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Impact of hybrid composites based on rubber tyres particles and sugarcane bagasse fibres

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	ACCEPTED MANUSCRIPT
1	IMPACT OF HYBRID COMPOSITES BASED ON RUBBER TYRES
2	PARTICLES AND SUGARCANE BAGASSE FIBRES
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9	
10	Abstract: The paper describes the impact behaviour of hybrid composites made of
11	sugarcane bagasse fibres and disposed rubber particles. The analysis was carried out
12	using a full factorial design $(2^5)$ on samples subjected to drop-tower testing. The effects
13	of the bagasse fibre treatment, length and weight fraction were considered, as well as
14	the rubber particles size and their amount. Higher weight fractions of coarse rubber
15	particles led to an enhancement of the absorption. Sustained chemical treatments of the
16	bagasse fibres provided an increase of the composites stiffness, reducing therefore the
17	energy absorption. In contrast, higher energy absorption was obtained in composites
18	made with untreated bagasse because of the enhanced fibre pull-out mechanism.
19	
20	Keywords: hybrid composite; disposed rubber; sugarcane bagasse; full factorial design;
21	fibre treatment; drop-tower impact testing
22	
23	1. INTRODUCTION
24	Hybrid composites consist of two or several types of reinforcements. The
25	general use of hybrid composites has increased because of their enhanced mechanical
26	properties [1], thermal stability and durability [2]. The use of recycled fillers as
27	reinforcements from renewable sources has been also considered, with the aim of
28	producing alternative materials addressing concerns related to the low sustainability of
29	conventionally reinforced polymer composites [3].
30	A variety of natural reinforcements has been used in polymeric composites, such
31	as cellulose, wood, cotton, jute, and bagasse from sugarcane. Natural fibres in general
32	tend to affect the mechanical performance of composites by toughening, and by
33	decreasing the deformation of the polymer and enhancing its elastic modulus [3].

Sugarcane bagasse has been widely used as reinforcing phase in cementitious and

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