

Investigation of optimal parameters for tensile strength property of ABS in rapid prototyping

Abstract

This paper presents the investigation of the effect of fused deposition modeling (FDM) parametric processes on the tensile strength of the developed acrylonitrile butadiene styrene (ABS) compliant prototype. The prototype is produced using prodigy plus FDM machine with Insight 7.2 software. Four essential process parameters include layer thickness, part interior style, raster width, and raster angle are considered. The effect of these parameters on the tensile strength of ABS prototype is studied. Experiments are conducted in accordance with Taguchi's design of experiment with three levels for each factor. The tensile strength of the models is tested using universal testing machine (UTM). The results are statistically analyzed using analysis of variance (ANOVA) in order to determine the optimal parameter which affects the tensile strength characteristic significantly. From the analysis, it was found that the part interior style parameter affects the tensile strength performance more greatly than others.

Keywords

Fused deposition modeling; Rapid prototyping; Taguchi method; Tensile strength