High Impact Hybrid Composite Material For Ballistic Resistance

Mohd. Yuhazri Yaakob[1,*], Md. Dan Md. Palil[2] and A. Faizal Mohd. Zain[3]
[1]*Faculty of Mechanical Engineering and Manufacturing,*
Kolej Universit Teknologi Tun Hussien Onn
Parit Raja, 86400 Batu Pahat, Johor.
[2]*Associate Professor Dr., Faculty of Mechanical Engineering and Manufacturing, Kolej Universiti Teknologi Tun Hussien Onn, Parit Raja, 86400 Batu Pahat, Johor.*
mdd@kuittho.edu.my, 0122732405 h/p
[3]*Professor Ir. Dr.,Centre for Graduate Studies,, Kolej Universiti Teknologi Tun Hussien Onn, Parit Raja, 86400 Batu Pahat, Johor.*

Abstract:
Most ballistic products use synthetic material such as Kevlar for reinforcement. As Kevlar is petroleum based, its cost is very much dependent on world market price. It is envisaged that natural materials to replace Kevlar can contribute to the drop in cost of ballistic products. Waste bio-organic materials as a filler in matrix materials to be made into hybrid composites have emerged as an alternative. One such material is coconut fiber in the form of chopped woven roving mat to be used as a filler, sandwiched between Kevlar and woven roving fiber glass. ABS resin from thermoplastic polymer was used as the matrix material. By using hydraulic hot press, the hybrid plastic composite is produced in panels with size 10 x 12 inches and thickness range between 14 to 16 millimeters with controlled weight not more than 1.4 kilograms. Ballistic tests on the composite are implemented based on NIJ standard-01.01.04 to meet Type one requirement. The high impact panel material properties and fabrication method that is developed is described in this paper.

Keywords: Ballistic products, Kevlar, waste bio-organic, coconut fiber, fiber glass, ABS, ballistic test.