VARIABLE LAYERS THICKNESS OPTIMIZATION OF THE PLA PARTS FORMED BY FFF/FFD METHOD

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Abstract

This work presents experimental study of the influence of layer thickness on surface quality and printing time using FFF/FFD method. Better surface quality of the printed part is achieved using thinner layers. Print time and achieved surface quality are in indirect correlation, on what basis, in order to satisfy both goals, detailed study needs to be done. Implementation variable layer thickness along Z axes can led to significantly reduction of printing time, but in the same way maintaining desired surface quality of the printing part. By applying the variable thickness of the layers, mostly benefits were obtained in zones where is a large change in the geometry in the part between the layers, such as spherical, conical, curved, and other shapes of complex surfaces. Constant and variable layer thickness experiments were conducted with bio-based polymer PLA on benchmark specimens. Constant thickness of the layers was 0.1, 0.2 and 0.3 mm, while variable values of the layer's thicknesses were form 0.1 up to 0.3 mm in steps of 0.04. Four specimens were produced on 3D printer with same printing speed of 60 mm/min, nozzle temperature of 205 °C and bed temperature 60 °C. After detailed microscopic study of the printed benchmark specimens, can be concluded that from the aspect of printing time and surface quality, optimal results can be expected when using variable layers thickness. In this way, good balance between printing time and surface quality is achieved.

Keywords

FFF/FFD, Variable layers, PLA, Surface quality, Print time

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