



NEWS BULLETIN #6: SPRING 2013

NEWBuildS Activities:



NEWBuildS 3rd Annual NEWBuildS Annual Workshop, May 17, 2013

- Dr. Y. H. Chui, Scientific Director & Ms. Lynn Embury-Williams, Chair of Board of Directors, hosted the 3rd NEWBuildS Annual Workshop at NAV Center, Cornwall, ON. A total of 66 participants from partner universities, FPInnovations, and government agencies and industry representatives including architects, engineers, building designers, structural engineers, builders and wood products manufacturers, participated in the Annual Workshop.
- Mr. Erol Karacabeyli, Manager - Advanced Building Systems of FPInnovations, gave the Keynote Address "Pan-Canadian Review of Research in Wood Building Systems". Mr. Karacabeyli is a member of the NEWBuildS Board of Director. He provided background on Canadian Forest Sector Innovation Systems and discussed the renaissance for tall wood buildings and the associated research efforts in Canada. He also announced that FPInnovations is working on the Technical Guide for Design and Construction of Tall Wood Buildings..
- The Workshop 2013 was a one-day event and consisted of 3 sessions – Structural, Durability & Energy and Fire & Serviceability. There were a total of 15 presentations with focus on a range of key building system related issues. The meeting package with the presentation abstracts was available and provided in electronic and paper format. NEWBuildS appreciated the presentation moderations by Professors F Lam, G Hadjisophocleous and J Straube.
- The presentations of Dr. Chui, Mr. Karacabeyli and the 15 HQP presentations and the Workshop 2013 program are available at Member area of <http://newbuildscanada.ca/members/researchers/> titled "May 17, 2013 – 3rd NEWBuildS Annual Workshop & Presentations, Cornwall, ON".
- Workshop 2013 program and photos are posted @ <http://newbuildscanada.ca/news/events/> - Past Event.





The 1st FIBRE Network Conference, May 13 to 16, 2013, Cornwall, ON

- FIBRE is “Forest Innovation by Research and Education” and consists of eight forest sector research networks. It is “working together to support the transformation of Canada’s forest sector.’
- The 1st FIBRE Network Conference took place on May 13 to 16, 2013 at the NAV Center, Cornwall, ON. This conference highlighted university-led forest product/process innovations, university-industry collaborations and student training. There were approximately 400 delegates at this Conference.
- The conference was consisted of several sessions.
 - The VIP sessions consisted of senior representatives of Natural Sciences and Engineering Research Council of Canada, Natural Resources Canada, FPIInnovations, and Forest Products Association of Canada.
 - Presentations from the eight forestry networks. NEWBuildS presentations were given by Dr. Frank Lam, UBC and Dr. George Hadjisophocleous, Carleton University and Christian Dagenais, FPIInnovations.
 - HQP Poster sessions – there was a total of 170 posters with 23 from NEWBuildS. These 170 posters competed for the Otto Maass Student Poster Competition Awards. A cash contribution towards the awards was provided by FPIInnovations.



FIBRE Workshop: *From Trees to Buildings*, February 18-19, 2013 Quebec City, QC

- This workshop focused on the research programs of three of the forestry networks, VCO, ForValueNet and NEWBuildS. Presentation topics ranged from growing trees with high quality wood fibres, optimizing the forest products value chain, to seismic performance of mid-rise steel-wood hybrid buildings. There were also presentations by provincial forestry representatives and a builder.
- NEWBuildS played a leading role in organizing this Workshop. The keynote presentation on ‘Wood and Buildings of the Future’ was presented by Dr. Andy Buchanan, University of Canterbury, New Zealand.
- NEWBuildS presentations focused on CLT research and were presented by Drs. F. Lam, S. Tesfamariam, S. Craft and J. Straube. Their presentations can be viewed @ <http://www.reseauvco.ca/index.php?id=155>.
- NEWBuildS HQPs researchers presented 8 posters.





NEWBuildS Outreach Committee:

- The Outreach Committee (OC) hosted several Conference Calls and established the Outreach Flow Path Template, NEWBUILDS Project Output Assessment V3 template and Tech Note template. These processes are established in order to have an orderly and organized approach to address dissemination of the research results.
- The list of theses is updated 3 times a year, March 1st, July 1st and November 1st. OC will use the Project Output Assessment template to evaluate the research results of each project thesis and recommend the next step.
- NEWBuildS will request that a Tech Note be prepared for each completed HQP project. The Tech Note will likely be a joint effort by the PI and HQP. These Tech Notes will be posted on the NEWBuildS web site.

NEWBuildS Project Enhancement Fund 2013 Competition:

NEWBuildS Project Enhancement Fund awards are intended to support activities to enhance the quality of NEWBuildS research project with a maximum amount of \$6,000 for each approval application. NEWBuildS approved 8 awards for the 2013 competition.

New Researcher & Research Project:

NEWBuildS welcomes Dr. Thomas Tannert, University of British Columbia (UBC) as the new PI for Research Project T2-14-C4 "Analysis of "FFTT" Timber-Steel-Hybrid-System".

