UNIVERSITY OF ALBERTA

NSERC CRSNG

NSERC Industrial Research Chair in Engineered Wood and Building Systems

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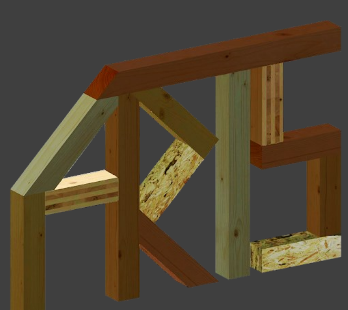
Content:



NEWSLETTER

Remark from IRC holder

The IRC group welcomes the following HQP to the group over the last two months:

- Dr. Hossein Daneshvar, PDF (Topic: Balloon construction utilizing mass timer panels)
- Dr. Behzad Vafaeian, PDF (Topic: Modelling of acoustics wave through mass timber panel and concrete hybrid floor panels)
- Md Saiful Islam, PhD student (Topic: Full panelization of prefabricated light wood frame buildings)
- Ning Kang, MSc student (Topic: Vibrational performance of timber floor systems with multiple spans or on beam support)

The IRC research group now consists of 5 PhD students, 4 MSc students, 3 PDF and 1 Research Assistant. There are also two visiting students from China, Ms Zirui Huang and Ms Baolu Sheng, who are making a great contribution to the research program of the IRC. A vibrant research program is being conducted by these 15 HQP covering a broad range of topics, including lateral resistance and stiffness of connections with inclined self-tapping screw connections, seismic performance of mass timber panel lateral load resisting systems in balloon construction, structural and acoustics performance of mass timber-concrete floor systems, in-plane elastic properties of mass timber panels, performance of CLT wall under combined bending and compression, floor vibration, and innovations in light roof frame construction.

Congratulations & Farewell

The IRC group would like to congratulate Dr. Jianhui Zhou for completing his PhD degree. Jianhui's PhD thesis is on simultaneous measurement of elastic constants of engineered wood-based panels by modal testing. With the completion of his degree, Jianhui will move on join the University of Northern British Columbia in Prince George as an assistant professor in UNBC's engineering in integrated wood design program. The IRC group would like to thank Jianhui for his work and wish him and his family all the best in Prince George.

2019 MOC Summit

We are pleased to announce that the University of Alberta and the University of Northern British Columbia will co-host a Wood Track for the 2019 Modular and Offsite Construction (MOC) Summit in Banff, AB. The Wood Track at the 2019 MOC Summit will have a theme on Mass Timber Buildings. The 2019 MOC Summit is the flagship of a multi-conference event that includes the 2019 International Symposium on Automation and Robotics in Construction (ISARC), the International Conference on Construction and Real Estate Management (ICCREM), and the Innovation in Construction Forum (ICF). We encourage everyone to submit abstracts for the Wood Track for the following topics:

- Timber–concrete composite floors - why, when, and how
- Innovative fastening systems for timber construction
- Lateral load-resisting systems for balloon construction
- Built environment - acoustics and vibrations
- Use of timber in modular construction and prefabrication
- Mass timber and fire
- Top-ups with timber - new spaces on existing structures

Abstract submission deadline is the 14th of September 2018. For further information please visit the official website (www.mocsummit.com) or contact Jianhui Zhou (jianhui.zhou@unbc.ca) & Jan Niederwestberg (jan.niederwestberg@ualberta.ca).

Contact Us

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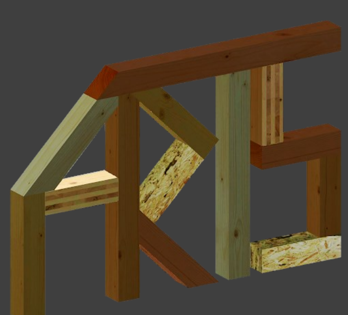

Project updates

Investigation of wood I-joists for floor applications in mid-rise construction

The described project was a MITACS Accelerate Project, which was finished in July. The objective of the project was to examine the wood I-joists against the requirements of mid-rise construction according to available design guidelines. Design considerations include diaphragm action, floor vibration and vertical movement. Based on the test results of small-scale diaphragm tests, modified fastener row factors J_f have been proposed for PKjoists as shown in the table below. In this table, fastener row factors were calculated by using the peak loads of small-scale diaphragm specimens and compared with values in CSA O86-14. A 10% reduction was proposed for PKjoists. Such modified values can be used as a supplement to fastener row factors provided in Section 11.4.2 of wood design guideline CSA O86-14.

Number of rows	PKjoists	Flange width [mm]	Fastener row factor, J_f				
			O86-14	SSL	I joist	%	modified
	PKI10	64	1.78	1.71	1.52	-11.11	1.60
2	PKI35	89	2.00	1.83	1.69	-7.65	1.80
	PKI50	89	2.00	1.93	1.77	-8.29	1.80
3	PKI50	89	2.67	2.42	2.11	-12.81	2.40

Nailed connections with an intermediate rigid insulation

To reduce thermal bridging in exterior light-frame wood wall assemblies an additional layer of thermal insulation is inserted between sheathing and framing. The insulation influences the reduced racking. Both, shear strength and stiffness of light-frame shear walls are highly dependent on the behavior of the nailed connections. To determine the effect of an insulation material between sheathing and framing elements forty nail joint specimens were tested. Specimens were fabricated using 10d or 16d nails, 19/32" OSB sheathing, SPF lumber and XPS insulation (0 to 2" with ½" increments). The results indicate a decrease in connection strength and stiffness with an increase in insulation thickness. The table below summarizes the test results.

Insulation Thickness	10d Nails				16d Nails			
			Base Case				Base Case	
	Mean [N]	CoV [-]	Load [%]	Stiffness [%]	Mean [N]	CoV [%]	Load [%]	Stiffness [%]
0"	1281	0.07	100	100	1514	0.05	100	100
½"	788	0.06	62	30	1060	0.11	70	49
1"	513	0.06	40	18	740	0.09	49	21
1 ½"	-	-	-	-	577	0.02	38	13
2"	-	-	-	-	352	0.16	23	6

Embedment and Withdrawal Tests of Self-Tapping Screws

Embedment and withdrawal tests were undertaken to evaluate the strength and stiffness of STS timber connections. The left figure shows results from the embedment tests. It shows the stiffness and strength at different insertion angles. Within different angles threaded and smooth shafts were tested at different diameters (12mm, 11mm, 9mm and 8mm (from left to right within a group)). Stiffness and strength increase with an increasing insertion angle. The right figure shows the withdrawal stiffness and strength of 9mm fully threaded and 10mm partially threaded screws (60mm thread) at different insertion angles and penetration depth. The figure shows a similar stiffness for all different angles, but an increase in stiffness with an increase in penetration length. Further the figure shows an increase in strength with increase in insertion angle, peaking at 45° insertion angle (for 3 out of 4 groups).