

## **Quasi-static penetration behavior of plain woven kenaf/aramid reinforced polyvinyl butyral hybrid laminates**

### **ABSTRACT**

Owing to the high cost of synthetic aramid fibers and the necessity for environmentally friendly alternatives, a portion of aramid was replaced by plain woven kenaf fiber, with different lay arrangements and thicknesses. The obtained hybrid composites with aramid and kenaf fibers were used to produce prototypes of army helmet shells. A hybrid composite material was produced using a hot press technique and comprises 19 layers of plain woven kenaf and aramid of various configurations and alternation. The behavior of this composite material on a quasi-static penetration test was studied and was found positive in terms of maximum load carried, energy absorbed in impact, and damage mechanisms. Consequently, a helmet armour was developed that was less costly and more readily available and that which could also be produced by reducing the potential harmful effects of petroleum products, without compromising the ballistic-resistant capability of the material.

**Keyword:** Quasi-static; Kevlar; Kenaf; Hybrid