

Tensile Characteristics of Waste Based Natural Fibre Composites from Rice Husk and Low Density Polythene Waste



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Abstract Manufacturing new products with waste material has exposed a tremendous contribute to sustainable waste management globally. Recently, natural fibres have gained attention among researchers, engineers and scientists as an alternative reinforcement for synthetic fibre-reinforced polymer composites due to low cost, fairly good mechanical properties, high specific strength, bio-degradability and eco-friendly characteristics. This project was carried out to investigate the tensile properties of waste based Natural Fibre Composite (NFCs) with the use of Rice Husk (RH) as the reinforcement material and the low-density polythene (LDPE) as the matrix. five types of waste based NFCs were developed by varying the weight fraction of fibre to LDPE weight, and weight fractions considered in this study are 10, 20, 30, 40 and 50%. Simple techniques were used to manufacture NFCs, such as shredder machine and hot press machine which do not need high expertise. Uniaxial tensile test was carried out according to the ASTM D3039, using universal tensile testing machine with displacement control loading method. Load, displacement and time histories were obtained and further analyses were undertaken by obtaining Young's modulus, yield stress, yield strain, ultimate tensile stress, failure strain, resilience modulus and toughness modulus for each variation. All types of NFCs with varying RH content show behaviour of materials having typical nonlinear elastic-plastic region. Research findings indicated that addition of 20–40% RH content provide better overall performance under universal tensile behaviour, by mainly considering the behaviour under elastic region and ultimate tensile strength.

Keywords Natural fibre composites · Rise husk · Low-density polythene · Tensile characteristics · Sustainability · Waste management

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