

On the need for reliable rolling shear characteristics in CLT lamellas and for efficient related test methods

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Effective modeling of structural behavior of cross-laminated timber (CLT) elements requires reliable input on the mechanical properties of its laminations. The cross-lamination of layers provides for dimensional stability of CLT elements. In this arrangement, however, all laminations in shear walls and the layers of floor elements oriented perpendicular to the major strength axis transfer shear stress in the radial–tangential plane, often referred to as rolling shear. It is among the least documented characteristics of wood, since it had been of marginal interest for structural lumber and engineered wood composites until the emergence of CLT.

While the numerical models may easily account for the contribution of rolling shear in the immediate and long-term deformations of laminated panels, simulations are charged with wide margins of uncertainty because of shortage of reliable experimental data. Rolling shear is not the easiest property to measure, and it received only limited coverage in the literature [1-7]. What has been documented was that the rolling shear strength and stiffness in the cross-layers in CLT floor panels is related to the species, density, growth ring orientation, and manufacturing parameters, but there is no evidence for a meaningful correlation with the grade of lumber, whether established by visual or machine grading.

In the presentation, we will discuss the pressing need for reliable data on rolling shear characteristics in clear wood and in structural lumber, their statistical distributions in species important for CLT industry, as well as for efficient test methods to allow generation of relevant data in timely manner. Prototype methods and preliminary data will be presented.

References

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