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An Experimental Study on the Effect of Operating Parameters during the Micro-Electro-Discharge Machining of Ni Based Alloy

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Abstract : Ni alloys have managed to cover wide range of applications such as automotive industries, oil gas industries, and aerospace industries. However, these alloys impose challenges while using conventional machining technologies. On the other hand, Micro-Electro-Discharge machining (micro-EDM) is a non-conventional machining method that uses controlled sparks energy to remove material irrespective of the materials hardness. There has been always a huge interest from the industries for developing optimum methodology and parameters in order to enhance the productivity of micro-EDM in terms of reducing machining time and tool wear for different alloys. Therefore, the aims of this study are to investigate the effects of the micro-EDM process parameters, in order to find their optimal values. The input process parameters include voltage, capacitance, and electrode rotational speed, whereas the output parameters considered are machining time, entrance diameter of hole, overcut, tool wear, and crater size. The surface morphology and element characterization are also investigated with the use of SEM and EDX analysis. The experimental result indicates the reduction of machining time with the increment of discharge energy. Discharge energy also contributes to the enlargement of entrance diameter as well as overcut. In addition, tool wears show reduction with the increase of discharge energy. Moreover, crater size is found to be increased in size along with the increment of discharge energy.

Keywords : micro holes, micro EDM, Ni Alloy, discharge energy
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