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## Analysis of kerf accuracy in dry micro-wire EDM (Article)

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### Abstract

View references (48)

Mineral oil–based liquids are normally used as the dielectric fluid in electrical discharge machining (EDM) where it has the ability in improving the efficiency of the machining process. Nevertheless, these dielectric fluids have the tendency to cause environmental problems. Therefore, as an alternative, gas has been introduced as the dielectric fluid also known as dry EDM (DEDM) process. However, kerf variation in dry micro-wire EDM (DμWEDM) process remains a critical issue. Thus, the objective of this research is to investigate kerf accuracy in DμWEDM. Experimental investigation was carried out on a stainless steel (SS304) with a tungsten wire as the electrode and compressed air as the dielectric fluid using integrated multi-process machine tool, DT 110 (Mikrotools Inc., Singapore). Central composite design (CCD) was used to design the experiment using two controlled parameters: capacitance and gap voltage. Analysis of variance (ANOVA) was used to analyse the results and to evaluate the adequacy of the developed model. The results were obtained by measuring the kerf using a scanning electron microscope (SEM) (JEOL JSM-5600, Japan). The investigation of kerf was divided into two responses which were upper kerf and bottom kerf. Empirical models were developed, and it was found that both parameters (capacitance and gap voltage) have high influence on both responses. The optimum parameters for both minimum upper and bottom kerf were found to be 0.1 nF capacitance and 91 V gap voltage. The developed models were found to be adequate since the percentage error is relatively small (< 3%). © 2020, Springer-Verlag London Ltd., part of Springer Nature.

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### Indexed keywords