

Engineering Hybrid Ramie-Manganese Steel Composite as a Processes to Bulletproof Panel Level IV NIJ Standard

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ABSTRACT

The purpose of this research is to engineer prototype of bulletproof panel level IV NIJ standard to increase national independence toward imported products. Ramie fibers be watted into woven roving using loom machines. The woven molded into composite using hand lay up method. The mold $15 \times 15 \times 5 \text{ cm}^3$ be given epoxy as a based. The woven fiber put into mold so that all of ramie fiber wetted by the matrix epoxy to be $15 \times 15 \times 2 \text{ cm}^3$. The second layer until fourteenth layers such as first and second layer. Panel closed the mold and pressed so that produce manganese 60% volume fraction. The projectile caliber 9 mm, 124 gram FMJ RN used for ballistic test. Manganese steel did not able as a hardfacing layer for bulletproof panel level IV NIJ standard. The thickness and number of lamina ramie fiber-manganese steel is more than 24 laminas to feasibility to absorb the kinetic energy of bullet in level IV NIJ standard.

Kata Kunci: *manganese steel, composite; ramie fibers; epoxy; level IV-A*