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Research and Development

Edited by J. Paulo Davim



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Preface

Nowadays, ways of forming materials include a large family of manufacturing processes in which plastic deformation and other techniques are used to change the shape of workpieces. Processes for forming materials include extrusion, forging, rolling, drawing, sheet metal forming, microforming, hydroforming, thermoforming, and incremental forming.

Machining is a manufacturing process in which a cutting tool or other technique is used to remove excess material from a workpiece so that the remaining material is the desired part shape. Machining includes traditional machining (turning, milling, drilling, etc.), nontraditional machining (EDM, ECM, USM, LAM, etc.), abrasive machining, hard part machining, high speed machining, high efficiency machining, and micromachining, among others.

Forming technologies and machining can be applied to a wide variety of materials, namely, metals, polymers, ceramics, composites, biomaterials, and nanomaterials.

This research book aims to provide information on materials forming and machining for modern industry. The initial chapter of the book provides novel experimental techniques for determination of the forming limits at necking and fracture. Chapter 2 is dedicated to hole-flanging by single point incremental forming. Chapter 3 presents flexible roll forming. Chapter 4 covers research issues in the laser sheet bending process. Chapter 5 is dedicated to multiple performance optimization in drilling using the Taguchi method with utility and modified utility concepts. Chapter 6 contains information on molecular dynamics simulation of material removal with the use of a laser beam. Finally, the last chapter of the book is dedicated to manufacturing processes of shape memory alloys.

This book can be used as a research book for a final undergraduate engineering course or as a topic on materials forming and machining at the postgraduate level. Also, this book can serve as a useful reference for academics; manufacturing researchers; mechanical, manufacturing, industrial, and materials engineers; and for professionals in materials forming and machining. The scientific interest in this book is evident for many important centers of research, laboratories, and universities throughout the world.

The editor acknowledges WoodHead/Elsevier for this opportunity and for their enthusiastic and professional support, and finally, I would like to thank all the chapter authors for their availability for this work.

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May 2015

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