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Investigation of process parameters for stable micro dry wire electrical discharge machining (Article)

Banu, A., Ali, M.Y., Rahman, M.A., Konneh, M.

Department of Manufacturing and Materials Engineering, Faculty of Engineering, International Islamic University Malaysia, P.O. Box 10, Kuala Lumpur, 50728, Malaysia

Abstract

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Micro dry wire electrical discharge machining (μDWEDM) is a process where gas is used as the dielectric fluid instead of a liquid. In this process, certain modifications of wire electrical discharge machining (WEDM) are needed during the machining operation to achieve stable machining. Smooth and stable machining operation in μDWEDM process remains as a critical issue. Thus, this paper presents the investigation of process parameters for a stable μDWEDM process. The investigation was performed on a stainless steel (SS304) with a tungsten wire as the electrode using integrated multi- process machine tool, DT 110 (Mikrotools Inc., Singapore). The experimentation method used in this phase was a conventional experimental method, one-factor-at-a-time (OFAT). Types of dielectric fluid, dielectric fluid pressure, polarity, threshold, wire tension, wire feed rate, wire speed, gap voltage, and capacitance were the controlled parameters. The machined microchannels were observed using scanning electron microscope (SEM). Stable and smooth machining operation of μDWEDM was found to be with compressed air as the dielectric fluid, workpiece positive polarity, 24% threshold, 0.0809 N wire tension, 0.2 μm/s wire feed rate, and 0.6 rpm wire speed. © 2019, Springer-Verlag London Ltd., part of Springer Nature.

SciVal Topic Prominence

Topic: Electric discharge machining | Electric discharges | Electrode wear

Prominence percentile: 99.053

Chemistry database information

Substances

W

Author keywords

DEDM | Dry EDM | Dry WEDM | DWEDM | Micro dry wire EDM | μDWEDM

Indexed keywords

Engineering controlled terms: Capacitance | Compressed air | Electric discharges | Machine tools | Machining centers | Scanning electron microscopy | Wire

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Engineering main heading: Electric discharge machining

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