
Preface

Nowadays, electric discharge machining (EDM) is considered as a mainstream process along with other conventional machining processes. The capability of cutting any electrically conductive material irrespective of its hardness and force-free nature of EDM has made it more acceptable to the manufacturing industries as compared to other advanced machining processes. With demand for miniature components and products, machining at microscale starts gaining attention of researchers as well as practicing engineers. Micro EDM is considered as one of the widely used machining processes for machining of small details in big parts or the machining of miniaturized components. Different variants of micro EDM extend its application domain to all sectors using microcomponents or microfeatures. Biomedical, aerospace, automotive, microelectronics, and jewelry or watch-making industries are some of those sectors.

This book provides a comprehensive coverage of micro EDM and its variant processes. This book summarizes micro EDM process, starting from its history to the latest advancement, which is carefully reviewed and written from journal papers, conference papers, technical notes, industries catalogs, magazines, etc. This book can be used as a reference guide by students, researchers, and professionals for learning, exploring new things, selection of process parameters, tool electrodes for different workpiece materials, and many more.

This book contains ten chapters covering the most important aspects of micro EDM process. **Chapter 1** provides an overview of different micro-manufacturing processes, history of EDM, working principle of micro EDM, summary of machine components as well as different variants of micro EDM. **Chapter 2** discusses micro EDM machine components such as machine tool structure, spindle system, servo control systems, pulse generators, dielectric fluids, sparking gap control systems, and tool electrodes. **Chapter 3** focuses on micro EDM milling, tool movement and rotation, and its capabilities and applications. **Chapter 4** discusses die-sinking micro EDM, machining behaviour, and capabilities and applications. **Chapter 5** focuses on micro EDM drilling, working principle, machining behavior, and capabilities and applications. **Chapter 6** discusses the different variants of micro EDM such as electro discharge grinding, reverse EDM, planetary EDM, hybrid EDM, and others related to deposition and surface modification. **Chapter 7** discusses important process parameters and their effect on the final quality of the machined surface. **Chapter 8** includes geometric error (overcut, taper, depth, etc.) and surface problems (recast layer, heat-affected zone, micro-cracks, residual stress, material migration, corrosion, etc.). **Chapter 9** focuses on the techniques used for the modeling of micro EDM and methodology for

theoretical calculation of temperature, crater size, etc. **Chapter 10** discusses the tool wear (types and their effects) and tool wear compensation methods (theoretical as well as experimental).

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