PRELIMINARY TENSILE INVESTIGATION OF FDM PRINTED PLA/COCONUT WOOD COMPOSITE

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Abstract

Fused Deposition Modeling (FDM) is an of additive manufacturing method that has been used to create multiple components from a variety of materials for a wide range of applications in layer-by-layer deposition. The thermoplastic polymers were used as a material which comes in the form of a filament. Coconut wood is highly recognized for its naturally affable, ecological components, thermal resilience, and corrosion resistance up to the present day. However, PLA's characteristics embedded in coconut wood remain limited. The aim of this study is to create and analyse the tensile properties of the specimens with varying infill percentages (25%, 50%, and 75%) and the infill patterns (grid, rectilinear, concentric, honeycomb, and triangle) on coconut wood reinforced PLA using the FDM technique. The specimen is printed in accordance with the ASTM standard for tensile testing which is ASTM D638 type 1. Following that, the tensile properties of the PLA and PLA-coconut wood were analysed. The results demonstrate that the concentric infill pattern with a percentage of infill 75% of pure PLA produced 37.55 MPa of Ultimate tensile strength and the maximum elastic modulus of 1.148 GPa and yield strength of 23.33 Mpa in tensile testing meanwhile the Grid pattern has the weakest properties among all the patterns.

Keywords: Coconut wood; PLA-based composite; 3D printing; FDM; Mechanical properties

ACKNOWLEDGMENT

The authors are grateful to Universiti Malaysia Pahang (www.ump.edu.my) for the financial support provided under the grant RDU192218, RDU190350, and RDU19402.

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