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EXPERIMENTAL ANALYSIS OF SURFACE ROUGHNESS AND DIMENSIONAL ACCURACY OF ABS - SSD 0150 FDM COMPONENTS

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ABSTRACT

Purpose

Rapid prototyping (RP) or rapid manufacturing is a booming technology, with its ability to shorten product design and development cycle. FDM parts are strong enough to allow functional testing and the technology allows complex in geometries to be made easily. FDM enables functional assemblies by consolidating sub assemblies into a single unit at the computer aided design stage and thus reduces part count, handling time, storage requirement and avoids mating and fit problems.

Design/Methodology/Approach

The present research is focussed on investigating the influence of the ABS-SSD 0150 based on Design of Experiments. The aim is to optimize the process parameters of the FDM machine such as filler density, shell thickness and layer thickness for improving the surface roughness and dimensional accuracy of FDM specimens using ABS filament as feedstock.

Findings

The present research aims to investigate the effect of surface roughness and interaction effects of the process parameters, on the surface roughness of FDM specimen based on ABS. Three parameters, namely layer thickness; shell thickness and Infill density, each at three levels were selected for the investigation of their influence on the ABS specimens fabricated by FDM technique. This paper describes an associate experimental style technique for deciding the optimum surface and dimensional accuracy of an engineered design of the Deposition Modelling (FDM) method.

Originality/Value

Shell thickness and layer thickness influenced compression specimen surface roughness of FDM processed parts. Multiple Regressions were used to predict the strengths of the fused deposition model specimens with good accuracy. As per the Gray relational grade, tensile and flexural strengths are maximized at a layer thickness of 0.1 mm, shell thickness of 1.5 mm and an infill density of 40 %. FDM specimen showed a significant deviation ranging from 0.1–0.7µm radial distances occurred.

KEYWORDS: Fused Deposition Modelling, Surface Roughness, Multiple Regression, Gray Relational Grade