

Modelling the mechanical stresses in adhesive joints of wood bondings considering the mechanical and moisture behaviour of the adherend

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Abstract Wood bondings have been used in timber construction and many other applications for a long time. Using layered arrangements, the homogenisation of the anisotropic physical and mechanical properties of solid wood reduce the influence of moisture and improve the mechanical behaviour of structural elements. However, new weak points can be created and effects such as debonding and delamination can occur. These failure characteristics depend on mechanical and hygroscopic loading as well as the composition of the structural components. Hence, delamination can be reduced by adjusting the properties of the appropriate adherent or by changing the structural assembly of the specific elements. Using finite element analysis, the influence of the adherent properties during the testing procedure and an example of cross-laminated wood panels on the adhesive load is investigated. The results show significant differences in the glue line stress distribution for varied growth ring angle, longitudinal Young's modulus, diffusion as well as swelling and shrinkage properties.

Keywords mechanical stresses, glued wood, modelling, hygroscopic load

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