

Preface

The more stringent requirements for enhanced quality of engineered products, especially those of miniature size and made from difficult-to-machine materials, have largely been responsible for the development and subsequent wide use of hybrid machining processes (HMPs). HMPs are variants of advanced machining processes (AMPs) that are combinations of either one or more specific AMP or an AMP combined with a conventional metal working process (usually some form of machining process) to achieve results that would not be possible with the individual constituent processes in isolation.

HMPs may also include assistance of an additional external energy source or fluid and/or abrasive media to enhance material removal rate and/or surface quality. HMPs are slowly but surely finding their way into mainstream manufacturing globally due to the associated high-quality machining and finishing capabilities. Micro-machining and micro-finishing are the two most important application domains where HMPs have demonstrated significant advantages. Their ability to machine extremely hard, brittle and difficult-to-cut materials and to produce improved surface integrity aspects are the key advantages.

The main objective of this book is to provide a wider perspective on some of the most important HMPs used for micro-machining and finishing purposes and to provide a resource for better understanding of the underlying working principles of the different processes. This book aims to address the needs of researchers, students and professionals in the fields of mechanical and manufacturing engineering as a first step into the world of hybrid machining processes.

Chapter 1 of this book presents an introduction, a brief overview and a detailed classification scheme of HMPs along with reference to some important applications. Electrochemical hybrid machining processes are presented in Chap. 2. This is followed in Chap. 3 with an introduction to thermal hybrid machining processes. Chapter 4 introduces various assisted type HMPs including vibration-assisted, heat-assisted, abrasive-assisted and magnetic field-assisted hybrid machining processes. The content of the various chapters is arranged to include a basic introduction of the process in question, equipment details, working principles,

significant process parameters and important applications. References are made throughout to the current and previous research work conducted as related to the individual processes.

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Hybrid Machining Processes

Perspectives on Machining and Finishing

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2016, VIII, 68 p. 30 illus. in color., Softcover

ISBN: 978-3-319-25920-8