Chapter 3
Electrical Discharge Micro-hole Machining Process of Ti–6Al–4V: Improvement of Accuracy and Performance

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Abstract Micro-electrical discharge machining (Micro-EDM) has become one of the promising micromachining processes utilizing which high accurate intricate micro-features can be machined efficiently in shop floor. In this chapter, an overview of micro-EDM process and its capabilities is presented for obtaining different desired shape/profile utilizing various machining techniques. The chapter also deals with differences between EDM and micro-EDM, details of system components and micro-EDM process parameters. The significant performance characteristics of micro-EDM process are also discussed. For improving the machining rate as well as for producing high accurate micro-features in different engineering materials, experimental investigation of micro-hole drilling process on Ti–6Al–4V material is carried out implementing several innovative machining strategies such as comparative study of employing kerosene and de-ionized water as dielectrics, the effects of mixing of boron carbide additive in kerosene and de-ionized water, effects of polarity changing between the electrode and effects of rotating the micro-tool. Detailed parametric analysis is carried out to explore the effects of process parameters utilizing these novel machining strategies. Optical and SEM micrographs taken at different parametric combinations have also been analyzed.

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