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PII: S0141-6359(17)30243-X
DOI: https://doi.org/10.1016/j.precisioneng.2017.10.008
Reference: PRE 6674

To appear in: *Precision Engineering*

Received date: 24-4-2017
Revised date: 6-9-2017
Accepted date: 13-10-2017

Please cite this article as: Kumar Ravinder, Singh Inderdeep.Productivity improvement of micro EDM process by improvised tool.*Precision Engineering* https://doi.org/10.1016/j.precisioneng.2017.10.008

Productivity improvement of micro EDM process by improvised tool

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Highlights

- An improvised electrode design assisting removal of debris from the machining zone.
- Minimum electrode fabrication time and improved response characteristics
- 300 % increase in aspect ratio of the drilled hole compared to the solid electrode.

Abstract

Micro electric discharge machining (μ-EDM) is a widely used process for machining of difficult to machine materials. The occurrence of arcing and short circuiting in micro electric discharge drilling (EDD) is a common problem which limits the aspect ratio achieved during the process. The present study is focused on the improvement in response characteristics by eliminating the occurrence of arcing and short circuiting. These problems can be addressed by modifying the tool electrode geometry. Although, EDD using shaped tool electrodes improve response characteristics as proven by the previous studies, but time spent in electrode fabrication must also be considered as it affects the overall productivity. Considering the literature related to EDD using shaped tool electrodes, the proposed electrode has been found to have minimum electrode fabrication time i.e. 9 minutes for an electrode length of 3.2 mm. Therefore, the proposed electrode is capable of producing holes of high aspect ratio with minimum electrode fabrication time. The proposed electrode was also found to be effective in eliminating the accumulation of debris in the machining zone. Moreover, the need of flushing during the process has been totally eliminated making it a self-flushing electrode. The mechanism