OJCE> Vol.2 No.3, September 2012

OPEN ACCESS

Evaluation of Screw Reinforcement on Bearing Performance of Wood Depending on Screw Position

PDF (Size:1083KB) PP. 160-166 DOI: 10.4236/ojce.2012.23021

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ABSTRACT

In this study, the reinforcement of wood by screws for partial compression perpendicular to the grain was studied. For the estimation of stiffness and strength, the reinforcement effect of screws depending on their position under the loading plate was evaluated by taking into account the internal displacement distribution of the wood. The finite element analysis (FEA) was used to investigate the internal displacement distribution of the wood. Then an approximate function that can be applied to various internal displacement distributions under loading plate was proposed. From the shear resistance mechanism between the screw and wood by taking their relative displacement distribution into consideration, the equations to estimate the initial stiffness and yield strength of the bearing performance of the wood reinforced by screws were derived. Then partial compression test was carried out for wood reinforced by screws with setting screw thread at various positions. The values obtained by the equations corresponded with the tendency of the experimental results. It was found that the screw reinforcement is more effective when its thread is positioned as much as distant from the contact surface.

KEYWORDS

Screw; Reinforcement; FEM; Partial Compression; Bearing

Cite this paper

S. Murakami, A. Kitamori, K. Jung, I. Hassel and K. Komatsu, "Evaluation of Screw Reinforcement on Bearing Performance of Wood Depending on Screw Position," *Open Journal of Civil Engineering*, Vol. 2 No. 3, 2012, pp. 160-166. doi: 10.4236/ojce.2012.23021.

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