

Fibre properties and crashworthiness parameters of natural fibre-reinforced composite structure: a literature review

ABSTRACT

Several natural fibres such as hemp, flax, sisal, kenaf and jute have been used in different industrial applications. Recently, natural fibres have drawn the interest of researchers, engineers and scientists as substitute reinforcements for fibre reinforced polymer (FRP) composite tubes. Due to their fairly good mechanical properties, low cost, high specific strength, environmentally-friendliness and bio-degradability, ease of fabrication, and good structural rigidity, these materials can be used in an extensive range of applications, including aerospace and the automotive industry. Previous studies focused on how to introduce the natural fibres into industrial applications and the replacement of synthetic fibres with natural fibre materials. The tensile properties of natural fibre reinforced polymers are mainly influenced by mechanical properties such as tensile properties, flexural properties, and impact strength are strongly affected by fibre content. Furthermore, the overall tensile and flexural properties of natural fibre-reinforced polymer hybrid composites are highly dependent on the aspect ratio, moisture absorption. The geometric designs such as geometry and shapes and triggering and non-triggering and filled and non-filled was found that significantly affected the crashworthiness parameters and specific energy absorption of natural fibre reinforced polymer composite tubes. Furthermore, the compressed data, which is based on the maximum values, reported in the literature, it can be observed that the woven flax fabric circular tube exhibits high energy absorption capability and CFE. This result contributes to the increased ability to use natural fibres in vehicle manufacture and thus increases the sustainability of this industrial sector. This paper presents an overview of the developments made in the area of natural fibres reinforced composites, in terms of their physical and mechanical properties, and crashworthiness properties. Several uncertainties affecting the experimental results were discussed.

Keyword: Polymer-composites; Natural fibre; Energy absorption