MASTER'S DISSERTATION AT STRUCTURAL MECHANICS

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

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FRACTURE ENERGY AND STRUCTURAL APPLICATIONS OF BIRCH

BACKGROUND

An increased use of wood in load-bearing structures not only provides environmental and climate benefits for societal development but also contributes to increased value for a vital national resource – the forest. To further develop modern timber construction, we need to explore new ways and applications for wood. To capitalize on future opportunities and address future challenges, we believe that structural elements made from both softwood and hardwood will play a crucial role. Fracture mechanical properties of various wood species need to be experimentally determined to enable their implementation in different calculation models.

AIM

The aim of the thesis is to gain knowledge about fracture energy and strength for Swedish birch subjected to tensile loading (perpendicular to the grain). To evaluate if the derived fracture energies are practically applicable in construction contexts, tests with dowel connections will be conducted. The practical results will be compared with theoretical results based on material parameters experimentally determined earlier in the project. The goal of the work is to assess whether the fracture energy determined in earlier tests is applicable in practice.

METHOD

The tests to be conducted on the birch material will be carried out according to the Nordtest method, which uses a three-point bending set-up, with a central part oriented such that it is loaded in tension perpendicular to the grain. Since wood is an anisotropic material, the specimens need to be tested in different orientations. Also a literature study about fracture energy will be performed in order to choose said orientations.

Tests of dowel connections will also be performed with the acquired data. Data from the fracture energy tests will then be used as input values in the calculation of the expected strength for the dowel connections.

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