

An Experimental Investigation on Surface Finish in Die-sinking EDM of Ti-5Al-2.5Sn

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ABSTRACT

Electrical discharge machining (EDM) is a non-conventional process for shaping hard metals and forming deep and complex-shaped holes by spark erosion in all kinds of electroconductive materials. The choice of the electrical parameters on the EDM process depends impressively on workpiece-electrode material combination. In this research, an effort has been made to study the surface finish characteristics of the machined surface in EDM on Ti-5Al-2.5Sn titanium alloy. The microstructure of the machined surface is investigated for discharge energy and electrode materials. The peak current, pulse-on time, pulse-off time, servo-voltage and electrode material (copper, copper–tungsten and graphite) are considered as process variables. The experimental work was performed based on an experiment design (central composite design). The surface roughness (SR) increases with peak current and pulse-on time and decreases with servo-voltage. Besides, the effect of the process parameters on surface roughness depends on electrode material. At low discharge energy, copper–tungsten electrode produces the finest surface structure whilst graphite delivers worst surface characteristics. Copper–tungsten with low discharge energy (low peak current and pulse-on time) can be used to obtain better surface finish.

KEYWORDS: EDM; Surface finish; Ti-5Al-2.5Sn; Electrode materials; Process variables

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