STUDY ON MACHINING TUNGSTEN CARBIDE WITH ELECTRICAL DISCHARGE MACHINING (EDM) USING TAGUCHI METHOD

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ABSTRACT

This paper describes the application of the Taguchi method for optimizing the electrical discharge machining process with multiple performance characteristics which material removal rate (MRR), tool wear rate (TWR) and surface roughness (SR). Based on electrical discharge machining (EDM) is one of the major manufacturing processes widely applied in die and mold making industry to generate deep and three dimensional complex cavities in many different classes of materials under roughing and finishing operations. There are different types of electrodes, workpiece and dielectric fluid had been selected as machining parameters. All specimens are machined using EDM Hitachi H-DS02N machine. In these studies, Taguchi method has been employed to identify the optimum machine parameter while machining tungsten carbide. The experiment used parameters are dielectric fluids (Kerosene, Amoil and Novis), currents (3 A, 6 A, 9 A), tool material (copper and copper tungsten), capacitance (0 nF, 3.3 nF, 10 nF) and polarity (positive and negative). The machining performances measured are MRR, TWR and SR. The Analysis of Variance (ANOVA) results show that current are the most significant parameters that affecting the MRR and TWR while the other parameters show that electrode polarity, tool material, capacitance and dielectric fluid are insignificant parameters. For SR, the most significant parameters are capacitance and followed by current, tool material, electrode polarity and dielectric fluid are insignificant machining parameters. The optimum condition for MRR occurs from experiment number 6 which are dielectric fluid = Amoil (level 3), current = 9 A (level 3) giving highest level on machining and SR occurs from experiment number 4 which are dielectric fluid = Amoil (level 2), current = 3 A (level 1) giving lowest level on machining. The result obtained will be giving answers on the best combination of machining parameters in order to get the best MRR, TWR, and SR.

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