UNIVERSITI TEKNOLOGI MARA

COMPRESSIVE PROPERTIES OF FIBRE REINFORCED POLYMER (FRP) ROD FILLED WITH ALUMINIUM FOAM

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of the requirements for the degree of
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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

Structures with metal foam cores have unique physical and lightweight properties which make them applicable for various applications especially in automotive and aircraft industries. They exhibit large plastic deformation under dynamic or quasi-static loading therefore they have the capability of absorbing considerable amount of impact energy. This enhanced their character and making them ideal energy absorbers and structure protectors. This study investigated the behavior of Fibre Reinforced Polymer (FRP) rod filled with aluminium foam which is applicable to be used in structural applications. The FRP composites and foams behavior were examined through mechanical testing. In this work, the aluminium foams were prepared using a melting technique incorporated with space-holder material which is NaCl particles. A technique was developed by wrapping the aluminium foam rod with FRP composites. This technique was introduced in order to improve the FRP composites mechanical properties especially its compressive strength and energy absorption capability by combining two different materials. The compressive tests were performed to obtain the mechanical properties of this material. CFRP rod filled with aluminium foam exhibited highest compressive strength; improved by 15.7% in elasticity modulus and 227% in energy absorption compared to their neat system. As for GFRP rod filled with aluminium foam, it is improved by 64.7% in elasticity modulus and 396% in energy absorption as compared to their neat system. This study also provides an insight behavior of the open cell foam and promotes further investigation to determine the viability of this structure to be used in various applications.

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TABLE OF CONTENTS