

## **Ballistic impact resistance of plain woven kenaf/aramid reinforced polyvinyl butyral laminated hybrid composite**

### **ABSTRACT**

Traditionally, the helmet shell has been used to provide protection against head injuries and fatalities caused by ballistic threats. In this study, because of the high cost of aramid fibres and the necessity for environmentally friendly alternatives, a portion of aramid was replaced with plain woven kenaf fibre, with different arrangements and thicknesses, without jeopardising the requirements demanded by U.S. Army helmet specifications. Furthermore, novel helmets were produced and tested to reduce the dependency on the ballistic resistance components. Their use could lead to helmets that are less costly and more easily available than conventional helmet armour. The hybrid materials subjected to ballistic tests were composed of 19 layers and were fabricated by the hot press technique using different numbers and configurations of plain woven kenaf and aramid layers. In the case of ballistic performance tests, a positive effect was found for the hybridisation of kenaf and aramid laminated composites.

**Keyword:** Kenaf fibres; PVB film; Kevlar fibres; Ballistic properties; Helmet