EDM OF ALUMINUM AND STAINLESS STEEL USING COPPER AND BRASS ELECTRODES

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ABSTRACT

In this work copper and brass electrodes have been compared in terms of wear characteristics and material removal rate during EDM (electrical discharge machining) of aluminum and stainless steel. It was found that a higher spark gap results more wear of the electrodes. It was found that volumetric wear ratio decreases with the increase in current during EDM. However, during machining of aluminum, volumetric wear ratio was found to be higher than that during machining of steel for both copper and brass electrodes. MRR (material removal rate) was found to increase with increase in current. Brass electrodes gave a higher MRR compared to copper electrodes and aluminum was removed faster than stainless steel.

INTRODUCTION

The principle of EDM, also called electrodischarge or spark-erosion machining is based on the erosion of metals by spark discharge [1]. Among the output parameters of EDM, material removal rate (MRR) and electrode wear are worth mentioning. It was found that in order to obtain a high value of MRR, both current and voltage should be fixed as high as possible [2]. It was also found that current intensity, pulse time and flushing pressure are the influential factors responsible for electrode wear (EW). In the present work wear characteristics of copper and brass electrodes have been studied during EDM of aluminum and stainless steel.

EXPERIMENTAL DETAILS

The electrode materials selected for the present study were copper and brass and the work materials were aluminum and stainless steel. The machining operations were conducted on a CNC die sinking machine of model ATC-VSH. Experiments were conducted with a current ranging from 2.5 A to 6.5 A while the voltage

was kept constant at 25 V. Experiments were conducted at a spark gap of 0.1 mm and 0.5 mm.

RESULTS AND DISCUSSION

It was found that corner wear of the electrodes increases with increase in current, but volumetric wear ratio decreases. Wear rate of the brass electrodes were found to be higher than that of copper electrodes. Again, wear of the electrodes was more intensive during machining of stainless steel compared to that during machining of aluminum. This is because of the fact that during machining of stainless steel electrodes are in working condition for a longer time to that during machining of aluminum. It was also found that electrode wear is higher while using a spark gap of 0.5 mm compared to that at a spark gap of 0.1 mm. Volumetric wear ratio was found to be higher during EDM of aluminum compared to the same during EDM of stainless steel. It was observed that the highest MRR was obtained during machining of aluminum with brass electrodes and the lowest value of MRR was obtained during machining of stainless steel with copper electrodes.

CONCLUSION

Brass electrodes undergo more wear compared to copper electrodes. Wear rate of the electrodes are more intensive during EDM of stainless steel compared to that during EDM of aluminum. MRR is high during machining of aluminum with brass electrodes and low during machining of stainless steel with copper electrodes. A higher spark gap causes higher electrode wear.

References

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