



Stiffness of Dowelled Steel-to-Timber Joints

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Summary:

The mechanical behaviour of timber structures is significantly influenced by the stiffness, load-carrying capacity and ductility of the joints. This study is focused on the stiffness of dowelled steel-to-timber joints, which were subjected to tensile loadings at different orientations with regard to the grain direction (0°, 30°, 45°, 60° and 90°). The values of the joint stiffness in service obtained from the tests were compared with predictive values from current design codes (Eurocode 5 and NDS). The current design codes showed their weak predictive ability. Besides timber density and fastener diameter, as well as clearance and friction between the joint members, orientation of load with respect to timber grain and dowel slenderness ratio are also the important factors that affect the stiffness of a joint. An empirical expression of stiffness for steel-to-timber joints with single dowel was proposed on the basis of the formula in Eurocode 5 and the Hankinson-type formula using non-linear fitting of the experiment results.

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