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Experimental investigation and prediction for tribo behavior of fillers concentrated FRP

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Composites have been established as one of the most promising modern materials to replace conventional metals and alloys in numerous structural and tribological applications. Fiber reinforced polymer (FRP) materials developed using thermoplastic and thermosets as matrices, natural and synthetic fibers as reinforcing and organic and inorganic materials as fillers have potential owing to their high strength to weight ratio. Natural fiber reinforced materials developed using plant fibers have attached the attention of the manufacturers because of their good strength, low cost and biodegradability. In the present work, cotton fibers are used as reinforcement with the polyester resin material. Tribological characterization of a material, determines its wear and friction coefficient properties at different operating parameters such as load, sliding distance, sliding velocity, filler content, etc. Response surface Box Behnken (BB) design approach is used to create the design matrix. Scanning electron microscope (SEM) is used to investigate the morphology of worn surfaces and artificial neural network (ANN) has been used to predict the tribo behavior of the cotton fiber polyester composites. A measured experimental database was used for successful training of the ANN and the test results reveal that the fillers have significant effect on tribo behavior of cotton fiber polyester composites. The results of validation network show that predicted tribo behavior is well acceptable when comparing it with the actual experimental results. The use of cotton fiber reinforced polyester composites can be employed depending upon various applications as per the requirement. For instance, the materials offer low wear rate and low co-efficient of friction may be used for the mechanical elements like gears, seals, bushes, bearings and turbines. The materials which offer high co-efficient of friction and low wear rate may be used for the brakes and clutches

Biography

Hiral H Parikh has pursued her PhD from CHARUSAT, Changa University, Gujarat, India, in the field of Tribological Characterization of Polymer Matrix Composites. Her research interest areas are biodegradable composites, polymer and polymer composites, tribological characterization, adhesive and abrasive wear analysis. She has guided many undergraduate projects and two postgraduate projects and she is a recipient of Dean's Choice Award - 2015 at Navrachana University, she serves as an external examiner to evaluate undergraduate students at various universities. She is accomplished researcher authored several research papers which have been published in national and international conference proceedings. She is the author of two book chapters with Springer and ACME (Advances in Chemical and Mechanical Engineering) publishers. She has number of international journal publications in her credit. She is also a member of Tribology Society of India and Indian Society of Technical Education.

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