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ONLINE ISSN : 1880-7577

PRINT ISSN : 0021-4795

Mokuzai Gakkaishi

Vol. 53 (2007) , No. 6 p.313-319

[\[PDF \(1239K\)\]](#) [\[References\]](#)

Development of Timber Portal Frames Composed of Compressed LVL Plates and Pins I.

Shear strength of joints composed of compressed LVL calculated using the theory of a beam on an elastic foundation

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(Received February 7, 2007)

(Accepted May 24, 2007)

Abstract: To predict the strength properties of timber joints composed of compressed LVL plates and compressed LVL pins, slip moduli and yield loads of the joints were calculated by the theory of a beam on an elastic foundation and the European yield theory, and joints with six kinds of glulam were tested in shear. At the compression-type lateral strength test of compressed LVL joints, first the compressed LVL pin yielded by bending and the load fell once (Stage 1), and then the load recovered and increased when the pin became embedded into the glulam (Stage 2). The slip modulus and the lateral resistance of the joint increased with increasing density of the glulam. The joint model of Stage 1 was a three-member double shear joint with timber center and side members, and that of Stage 2 was a two-member single shear joint with a virtual timber-to-timber connection at the center of the member. In Stage 1, the slip modulus of the joint and the yield load of the pin calculated by the theory of a beam on an elastic foundation showed significant correlation with experimental values. In Stage 2, the yield load of the glulam calculated by the European yield theory showed significant correlation with experimental values.

Keywords: compressed LVL, shear strength, elastic foundation, European yield theory, dowel

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To cite this article:

Kinsaku Nakata and Kohei Komatsu: Mokuzai Gakkaishi Vol. 53, No. 6, 313-319 (2007) .

doi:10.2488/jwrs.53.313

JOI JST.JSTAGE/jwrs/53.313

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