Effect of magnetic polarity on surface roughness during magnetic field assisted EDM of tool steel

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ABSTRACT

Electrical discharge machining (EDM) is one of the non-traditional machining techniques where the process offers wide range of parameters manipulation and machining applications. However, surface roughness, material removal rate, electrode wear and operation costs were among the topmost issue within this technique. Alteration of magnetic device around machining area offers exciting output to be investigated and the effects of magnetic polarity on EDM remain unacquainted. The aim of this research is to investigate the effect of magnetic polarity on surface roughness during magnetic field assisted electrical discharge machining (MFAEDM) on tool steel material (AISI 420 mod.) using graphite electrode. A Magnet with a force of 18 Tesla was applied to the EDM process at selected parameters. The sparks under magnetic field assisted EDM produced better surface finish than the normal conventional EDM process. At the presence of high magnetic field, the spark produced was squeezed and discharge craters generated on the machined surface was tiny and shallow. Correct magnetic polarity combination of MFAEDM process is highly useful to attain a high efficiency machining and improved quality of surface finish to meet the demand of modern industrial applications.

KEYWORDS:

Electric discharge machining; Electric discharges; Finishing; Graphite electrode