

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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REPORT

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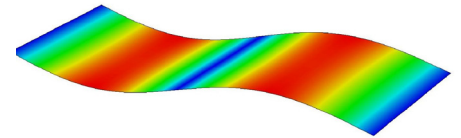
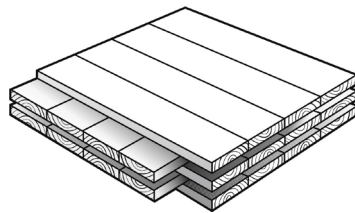
EXAMINER

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UTILIZATION OF HARDWOOD IN CROSS-LAMINATED TIMBER



BACKGROUND

Cross-laminated timber (CLT) made in Sweden is in general made out of pine or spruce. This is natural as pine and spruce are the most common wood species found in the Swedish forests. There are however other wood species available domestically, such as birch, which is the most common hardwood species in Sweden.

Previous research indicates that CLT-panels made of other types of wood than pine or spruce can have a positive effect on the strength of the panel and on its dynamic properties. The hardwood market in Sweden is not utilized to its utmost potential due to an absence of businesses which can refine and utilize hardwood species, e.g. birch. From a sustainability perspective, utilization of local raw materials, for example in CLT production, would be preferable to non-domestic options, such as material export.

AIM

The aim of the project is to demonstrate improved static/dynamic performance in CLT-panels made of other wood species than pine/spruce. This could contribute to the current research pool for CLT-panels, and potentially generate incentive for CLT-manufacturers in Sweden to diversify their manufacturing processes further using unconventional wood species.

PROBLEM STATEMENT

- What improvements with regards to static/dynamic response can be expected with CLT-panels made of hardwood compared to conventionally used softwood?

- Is it possible for CLT-panels made of hardwood to acquire similar characteristic properties as CLT-panels made of softwood, but with a smaller thickness?

METHOD

The project will be divided into four phases, where the various phases more or less overlap each other from a time perspective. In the first phase, a literature review will be performed. Up-to-date research regarding CLT-panels stiffness properties will be compiled in conjunction with general information about CLT as a structural element. In addition, different beam and plate theories will be included in the literature review depending on the chosen calculation models.

The second phase consists of an experimental investigation of CLT-panels. The panels will be investigated regarding their static and/or dynamic response for relevant loading situations. This bridges over to the third phase, numerical modeling. A numerical model will be calibrated based on the experimental results. When an acceptable calibration has been achieved, the impact of different types of materials on the static and/or dynamic response can be examined, e.g. with parametric studies.

Lastly, in the final phase of the project, results from the previous phases can be analyzed, compared and conclusions can be made.

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