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Altri autori (Persone)	ChenXiaoqi DevanathanR (Rajagopalan) FongAik Meng
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Nota di contenuto	Preface; Contents; Chapter 1 Overview of Material Processing Automation; 1. Constrained and Non-Constrained Material Processing; 2. Multi-Facet Mechatronic Automation; 3. Sensors for Material Processing; 3.1 Measurands in Material Processing; 3.2 Types of Sensors; 3.3 Microsensors and Soft Sensors; 4. Intelligent Control Techniques; 4.1 Conventional Computer Numerical Control; 4.2 Sensor Based Machine Tool Control; 4.3 Open Architecture and Distributed Control; 4.4 Intelligent Control and Computing Techniques; 4.5 Human-Machine Interface; References Chapter 2 Process Development and Approach for 3D Profile Grinding/Polishing1. Introduction; 2. Profile Grinding and Polishing of Superalloys; 2.1 Superalloy Components and Manual Blending; 2.2 CNC Milling; 2.3 Wheel Grinding; 3. Force Control in Material Removal; 3.1 Robot Holding Tool; 3.2 Robot Holding Workpiece; 4. Model-Based Robotic Machining; 5. Part Variations and Process Dynamics; 6. System Concept of Adaptive Robotic Blending System; 6.1 A Mechatronic

Approach; 6.2 Device and Process; 6.3 Knowledge-Based Process Control (KBPC); 6.4 Data-Driven Supervisory Control (DDSC)
6.5 System Layout and Working Cycle7. Process Optimisation; 7.1 Grinding/Polishing Process Parameters; 7.2 Tool Path Optimisation; 7.3 Tool Wear Compensation; 8. Concluding Remarks; References; Chapter 3 Adaptive Robotic System for 3D Profile Grinding/Polishing; 1. Introduction; 2. Finishing Robot and Control Interface; 2.1 Finishing Robot; 2.2 Self-Aligned End Effector; 2.3 Control Interface; 3. In-Situ Profile Measurement; 3.1 Off-Line versus In-Situ Approach; 3.2 Sensor Techniques; 3.3 Coordinate Transform; 4. Template-Based Optimal Profile Fitting; 4.1 Template Generation
4.2 Profile Fitting Requirements4.3 A Fast Converging Minimisation Algorithm; 4.4 Software Development; 5. Adaptive Robot Path Planner; 5.1 Definition of Tool Path; 5.2 Derivation of End-Effector Orientation; 5.3 Generation of Tool Path; 6. Implementation of SMART 3D Blending System; 7. Results; 7.1 Dimension of Finish Profile; 7.2 Surface Roughness and Finish Quality; 7.3 Wall Thickness; 8. Concluding Remarks; References; Chapter 4 Acoustic Emission Sensing and Signal Processing for Machining Monitoring and Control; 1. Introduction; 2. Sensors in Machining Process Monitoring
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1.3 Automated Welding

Sommario/riassunto

This volume presents the editors' research as well as related recent findings on the applications of modern technologies in electrical and electronic engineering to the automation of some of the common manufacturing processes that have traditionally been handled within the mechanical and material engineering disciplines. In particular, the book includes the latest research results achieved through applied research and development projects over the past few years at the Gintic Institute of Manufacturing Technology, Singapore. It discusses advanced automation technologies such as in-process sens