

## **The effect of fiber content on the crashworthiness parameters of natural kenaf fiber-reinforced hexagonal composite tubes**

### **ABSTRACT**

The aim of this paper is to study the effect of fiber content on the crashworthiness parameters (i.e., energy absorption and stroke efficiency) and the failure modes of a non-woven kenaf (mat) fiber-reinforced hexagonal composite tube. The composite was prepared and fabricated using the hand-lay-up method; fabrication was followed by axial compression testing using an Instron 3382 machine. Various fiber contents were considered, including 25%, 30%, 35% and 40%. A fiber content of 25% to 30% (mass percent) resulted in the best crashworthiness parameters. Furthermore, the amount of energy absorbed decreased as the fiber content increased, as did the mean crash load and the stroke efficiency. A few distinct failure modes were identified during the experiments, including the progressive failure mode, in which failure begins at the top end of the tube, and the transverse crack failure mode, which is associated with the buckling failure mode; after the crash occurs, the top or bottom end of the hexagonal tube begins to break and is fragmented into small pieces.

**Keyword:** Energy absorption; Fiber content; Kenaf fiber; Axial test