STUDY ON MACHINING SKD 61 WITH ELECTRICAL DISCHARGE MACHINING (EDM) USING TAGUCHI METHOD

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ABSTRACT

There are many non-traditional machining techniques are being used in industries nowadays in order to produce good surface finish and high quality product. One of the non-traditional machining techniques that commonly used in the industrial is Electrical Discharged Machining or usually called as EDM. EDM is widely used for machining plastic injection moulds, stamping dies and parts for automotive, defense, electronics and telecommunication industries. The general principle of EDM is based on removing material by repeated electrical discharges between a tool (electrode) and the work piece with the presence of dielectric. From literature review, it was found that SKD 61 is commonly used materials for making moulds in Malaysian's industries. From the previous research, it was found that the best tool (electrode) and dielectric for machining SKD 61 is copper (Cu) and Amoil respectively. Taguchi Method was selected to perform this study where eight specimens in three different machining parameters were studied: diameter of electrode (16 and 8mm), current (6A and 3A) and polarity (positive and negative). The performances of machining using different machining parameters were measured through material removal rate (MRR), tool wear rate (TWR) and surface roughness (SR). All specimens were machined using EDM Hitachi H-DS02N machine. Analysis were conducted using the Design of Expert software (DX7 Trial Program) to generate the Analysis of Variance (ANOVA) in defining the optimum machining condition of SKD 61 work pieces machined with Cu electrode in Amoil dielectric. The ANOVA result shows that current is the most significant parameter that influences the result of MRR followed by polarity and electrode diameter. For TWR and SR, the most significant parameter is polarity followed by current and electrode diameter. It was found that optimum MRR condition occurs during electrode diameter = 18mm; polarity = negative; and current = 6A; optimum TWR condition occurs during electrode diameter = 16mm; polarity = positive; and current = 6A while optimum SR condition occurs during electrode diameter = 16mm; polarity = positive; and current = 3A.