





## Prediction of Withdrawal Resistance for a Screw in Hybrid Cross-Laminated Timber

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### Summary:

The aim of this study was to predict the withdrawal resistance of a screw in hybrid cross-laminated timber (CLT) composed of two types of lamina layers. A theoretical model to predict the withdrawal resistance was developed from the shear mechanism between a screw and the layers in hybrid CLT. The parameters for the developed model were the withdrawal stiffness and strength that occurs when a screw is withdrawn, and the penetration depth of a screw in layers of a wood material. The prediction model was validated with an experimental test. Screws with two different diameters and lengths ( $\text{Ø}6.5 \times 65 \text{ mm}$  and  $\text{Ø}8.0 \times 100 \text{ mm}$ ) were inserted in a panel composed of solid wood and plywood layers, and the withdrawal resistances of the screws were evaluated. At least 30 specimens for each group were tested to derive the lower 5th percentile values. As a result, the developed model predictions were 86–88% of the lower 5th percentile values of hybrid CLT from the properties of the lamina layer. This shows that the withdrawal resistance of hybrid CLT can be designed from the properties of its layer.

Online Access: Free

### Resource Link

<https://jwoodscience.springeropen.com/articles/10.1186/s10086-020-01926-8>