Update on NEWBuildS Web site:

NEWBuildS web site www.newbuildscanada.ca is updated constantly. All projects, events and presentations are available now to reflect the latest developments.

- The web site is separated into 2 main areas; Public and Member (brown bar). The Member area contains all relevant and on-going NEWBuildS research documents and can be used as reference and library for NEWBuildS researchers.
- For graduated HQP with defended thesis, the achievement will be acknowledged as follows;
 1. Theme Tab - The project is updated with revised designation for the graduated HQP and followed by the title of the thesis with downloadable "Abstract"
 2. Publication Tab / Thesis - Graduated HQP is listed with Thesis Title (if different from project title). Thesis can be downloaded through the link to the HQP university web site.

All HQP should forward their theses to NEWBuildS a.s.a.p. as they are required by the Outreach Committee. The university web site link will also be needed when available so that the link can be updated on the web site.

For 2013, the average monthly traffic at NEWBuildS web site Statistics is as follows;

- 500 unique visitors with 2500 visits, 7,000 web pages and 20,000 hits

Interaction with external stakeholders:

- Ms. Lynn Embury-Williams, Chair of BoD and Dr. Y. H. Chui met **British Columbia Forestry Innovation Investment (BC FII) Ltd.** Following the meeting, NEWBuildS submitted a proposal for an HQP Tall Building Design Project to BC FII for funding support under its Wood First

Program. This project, presented below, has been approved for funding support and it will be launched later this year. BC FII is now listed as a NEWBuildS Associate Network Partner.

- **Alberta Innovates BioSolution** is listed as a NEWBuildS Associate Network Partner since it has provided financial support to NEWBuildS for the past 2 years.

NSERC Strategic Network Enhancement Initiative (SNEI):

- The joint submission by FIBRE networks received a NSERC SNEI grant in the amount of \$520,000 for 2013. NEWBuildS will receive \$60,000 which will be used to fund, along with the BC FII funding, the new NEWBuildS project; HQP Tall Building Design Project.

NEWBuildS HQP Tall Building Design Project:

The main objectives of this project are

1. To demonstrate the application of analysis and design tools developed and adopted within NEWBuildS research program in designing tall wood buildings.
2. To identify potential technical challenges when designers choose the alternative solution path for high-rise wood buildings, and future research needs.
3. To provide a real-world training environment for NEWBuildS graduate students and post-doctoral fellows.

A design team consisting of 3 practicing building design professionals and 6 NEWBuildS HQP will under the design project. The deliverable will be a Workshop in 2014 and a report to the stakeholders and industry.

Completed theses:

Ms. Sepideh Ashtari	Master of Applied Science, Civil Engineering	University of British Columbia	PROJECT T1-7-C3: Evaluating the In-plane Stiffness and Strength of CLT Floor Diaphragms
Ms. Xinlei Huang	Master of Applied Science, Civil Engineering	University of British Columbia	PROJECT T2-6-C3: Diaphragm stiffness in wood-frame construction
Mr. Marc Aguanno	Master of Applied Science, Civil and Environmental Engineering	Carleton University	PROJECT T3-3-C7 - Thesis Title: Fire Resistance Tests on Cross-Laminated Timber Floor Panels: An Experimental and Numerical Analysis
Mr. Cameron James McGregor	Master of Applied Science, Civil and Environmental Engineering	Carleton University	PROJECT T3-3-C7 - Thesis Title: Contribution of Cross Laminated Timber panels to room fire

Future Network and related events:

NEWBuildS will host a CLT Industry Focus Day on July 19, 2013 at Vancouver Radisson Airport Hotel, Vancouver, BC. <http://newbuildscanada.ca/news/events/>. NEWBuildS researchers will provide a summary of CLT research projects on Structural, Fire & Serviceability and Building Envelope, receive feedbacks on these projects. Apart from NEWBuildS researchers, the invited participants are from FPInnovations, CLT and massive timber panel producers, building design community, government agencies, regulatory bodies and associations.

Round table discussion sessions will be held to discuss challenges faced by designers and manufacturers, and to identify future research needs.

Featured Project:

PROJECT T1-1-C1: Development of evaluation methodology for rolling shear in CLT

Lead Investigator: **Dr. Meng Gong, University of New Brunswick**

HQP: **Ms. Qinyi Zhou**

FPInnovations Co-Investigator(s): **Dr. Mohammad Mohammad**

Rolling shear properties of cross laminated timber (CLT) are very low due to the configuration of the cross layer. In some applications they are the key properties that govern the design and application of CLT. The goal of this study is to develop an appropriate methodology for measuring the rolling shear modulus and strength of cross laminated timber (CLT) for use by the CLT industry.

