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Study of machining parameters of wire electrical discharge of aluminum matrix composites (AMCs) with Taguchi method

Abstract

Wire Electro-Discharge Machining (WEDM) is a special form of electrical discharge machining that uses a small diameter wire as the electrode to cut a narrow keft in the work. The objective of this study is to determine the optimal machining parameters to achieve the best performance of Material Removal Rate (MRR) and surface roughness (SR) while cutting the newly advance material, Aluminum Matrix Composite with 6% fiber (AMCs) by using WEDM. Taguchi method and the orthogonal array of L-9 (34) has been use in this research to design the experiment. The parameters chosen are Pulse on Time (TON), Pulse off Time (TOFF), Servo Voltage (SV), and Wire Speed (WS). These parameters have been use to design 9 different setting of machining to determine the best combination of parameter. The effect of these machining parameters to MRR and SR was analyzed with Mean Square Deviation (MSD), Signal-to-Noise (S/N) ratio and Average Factor Effect (calculation), and Design Expert (DX7) software. Analysis of Variance (ANOVA) is performed to determine the most influenced or significant parameter. In this study, the results on the material removal rate and surface roughness have been discussed. Confirmation test must be made to confirm the accuracy of the value predicted.

Keywords: WEDM; Material Removal Rate; Surface Roughness; Taguchi Method; Optimization.