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Sérgio Luiz Moni Ribeiro Filho, Pablo Resende Oliveira, Tulio Hallak Panzera, Fabrizio Scarpa

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IMPACT OF HYBRID COMPOSITES BASED ON RUBBER TYRES PARTICLES AND SUGARCANE BAGASSE FIBRES

Sérgio Luiz Moni Ribeiro Filho[1], Pablo Resende Oliveira[1], Tulio Hallak Panzera*[1], Fabrizio Scarpa[2]

[1] Centre for Innovation and Technology in Composite Materials, Department of Mechanical Engineering, Federal University of São João del Rei - UFSJ, São João del Rei, Minas Gerais, Brazil. *Corresponding author: panzera@ufsj.edu.br

[2] Bristol Composites Institute (ACCIS), University of Bristol, UK

Abstract: The paper describes the impact behaviour of hybrid composites made of sugarcane bagasse fibres and disposed rubber particles. The analysis was carried out using a full factorial design (2^5) on samples subjected to drop-tower testing. The effects of the bagasse fibre treatment, length and weight fraction were considered, as well as the rubber particles size and their amount. Higher weight fractions of coarse rubber particles led to an enhancement of the absorption. Sustained chemical treatments of the bagasse fibres provided an increase of the composites stiffness, reducing therefore the energy absorption. In contrast, higher energy absorption was obtained in composites made with untreated bagasse because of the enhanced fibre pull-out mechanism.

Keywords: hybrid composite; disposed rubber; sugarcane bagasse; full factorial design; fibre treatment; drop-tower impact testing

1. INTRODUCTION

Hybrid composites consist of two or several types of reinforcements. The general use of hybrid composites has increased because of their enhanced mechanical properties [1], thermal stability and durability [2]. The use of recycled fillers as reinforcements from renewable sources has been also considered, with the aim of producing alternative materials addressing concerns related to the low sustainability of conventionally reinforced polymer composites [3].

A variety of natural reinforcements has been used in polymeric composites, such as cellulose, wood, cotton, jute, and bagasse from sugarcane. Natural fibres in general tend to affect the mechanical performance of composites by toughening, and by decreasing the deformation of the polymer and enhancing its elastic modulus [3]. Sugarcane bagasse has been widely used as reinforcing phase in cementitious and