

## **Design and fabrication of shoe shell from kenaf fibre reinforced unsaturated polymer composites**

### **ABSTRACT**

Natural fiber materials have been widely used for several years and their market share is continuously growing. Natural fiber polymer composites are lightweight and environmentally friendly as well as low cost compared to traditional engineering materials. The primary aim of this study was to design and fabricate a shoe shell using a kenaf fiber reinforced unsaturated polyester composite. Thus, 40% kenaf bast fibers were combined with 60% unsaturated polyester to produce a composite material for making a composite shoe shell. A total design method was used in the design of the composite shoe shell starting with the conceptual design. Concept development was used to carry out a market investigation through literature reviews, questionnaires, and surveys of existing products on the current market. In addition, concept development generated a product design specification as a design guide obtained through brainstorming, mind mapping, and a TRIZ engineering system solution. Moreover, technical drawing and 3D model construction, using SOLIDWORKS (2015) were utilized to produce a detailed design of the composite shoe shell. Subsequently, the manufacturing and fabrication processes were carried out based on the technical drawings that had been finalized and were successfully carried out using a hand lay-up process.

**Keywords:** Composites; Conceptual design; Kenaf fiber; Shoe shell; Unsaturated polyester