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

This is the first newsletter prepared by the IRC research group to provide stakeholders and sponsors with a regular update on the activities of the IRC. It is planned that this newsletter will be issued bi-monthly. In this inaugural issue, a few ongoing student projects are highlighted. Also an update on the status of the Acoustic Lab at University of Alberta is provided.

The IRC research program was formally commenced in August 2017, and the first Industrial Advisory Committee was held in November 2017. To-date, 5 graduate students, two research assistants and a technician have been recruited. The tentative project titles of the 5 graduate students are provided below. In addition, about 10 undergraduate students have worked or are currently working on various aspects of the IRC program, supporting the research activities of the graduate students and research assistants.

Student Name:	Tentative Thesis Title:
Lei Zhang (Ph.D. Student)	Mass timber-concrete composite floor system with notch connections
Md Abdul Hamid Mirdad (Ph.D. Student)	Structural performance of the Mass Timber Panel-Concrete (MTPC) composite floor system with insulation and inclined self-tapping screw.
Ruihan Zhao (M.Sc. Student)	Analytical Modeling of Lateral Strength and Stiffness of Inclined Self-Tapping Screw Connection
Sabrina Philippe (M.Sc. Student)	Development of a new hybrid system: a self-centering steel brace frame connected with shear transfer device to mass timber mass panel or glulam timber frame
Tom Joyce (Ph.D. Student)	Load distribution in inclined self-tapping screw connections with steel side plates

UofA Acoustics Lab status

Acoustics have become a topic of interest in the recent years. Low-frequency impact sound insulation is critical to the impact insulation class rating of mass timber floors. Therefore, our group visited the Mechanical Engineering Acoustics and Noise Unit (MEANU) in south-east Edmonton recently, which is the only full-scale Canadian acoustics laboratory directly associated with a university. The laboratory has two inter-connected reverberation chambers for airborne sound transmission measurement of wall assemblies according to ASTM and ISO standards. Our group is trying to develop a non-standard method and adopt the laboratory for research on impact sound transmission measurement of mass timber floors and timber-concrete floors.

Web site of IRC

A web site has been created for better communication of IRC program to all interested parties and stakeholders. The contents of the web site will be populated over the next few months and will be updated on a regular basis. The link to the web site is shown below:

https://sites.google.com/ualberta.ca/timber

Contact Us

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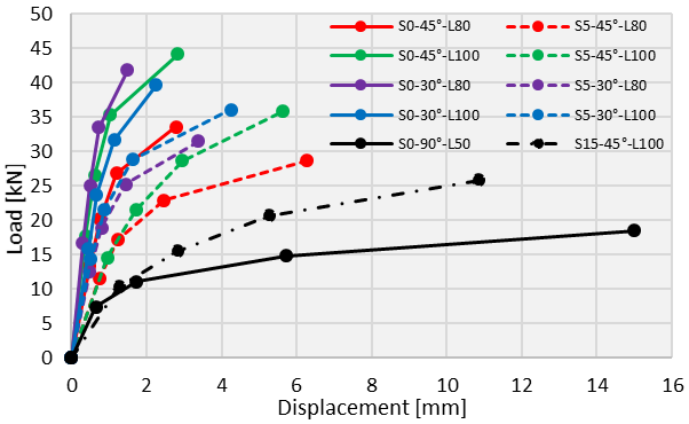
Project updates

CLT-Concrete Connection Tests

Cross laminated timber-concrete connection tests were undertaken as part of the MTP-concrete with insulation layer project (Project II1). The overall objectives of the project are the development of a structural design approach for mass timber panel-concrete composite floors and to evaluate the influence of sound insulation layers on the performance of connections and the overall floor. Connection tests were undertaken to evaluate the influence of sound insulation layers on the self-tapping screw connection strength and stiffness. Shear tests were undertaken with self-tapping screws with a diameter of 11mm with various sound insulation thicknesses and screw insertion angles. The results can be seen in the figure below. The sample labeling provides information about the buildup of the samples. "S#" indicates the thickness of the sound insulation in mm, the second term indicates the insertion angle, and "L#" indicates the embedment depth in mm. The graph shows a capacity increase with an increase of embedment length. Further, an insertion angle of 30° shows higher capacity than connections with an insertion angle of 45°. The connection stiffness is mainly influenced by the thickness of the sound insulation. The specimen with no insulation show the highest stiffness, an insulation thickness of 5mm leads a stiffness reduction between 15 and 20%, while an insulation thickness of 12mm leads to a 40% reduction.



CLT-Steel Connection Tests

CLT-steel shear connection tests were carried out with fully-threaded screws (FT) and partially-threaded screws (PT) with two diameters, 8 and 12mm. These tests provide data for several other projects. All screws had a length of 140mm. The results presented below show the influence of the diameter and the different thread types. With the screw diameter increasing from 8 to 12 mm, the capacity and strength values of CLT specimens increased respectively by 63% and 31% with partially-threaded screws and by 52% and 40% with fully-threaded screws. Based on the partially-threaded screws the fully-threaded screws showed a strength increase of 30% for the 8mm screws and 21% for the 12mm screws. A significant increase in stiffness was not recorded.