COLD-PRESSED HYBRID POLYESTER COMPOSITES CONTAINING SHORT SISAL FIBRES AND CERAMIC MICRO PARTICLES

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Abstract: The use of biocomposites in industry has been driven by the economic and environmental needs of projects aimed at sustainable development. The length of natural fibres varies by species, production and extraction, and can be an obstacle for application in the industry. This work investigates hybrid polyester composites made with short sisal fibres and ceramic micro particles based on a cold pressing process at 0.8 MPa. A full factorial design 2231 was carried out to analyse the effects of fibre length (10 mm and 30 mm), type of micro particles (Portland cement and silica) and amount of particles (5wt%, 10wt%, 15wt%) on the flexural modulus and strength, apparent porosity and water absorption. The incorporation of 15wt% ceramic micro particles in composites made with 10 mm fibre length increased the flexural modulus nearly at 29.2% compared to the inclusion of 5wt%. The change from 10 mm to 30 mm length of sisal fibre in hybrid composites containing cement particles provided a 20.6% increase in flexural strength. The apparent porosity and water absorption of the composites fabricated with 10wt% Portland cement were 37.7% and 43.8% higher than those made with silica particles. Cold compaction has revealed a promising manufacturing process for obtaining large-scale composite laminates with excellent surface finish, being suitable for a variety of secondary structural applications in aeronautical, automotive and construction engineering.

Keywords: Sisal fibres, biocomposites, polyester polymer, hybrid composite.