pm – 4:40pm	**Recent Innovations in Wood Frame Housing** Mark Collins, I Level by Weyerhaeuser, USA Engineered lumber has come a long way over the last 40 years. Once thought of as a specialty framing product, engineered lumber can be found in most wood framed projects. At one time, it was limited mostly to floor and roof applications. Now engineered lumber can be found all throughout the structure. In this presentation we will discuss the latest products and applications, advances in software, and the growing trend towards pre-cut and panelized systems.
4:40pm – 5:20pm	**Wood and the Environment** Sam Francis, American Wood Council In this session, we will review the definitions of green building and its relationship to sustainable building materials. We will examine various green building rating systems and discuss their respective treatment of wood as a building material. The differences in that treatment will be reviewed and it ramifications will be further explored. Then we will examine internet sources for information on the subject of sustainable buildings. Finally, we will review the qualities which make wood a sustainable construction material, discuss the characteristics which make wood a green building material and review how various rating schemes treat each of wood's characteristics.

Program - Second Day (Nov. 2)

WFCM Workshop

AWC 207 Option B: WFCM - Design of Wood Frame Buildings for High Wind, Snow, and Seismic Loadings

The American Wood Council is the industry leader in development of standards for wood design. **Participants in this seminar will be able to comprehend provisions of the 2005 NDS®, and the Wood Frame Construction Manual 2001 National Edition for wind, snow, and seismic applications.** Attendees will learn about lateral load behavior and structural response, and also be able to apply building code and issues, connection design philosophies, detailing, and code provisions.

This **1-day workshop** (7.0 teaching contact hours) combines lectures, slide presentations and interactive participation of the participants with the instructor in the use of ANSI/AF&PA Wood Frame Construction Manual (WFCM) for One- and Two-Family Dwellings. The focus of the course is practical design using tables from the WFCM. By using an example two-story house, participants will analyze a typical wood-frame house from roof to foundation sited in Seismic Design Category D-1 and 120 mph wind speed. The participant's workbook, including design example, is the focal point of the course. After the course, this workbook will facilitate design of other buildings for high wind, seismic and snow loading. Learning how to efficiently use the WFCM will be valuable to participants as it offers a method of design for high wind with a minimum amount of time commitment by the designer.

The specific **course objectives** are to:

- Become familiar with provisions of the WFCM and the Commentary to the WFCM,
- Learn how to design a typical two-story house for seismic and wind loading by a design demonstration, and
- Through the use of the course notebook, be able to execute similar designs.

The course will be of benefit to three audiences: architects, engineers, and other designers of one- and two-family dwellings; building code enforcement officials; and building contractors. Designers of wood framed one- and two-family dwelling projects are the primary audience for this course since the participants learn how to design a typical two-story house for wind, seismic and snow loading by a design demonstration. In many instances, building contractors are also home designers, and thus builders should also consider attending. Building officials will also directly benefit by familiarizing themselves with the tables and specifications being used in the design of wood framed residences in high wind and seismic regions.

The **outline** for this one-day course is as follows:

TIME	TOPIC
7:15am – 8:00am	Registration / Exhibit booths* / Light Breakfast
8:00 – 9:30	**ASD and LRFD with the 2005 National Design Specification® for Wood Construction** (1.5 hrs) The NDS® for Wood Construction 2005 is a dual format ASD and LRFD document with some

	enhancements from the 2001 version. As an updating session, learn about the format of the new document and how to apply its ASD and LRFD design provisions to wood construction through worked examples.
9:30 – 10:00	**Wood Frame Construction Manual 2001 National Edition** (0.5 hrs) The WFCM is a referenced standard in the International Building Code and the International Residential Code, providing an alternative to the IBC/IRC provisions for structural design of residential structures in areas of high wind, snow, or seismic loads. However, the WFCM has applicability in any geographic region of the US since the 2001 edition encompasses "normal" loads as well as high loads. Learn about engineered and prescriptive provisions for the design of residential structures, including structural behavior overviews. Learn about the unique provisions of this code in that they are engineered, yet prescriptive; containing extensive tables and diagrams for use by builders and code officials as well as experienced designers. The session works through some brief design examples which use the manual.
10:00 – 10:15	Morning Break
10:15 – 11:15	**Wood Frame Construction Manual 2001 National Edition** (continued, 1.0 hr) The session will explain different construction types and the behavior of small structures and structural elements under gravity, seismic and wind forces through projected graphics and lecture. An introduction to engineered shear wall design, location, and inspection points will be offered. Learn also about the Guide to Wood Construction in High Wind Areas for One- and Two- Family Dwellings, a publication designed to simplify 2001 WFCM provisions for the builder. On completion of this session, you will be knowledgeable about: 1. The purpose of the 2001 WFCM and its development process. 2. Code acceptance and references. 3. 2001 WFCM document layout. 4. Design provisions, including: - shear walls and the “Standard” Shear Wall concept - wind load resistance and behavior - snow load resistance - seismic load resistance and behavior. 5. Design examples for each load type as first familiarization with the Standard.
11:15 – 12:00	**Design of Wood Frame Buildings for High Wind, Snow, and Seismic Loadings – General Information and Getting Ready** (0.75 hrs) This hands-on segment features, by example, the complete design of a real two-story dwelling for wind, snow, and seismic loadings using the provisions and tables of the Wood Frame Construction Manual 2001 National Edition. In this segment, general information is presented on the building description, loads on the building, WFCM applicability limitations, prescriptive design limitations, load paths, and design checklists.
12:00 – 1:00	Complimentary Lunch

1:00 – 2:30	**Roof and Top Story Design** (1.5 hrs) Students get to work beginning by designing the roof and top story of the dwelling including: roof rafters and sheathing, beams, ceiling joists and diaphragms, and all connections; wall framing and sheathing, shear walls as necessary, floor framing and sheathing, connections, and details, using referenced worksheets and the WFCM 2001.
2:30 – 2:45	Afternoon Break
2:45 – 4:30	**Bottom Story Design** (1.75 hrs) Students complete the hands-on experience with the detailed design of all bottom story wall framing and sheathing, single wall and combined wall shear walls, floor framing and sheathing, connections, and details. Again, referenced worksheets and the WFCM 2001 are used. Supplemental worksheets, checklists and supporting documentation are described.

Note: If you are attending day 2, don't forget to order the 2001 WFCM Books during registration.

Exhibitors:

- iLevel™, A Weyerhaeuser Business
- FastenMaster – OMG Roofing Products
- Cowls Building Supply
- American Wood Council

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