The study consists of two phases. In Phase I, variable-span bending test and two-plate shear test were conducted on three types of downscaled specimens, including wooden cross layer (WCL), steel-wood-steel (SWS) and 3-layer downscaled CLT (WWW), to explore an appropriate method to measure the rolling shear properties. Initial results showed that rolling shear modulus of WCL from 2-plate shear test was 72.61 MPa, which was more than twice higher than that of cross layer of SWS from the variable span bending tests. Rolling shear strength of WWW at the span-to-depth ratio of 6 under 3-point bending tests was 2.74 MPa. The verification results using the shear analogy method, as shown in Figure 1 and Figure 2, revealed that the CLT deflection at a span-to-depth ratio of 6.5 could be well predicted when the input rolling shear modulus, G_{rt} , was measured from the variable span bending test. If the input G_{rt} into the shear analogy model was measured from the two-plate shear test, the calculated CLT beam deflection (d_c) using the shear analogy method agreed with the measured deflection (d_m) at the span-to-depth ratio of around 14.

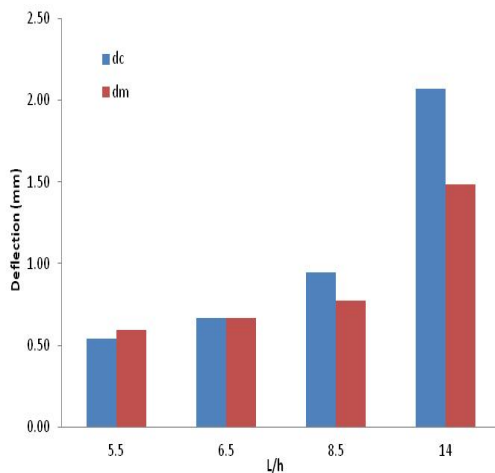


Fig. 1 Comparison between d_m and d_c of WWW based on E_m and G_{rt} measured with SWS bending test

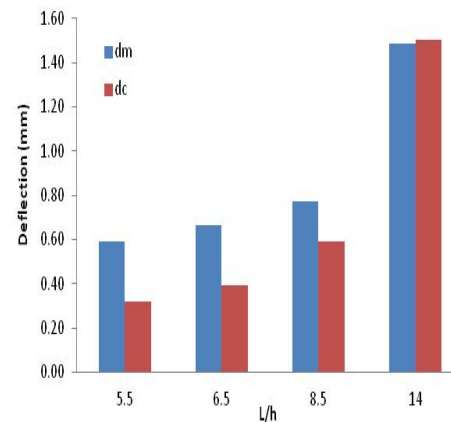


Fig. 2 Comparison between d_m and d_c of WWW based on G_{rt} of WCL measured by two-plate shear test

Based on the findings of Phase I, two-plate shear test was selected and conducted on wooden cross layer composed of No.3 grade 2 by 4 lumber to obtain the rolling shear modulus and the bending test was performed on 3-layer CLT beam to verify the results from two-plate shear test and also determine the rolling shear strength. It has been found that rolling shear modulus of wooden cross layer (WCL) under two-plate shear test was 136MPa, and rolling shear strength of 3-layer CLT beam tended to increase as the span-to-depth ratio decreased. The maximum rolling shear strength was found to be 1.63MPa at span-to-depth ratio of 6 for 3-layer CLT under centre-point bending test. The deflection of 3-layer CLT beam could be well predicted when the span-to-depth ratio of 17 based on the G_{rt} of WCL from two-plate shear test, as shown in Figure 3.

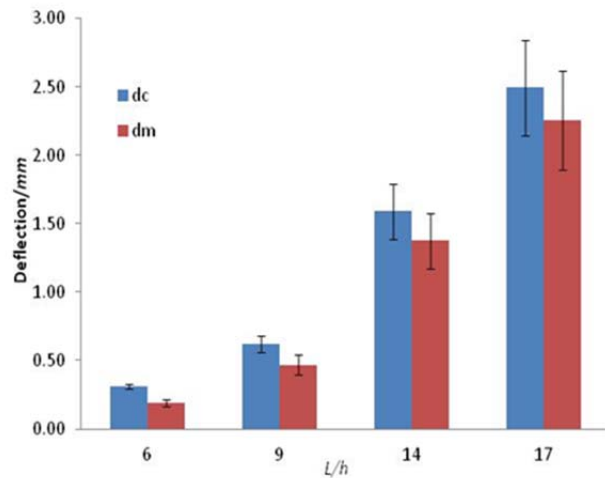


Fig.3 Comparison between d_m and d_c of specimen of 3-layer CLT beam based on G_{rt} of WCL measured by two-plate shear test

Failure modes of WCL under two-plate shear test and 3-layer CLT beam under bending test are shown in Figure 4 and Figure 5. Both failure modes are showing a significant rolling shear failure. Crack(s) initiated within the earlywood zone near the boundary between two growth rings, propagated along the growth ring or wood rays. Finally, specimens failed at the bonding surface or delaminated due to shear.



Fig.4 Failure mode of WCL under 2-plate shear test

Fig.5 Failure mode of 3-layer CLT beam under bending test

Based on the results to-date, it appears that two-plate shear test is a more appropriate test method for measuring the rolling shear modulus of a cross layer, which can be used to predict accurately the beam deflection at common practical span-to-depth ratios. However, more work is required to substantiate this. The bending test might be an appropriate test method for determining the shear strength of 3-layer CLT because it could produce a failure mode similar to that encountered under bending, which is a common loading configuration that produces rolling shear failure.