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Experimental investigation of mechanical properties of Palm - Bamboo – Glass fibre composites

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Abstract

This work's goal is to examine the mechanical characteristics of Palm-Bamboo-Glass fiber composites by varying the stacking sequences of Palm, Bamboo and Glass fibre (i.e 1. Glass+Bamboo+Glass+Palm+Glass 2. Glass+Palm+Glass+Palm+Glass and 3. Glass+Bamboo+Glass+Bamboo+Glass). Since the bamboo fibre is of high ultimate tensile strength compared with other natural fibres, the bamboo fibre has been chosen for making the composite. The composites of varying stacking sequences were made by combining a compression moulding process with a manual hand lay-up method and study has been done to figure out how weaving design and stacking sequences affect mechanical and physical properties like tensile strength, flexural strength, impact strength. The Glass+Bamboo+Glass+Bamboo+Glass composite material exhibited the highest tensile strength and has a strength holding capacity of 167.28 MPa (Tensile Strength), which is capable of having maximum flexural load up to 350 N with a 19 mm displacement (flexural) and maximum impact value of 4 J.

Introduction

A composite is a structural material comprised of two or more microscopic components that are insoluble in one another [18]. The composite material which is made of comprising polymer matrix combined with fibres are called as fibre reinforced polymers composite (FRP). Even though these composite materials have strong mechanical qualities, their inability to degrade causes them to pollute the environment [2]. Recently, businesses and material researchers have focused on using natural composites for a variety of purposes, due to their characteristics like low density, low weight, environmental friendliness, and high specific strength and natural fibres are chosen over synthetic ones [5]. Natural fibre composites are often utilized in the building, aerospace, packaging, automotive, and other sectors [2]. The ability of natural fibre reinforced composites to support tensile loads increases as the fibre content reaches an appropriate level [15]. Bamboo fibre, which is also relatively easy to cultivate, is one of the most popular natural fibres and compared to