

عنوان مقاله:

Production of Continuous Fiber Reinforced Ther-moplastic Composites via Fused Deposition Model-ing 3D Printer

محل انتشار:

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خلاصه مقاله:

Continuous glass fibers have been implemented as the reinforcement to produce continuous fiber-reinforced thermoplastic composites via fused deposition modeling 3D printer. One major drawback in FDM process is the general weakness of the produced parts, due to the nature of the materials namely thermoplastics. One conventional method is to strengthen plastics with continuous fibers of glass, aramid or carbon. Due to the nature of extrusion based additive manufacturing processes, like FDM, where the part is formed by deposition of molten material, to embed reliably a solid and continuous material (named fiber), is a serious challenge. In the approach presented in this paper, a nozzle was designed so that the continuous glass fiber was guided into the molten area through the orifice from the side, where it was impregnated by the molten filament polymer. Then, it was deposited on the bed, at the start, or on the previous layer, during built up. This method enables the production of strengthened parts made of continuous fiber reinforced thermoplastic composite with various fiber content and various types of polymeric materials as the matrix. The tensile strength of the produced parts increased significantly (up to 300 MPa) depending on the volumetric percentage of fibers. The maximum fibers volumetric percentage of 37% was obtained, and the results showed that the strength of the samples is consistent with the Rule of mixtures. This consistency indicates the effective role of the embedded fibers. The manufactured products exhibited excellent dimensional accuracy and good surface quality.

کلمات کلیدی:

Continuous fiber; Fused Deposition Modeling; 3D Printer

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