

## **Low velocity impact behaviour and post-impact characteristics of kenaf/glass hybrid composites with various weight ratios**

### **ABSTRACT**

The aim of this work was to analyze the effects of hybridizing kenaf and glass fibre to develop hybrid composites with varying weight ratios on the low velocity impact response and the post-impact properties of the obtained composites. Four main process had been carried out in this study, which were the fabrication of composites, the low velocity impact testing, the dye penetrant evaluation on the impacted composites and the compression testing on the impacted samples after the dye penetrant evaluation. This research was motivated by the increasing demand for lightweight, cost-effective and environmentally friendly materials to be applied at an industrial level. In this paper, natural kenaf fibre was hybridized with synthetic glass fibre in an attempt to create an attractive material for the composite industries. The materials were fabricated in seven samples with varying weight percentage ratios of the fibres, while the glass fibre was used as the outermost layer for each formulation. A sample made entirely from kenaf fibre and another one entirely from glass fibre were also included for comparison. The formulation that demonstrated the best tensile performance – that with the weight percentage ratio of 25% kenaf fibre and 75% glass fibre – was then subjected to low velocity impact tests. Four impact energy levels of 10 J, 20 J, 30 J and 40 J were applied to study the propagation of impact in the composite with the optimum formulation. The closed curve on the graph plotting force versus displacement indicated the success of the specimen in absorbing the dissipated energy up to 40 J. The dye penetrant test was performed to investigate the damage area progression, and it revealed that a higher energy level will produce greater damage. Compression after impact tests indicated that the compression damage decreased as the impact energy was increased. Considering that the hybrid composite with the weight ratio of 25% kenaf fibre and 75% glass fibre approached the performance of the material made entirely from glass fibre, it may be concluded that it can be employed for product development in environmentally friendly technologies

**Keyword:** Kenaf; Glass; Hybrid composites; Low velocity impact; Compression after impact; Dye-penetrant test; Non-destructive testing