

HYBRIDE RAMI TITANIUM REINFORCED EPOXY COMPOSITE (HRTREC) FOR BULLET PROOF PANEL

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ABSTRACT

Research on bullet-resistant composites from and flax without hard material hybrids has succeeded to level III with a density of 1.4 gr / cm³. Then continued the research on level IV bullet-resistant composites by adding one layer of hard material with the title "Engineering NIJ Standard Level IV Bullet Resistant Panel from Composite Hemp-Epoxy Fiber hybridized with Titanium Material". The results of this study succeeded in making composite level IV bullet resistant but the density was still high at 2.7-2.9 gr / cm³.

The main problem is the density of level IV composites is still relatively heavy when applied to bullet-proof vests. The research proposed this year is aimed at solving the composite problem using titanium which is hardened by the electroless process as a hybrid metal in composite hemp-epoxy. Hemp fiber (*Boehmeria Nivea*) is a relatively strong natural fiber based on cellulose as a base for making bullet-resistant composite panels. This research is an advanced study of epoxy-hemp composites which are hybridized with hard metals capable of holding level IV bullets, but still have relatively high weight. Flax fiber aged 60 days is woven with the ATBM weaving process so as to produce woven in the form of sheets. This webbing is cut to size 15 cm x 15 cm as composite reinforcement. The composite manufacturing process uses a hand lay-up. Molds with dimensions of 15 cm x 15 cm x 5 cm were given epoxy as a base, then woven hemp fiber was inserted so that it was moistened by epoxy. The top surface of the hemp is given epoxy. After being wetted with epoxy, the second layer of flax woven was put into the mold and given epoxy as in the first step. This step is continued until it reaches the 14th layer. The 15th layer is titanium which is hardened with electroless and continued with 2 layers of flax woven again. After all the epoxy is wetted, the mold is closed and made with a press machine. After 8 hours, the mold is opened and titanium hybrid hemp epoxy composite (KERHT) is taken and ready to be tested. The firing test was carried out with the Phantom Camera Control at UTM Malaysia's LAB CACM.

The main objective of the research is to make a prototype NIJ standard IV level IV bulletproof panel prototype to increase the nation's independence towards imported products. The specific objective to be achieved in this study is to make a standard IV level IV bullet resistant panel with a specific gravity of no more than 2.4 grams / cm³. Knowing the effect of titanium mixed in epoxy-hemp composites on bullet resistance

Kata Kunci: *Epoxy-Ramie Composite, Titanium, electroless process, Shoot Test, Level IV*