

6. Design and Construction of Large Timber Structure - Experiments of CLT seismic walls and Verification of Constructability -

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We designed and constructed a large timber structure of eight stories. The building structure consists of a combination of timber and reinforced concrete elements. The timber structure is comprised of a frame of timber columns and beams, along with cross laminated timber (CLT) seismic walls. Connections to the frame were formed from combinations of commonly used steel plate inserted drift pin connections and a newly-devised shear cotter joint, resulting in high initial stiffness.

A performance evaluation was carried out based on the results of structural performance tests conducted on the joining method. We reduced construction times by simultaneously constructing the reinforced concrete and timber structures on each floor. The construction process of the timber structure was verified using a mockup. The approximately 208 m³ of timber incorporated into the structure corresponds to the sequestration of about 148 tons of CO₂, and the use of 214 m³ of environmentally friendly concrete to construct the foundations enabled a reduction in CO₂ emissions of approximately 45 tons, enabling to reduce the building's environmental impact.

The results of this study will help build knowledge and understanding in this field, in particular when designing and building large timber structures.

Keywords: large timber structure, mixed structure, cross laminated timber (CLT) seismic walls, mockup, environmentally friendly concrete