UNIVERSITI TEKNOLOGI MARA

STRUCTURAL PERFORMANCE OF HYBRID MENGKULANG GLULAM CONCRETE BEAM

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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 indicated 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

Engineered wood products, such as glued laminated timber (glulam), are designed to decrease the weaknesses of natural wood, such as knots and non-uniform strength, and so increase stiffness and weight carrying capability. One way for increasing the load carrying capacity and performance of glulam structures is to use glulam-composite constructions. Several elements must be considered, including the stiffness of the bonding lines and the presence of flaws in the wood. The materials tests were carried out to explore the materials properties of glulam, such as moisture content, shear block, and delamination test, while concrete qualities were tested for slump and compression tests. In this study, the constraints and benefits of combining concrete with glulam have been addressed. Mengkulang beam and hybrid Mengkulang glulam with concrete (HMGC) structural sizes have been designated as RC, MC, HMGC A and HMGC B, respectively. Mengkulang glulam beam's modulus of rupture (MOR) and modulus of elasticity (MOE) was found to be 66.67 N/mm^2 and 14,565.23 N/mm^2, respectively. The load-carrying capacity of MG was 119.48 kN for this study is three times higher than the RC beam of 40.48 kN and lower than HMGC A and HMGC B by 53.51% and 46.24%, respectively. Both HMGC A and B did not contributed to the bending strength of the MG beam however contributed to double the displacement prior to fracture. Both HMGCs failed due to MG layers splits in the tension zone on weaker zone (finger-joint area) and concrete cracks in the compression zone. Screws acting as the shear-stud between two hybrid materials failed to keep the two materials intact, resulting in non-composite behaviour.

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TABLE OF CONTENTS