

# Optimization Parameter Effects on the Quality Surface Finish of 3D-Printing Process using Taguchi Method

## Abstract

Fused Deposition Modelling (FDM) is a process for developing Rapid Prototype (RP) objects according to numerically defined cross sectional geometry by depositing fused layers of material. This RP may used straight to the application. Therefore, this research has been done to optimize the best parameter towards better roughness on the surface. Plus, this research is to explore the influence of layer height, outline speed and extruder temperature with the surface roughness. A specimen has been proposed to fulfil the objective of the research. In order to build the specimen, it has been drawn by CAD. The, it was transfer to Standard Triangulation Language, (STL) file. The STL will read and the FDM will deposits the material from the bottom curve and build up the model to the top curve. In order to reduce experimental runs, Taguchi Method based on central composite design is adopted. L<sub>9</sub> was used to run the specimen. Thus, there is nine experiment that will run. Specimens are prepared to improve surface roughness of the 3D printing. The specimen was measured by Mitutoyo CS3000 525-780EI. Relations among responses and process parameters are determined and their validity is proved using analysis of variance (ANOVA). Response surface are analysed to establish main factor effects and their interaction on responses. The specimen is proposed in flat and curve surface. For the result, it is stated that layer height was the main parameter that effects of the surface roughness, compare to the outline speed and extruder temperature.