MASTER'S DISSERTATION AT STRUCTURAL MECHANICS

DEPARTMENT OF CONSTRUCTION SCIENCES | FACULTY OF ENGINEERING LTH | LUND UNIVERSITY

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PRESENTATION
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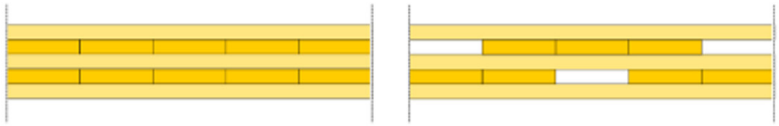
IN COOPERATION WITH
ARTELIA, COPENHAGEN

GAP CLT
Possibilities and limitations



BACKGROUND

Cross laminated timber (CLT) is a prefabricated engineered wood product, consisting of various layers of timber lamellas which are stacked and glued upon each other crosswise. A common use for Cross laminated timber is to act as a slab in a floor system, offering a more sustainable alternative to a concrete slab in a multi story building.

In ongoing research, a modified version of a cross laminated timber slab is being studied. This version removes certain either transverse or longitudinal lamellas in order to reduce material usage. However the effect of removing these lamellas in real life use is still relatively unknown. Therefore, the possibilities and the limitations of this "gap CLT" needs to be studied further.

When modelling traditional cross laminated timber, beam theory and plate theory is commonly applied. However, these beam and plate theory models do not always describe the slab with sufficient accuracy, making it complex to model. Along with the gaps created by the removed lamellas, the mechanical behavior of the gap CLT is hard to predict with the current approaches. To predict the strength and stiffness of the panels, understanding the behavior plays an important role. The approaches most commonly used are the Shear analogy method, Timoshenko theory and the gamma method, which relates to beam models. Furthermore, Mindlin-Reissner theory is also commonly used but relates to plate models.

AIM

The aim of this work is to contribute to a greater understanding of the structural behavior of this optimized cross laminated timber. This will, in turn, support the future development of the product, making it more environmentally and economically sustainable, thanks to the reduced material usage.

The work is also expected to give further knowledge about the usage of different Finite element method software. To add to the existing scientific foundation, this project will bring knowledge about how different modelling approaches can be used to describe the gap CLT, where real life structural conditions are taken into consideration. Here, primarily SLS conditions according to Eurocode 5 are examined.

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