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

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Abstract

Micro dry wire electrical discharge machining (mu DWEDM) 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 mu DWEDM process remains as a critical issue. Thus, this paper presents the investigation of process parameters for a stable mu DWEDM 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 mu DWEDM was found to be with compressed air as the dielectric fluid, workpiece positive polarity, 24% threshold, 0.0809 N wire tension, 0.2 mu m/s wire feed rate, and 0.6 rpm wire speed.

Keywords

Author Keywords: Dry EDM; DEDM; DryWEDM; DWEDM; Micro dry wire EDM; mu DWEDM

KeyWords Plus: CURRENT RESEARCH TRENDS; EDM PLASMAS; SINKING EDM; WEDM; OPTIMIZATION; VIBRATION; BREAKDOWN; ACCURACY; NITROGEN; TAGUCHI

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