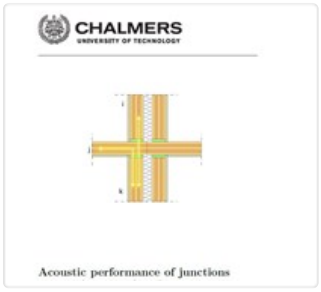

Acoustic performance of junctions in cross laminated timber constructions

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Summary:

With the emergence of cross laminated timber (CLT) as a structural material on the global market, the need to understand the acoustical behavior of buildings constructed with the material grows. CLT faces a set of challenges that concrete or masonry do not; being low density, high in stiffness, sometimes isotropic and sometimes orthotropic depending on the composition. Flanking sound transmission often becomes an issue in the acoustic performance of mass timber buildings. While direct sound transmission can be treated with conventional methods e.g. additional layers, the flanking paths are more complicated to treat since they need to transfer loads over the length of the element. This master's thesis aims to investigate the flanking paths in cross laminated timber buildings by measuring the structure-borne vibration reduction index (Kij) in realized buildings. The in-field measurements are compared to standardized estimation models and lab measurements published in past research. This thesis finds that standardized estimations underestimate the performance of the examined junctions in low frequencies. The lab measurements are closer to the in-field performance but exaggerate the influence of metal connections and mass-spring behavior of junctions with elastic interlayers. Additionally the theory and results indicates that external loads on the junction play a major role in the resulting performance. Elastic interlayers are not as effective in low levels as in the high levels of any given building, presenting a challenge as mass timber structures are increasingly being built taller.

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