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 second Industry Advisory Committee was held on September 28 at the University of Alberta. Prior to the Committee meeting, nine HQP presented their research projects to the Committee members. These presentations were also broadcast live via web conferencing to staff members of the industry partners and selected research collaborators. Active discussion followed most of the presentations. Copy of the presentations will be posted on the ARTS home page.

In August, the Chair holder and 4 HQP attended the World Conference in Timber Engineering, Seoul, Korea. A total of 5 oral presentations were made by the group.

In September, 6 oral presentations and several posters were presented by IRC members during the Structures Graduate Students Conference of the University of Alberta, where Dr. Behzad Vafaeian won a prize for the presentation of his work (see page 2).

The IRC group welcomes the following to the group in September:

- Prof. Chongfang Chen, South East University, Nanjing, China as a visiting professor
- John Spencer, MSc student (Topic : Acoustic performance of concrete-mass timber panel composite floor systems)

John was a graduate from our undergraduate program and was our technical support staff member for 1 year prior to enrolling in our MSc program. He is being co-supervised by the Chair holder and Dr. Jianhui Zhou, of UNBC.

Wood/Bamboo Composite Workshop

The IRC will host a Wood/Bamboo Composite Workshop on November 8 2018. As a green and renewable source bamboo is being used to produce Engineered Bamboo Composites (EBCs) which are fabricated by gluing bamboo strands or veneers together under controlled temperature and pressure. The mechanical properties of EBCs are similar to or even superior to those of commonly used wood products. Over the past decade, the application of wood products for mid- or high-rise buildings has been growing rapidly around the world. A number of innovative mid- and high-rise wood buildings have been created worldwide demonstrating the potential for bamboo products to be used such applications. The workshop will highlight the research on engineering aspects of bamboo as a construction material for building systems and program standardization.

2019 MOC Summit - Update

As previously mentioned, 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, May 21-24, 2019. The Wood Track at the 2019 MOC Summit will have a theme on Mass Timber Buildings with 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, and Top-ups with timber - new spaces on existing structures. The **abstract submission deadline** has been moved to the **31st of October 2018**. We encourage everyone to submit abstracts. For further information please visit the official website (ww.mocsummit.com) or contact Jianhui Zhou (jianhui.zhou@unbc.ca) and Jan Niederwestberg (jan.niederwestberg@ualberta.ca).

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Project updates

Acoustic Performance of CLT-Concrete Composite Floors

A CLT-Concrete composite floor comprised a concrete slab, a CLT plate, shear studs, and usually a sound insulation resilient layer located between the structural plates. A merely CLT floor is known to have low noise insulation; however, this disadvantage can largely get improved by integrating a concrete slab with the CLT floor. The quantitative (and combined) effects of the concrete slab's thickness, and shear stud spacing on the acoustic performance of CLT-concrete composite are not fully investigated yet. In this study, we investigated the effects of aforementioned parameters on the acoustic performance of CLT-floors. The transmission of structure-borne sound due to steady state harmonic point loads on the floor in the frequency range of 20-500Hz was considered. This parametric study utilized vibro-acoustic finite element simulation and chose a comparative approach. The following groups of parametric cases were considered: 1) a CLT floor (175mm of thickness), 2) composite floors with different shear stud spacing (Ls = 100mm, 300mm, no shear studs, perfect shear bond), and different concrete slab's thicknesses (ts = 50, 75, 100, and 150mm), The acoustic performance of each floor located on a semi-infinite acoustic medium (Fig. 1) and subjected to the harmonic point loads was represented by the average output sound power level over the considered frequency range. Figure 2 depicts the simulated quantity for each case.

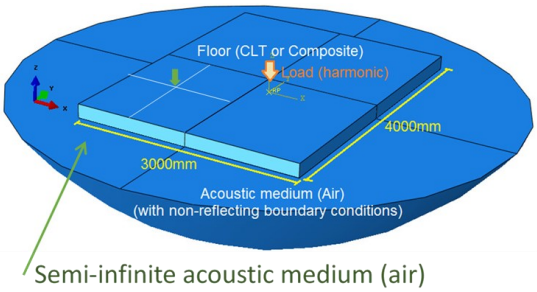

Fig. 1. The typical geometry of the models

The smaller the output power level, the higher the noise insulation (Fig. 2). Hence, the results demonstrated that adding a layer of concrete significantly improves the sound insulation aspect of the CLT floor. Moreover, this sound improvement well increased with the increase of the concrete thickness. The stud spacing/existence did not show a significant effect on the floor sound insulation. This indicates that normal forces at the CLT-concrete interface govern more of the sound transmission. Comparison of the perfect (shear) bond case with the other composite cases indicated lower output power level for the former case. This suggests that a composite floor with higher degree of structural integrity, i.e. perfect bond, has better sound insulation on average. Our study is an ongoing research that will include the effect of the insulating layer on the acoustic performance of the composite floors and will also consider impact loads.

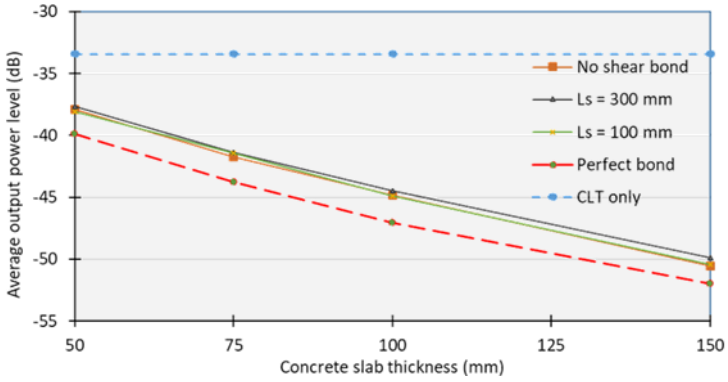

Fig. 2. Average output sound power level over the considered frequency range for each floor.