



OPTIMISATION OF 3D PRINTING PARAMETER FOR IMPROVING MECHANICAL STRENGTH OF ABS PRINTED PARTS

Maisarah Mohamed Bazin, Mohamad Zulfadhli Mat Othman, Mahfodzah Md Padzi

Mechanical Engineering Section,
Universiti Kuala Lumpur Malaysia France Institute,
Jalan Teras Jernang, 43650 Bandar Baru Bangi, Selangor, MALAYSIA

Farizah Adliza Ghazali

Fabrication & Joining Section,
Universiti Kuala Lumpur Malaysia France Institute,
Jalan Teras Jernang, 43650 Bandar Baru Bangi, Selangor, MALAYSIA

ABSTRACT

Three-dimensional (3D) printer is a computer-aided manufacturing (CAM) device that creates 3D objects. The principle of 3D printing involves a digital model which is turned into a solid 3D physical object by adding the material layer by layer. The objective of this study is to determine the optimum combination of a 3D printing machine parameter setting, such as printing temperature, speed and resolution, to produce the highest flexural strength. Taguchi Method and Analysis of Variance (ANOVA) were applied to get the best process parameter combination and to identify the most affective parameter on the flexural strength. The result from this study demonstrated that the optimum setting for the 3D printer (Vagler V-821) machine had printing temperature of 240 °C, printing speed of 30 mm/s and printing resolution of 250 μm. The result from the Taguchi Method and ANOVA concluded the most effective effect on the flexural strength was printing speed, followed by printing resolution and printing temperature.

Key words: 3D printing, ABS, ANOVA, Taguchi method and flexural strength.

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1. INTRODUCTION

A three-dimensional (3D) printing is an advanced process of translating a digital file into 3D solid objects. 3D printing is a technology that develops objects by using additive process without the need for a cutting tool or mold. Fused Deposition Modelling (FDM) is an additive