UNIVERSITI TEKNOLOGI MARA

WITHDRAWAL PERFORMANCE FOR DOWELLED TIMBER CONNECTIONS MADE OF MERBAU AND CHENGAL SPECIES

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicates or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

This thesis investigated the withdrawal performance of wood and steel dowels inserted in Merbau and Chengal species. The usage of steel as timber connectors was an issue as the steel production produces harmful gases. Wrong design and application of different materials could lead to loss of material durability, thus resulting in connection failure as steel and timber have different behaviour. Nevertheless, this study is significant due to the incomplete information on withdrawal performance of timber connection system in Malaysian Standard MS: 544 for Part 2 (Permissible Stress Design of Solid Timber). An experimental study was conducted with 564 timber dowelled connection samples tested in total. The experimental program includes various parameters tested, diameter, dowel embedment depth, type of dowel material, weathering condition and the timber species. The withdrawal capacity obtained proved that diameter, embedment depth, type of dowel and weathering condition affect the withdrawal performance of timber dowelled connection. Only timber species does not affect the withdrawal performance of dowelled timber connection. From the results, it can be concluded that timber with higher density and larger diameter does not necessarily provide better withdrawal performance. There was a good relation between the effect of diameter and type of dowel material. Still, there was no relation between diameter and timber species on withdrawal performance of timber dowelled connection. There was also a poor relationship between the effect of embedment depth and timber species on the withdrawal resistance of timber dowelled connection. Apart from that, there was a good relation between the impact of type of dowel and timber species on withdrawal capacity of timber dowelled connection. As for weathering conditions, the effect has good relations with the type of dowel and timber species on the withdrawal capacity of timber dowelled connections. There was also a good relation between the effect of timber species on withdrawal resistance of timber dowelled connection. The results pointed that there was a significant effect of weathering conditions on the withdrawal performance. The weathering conditions proved to have a relation with the type of dowel and timber species on withdrawal performance.

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