

Table of Contents

Preface

Development of a Multifunctional Micro-Machining System and its Applications L.B. Zhou, Y. Yaguchi, T. Fujii, J. Shimizu and H. Eda	3
Fabrication of Electroplated Micro Grinding Wheels and Manufacturing of Microstructures with Ultrasonic Vibration H. Onikura, R. Inoue, K. Okuno and O. Ohnishi	9
Experimental Investigation of Micro Scratching of Two-Phase Steel: Plastic Flow Mechanisms of the Ferrite and Cementite Phases H. Taniyama, H. Eda, L.B. Zhou, J. Shimizu and J. Sato	15
A Study of the Fabrication of Multi-Layer Microstructures Using ELID Grinding and the Thick Photoresist Lithography Technology J.W. Kim, Y. Yamagata, S. MORITA, S. Moriyasu, H. Ohmori and T. Higuchi	19
An ELID Grinding System with a Minimum Quantity of Liquid Y. Pan, T. Sasaki, N. Ito, H. Ohmori, Y. Yamagata, Y. Uehara and W.M. Lin	23
Micro-Hole Machining Using Ultrasonic Vibration H.J. Choi, S.W. Lee and B.G. Lee	29
A Study of Micro-Tool Machining Using Electrolytic In-Process Dressing and an Evaluation of its Characteristics S.W. Lee, H.J. Choi, H.W. Lee, J.Y. Choi and H.D. Jeong	35
Development of a Novel Ductile-Machining System for Fabricating Axisymmetrical Aspherical Surfaces on Brittle Materials J.W. Yan, J. Tamaki, K. Syoji and T. Kuriyagawa	43
Ultraprecision Fabrication of Glass Ceramic Aspherical Mirrors by ELID-Grinding with a Nano-Level Positioning Hydrostatic Drive System T. Suzuki, H. Ohmori, Y. Dai, W.M. Lin, K. Katahira, A. Makinouchi, H. Tashiro, H. Yokota, M. Suzuki, T. Abe and T. Shimasaki	49
Deterministic Manufacturing Processes for Precision Optical Surfaces H. Pollicove and D. Golini	53
High-Precision Low-Damage Grinding of Polycrystalline SiC L. Yin, E.Y.J. Vancoille, L.C. Lee, Y.C. Liu, H. Huang and K. Ramesh	59
Force Characteristics and Deformation Behaviors of Sintered SiC during an ELID Grinding Process H. Ohmori, Y. Dai, W.M. Lin, T. Suzuki, K. Katahira, N. Itoh, A. Makinouchi and H. Tashiro	65
High Efficiency ELID Grinding of Alumina Ceramics F.H. Zhang, G.W. Kang, Z.J. Qiu, Y.S. Yang and X.K. Shi	71
Development of Grinding Technology for the Film of Diamond Coated Cutting Tool Y. Murakami, M. Sakurai, S. Yui, H. Matuhashi, H. Liu and R. Kawai	77
Grinding Characteristics of Solid Immersion Mirrors with the ELID Grinding Method Y. Uehara, H. Ohmori, Y. Yamagata, S. Moriyasu, T. Suzuki, K. Ueyanagi, Y. Adachi, T. Suzuki and K. Wakabayashi	83
A Basic Study of the Behavior of Slurry Action at Multi-Wire Saw K.I. Ishikawa, H. Suwabe, S. Itoh and M. Uneda	89
A Fundamental Study of Dry Blasting: Effects of Abrasive Grains on Surface Roughness K. Kitajima, T. Yamamoto and M. Izawa	93
Processes for the Generation of Glossiness on Ground Granites and Ceramics X.P. Xu, H. Huang, Y. Gao and H.J. Xu	99
Force and Energy Characteristics in Grinding of Ceramics J.Y. Shen, Y. Li, X.P. Xu and Y. Gao	105
A Study of the Process of Granite Belt Grinding C.Y. Wang, Z. Qin, X. Wei and Y.X. Wu	111
The Effects of the Jet Impact Angle on the Cutting Performance in AWJ Machining of Alumina Ceramics J. Wang	117
Nano-Topography Characterization of Axisymmetrical Aspherical Ground Surfaces T. Kuriyagawa, N. Yoshihara, M. Saeki and K. Syoji	125

Three-Dimensional Shape Modeling of Diamond Abrasive Grains Measured by a Scanning Laser Microscope	
T.A. Mahmoud, J. Tamaki and J.W. Yan	131
Improvement of Machined Surface Quality in Ultra-Precision Plane Honing	
T. Kuriyagawa, K. Nishihara, S. Suzuki, Y.B. Guo and K. Syoji	137
Improvement in the Ground Surface Roughness of Fused Silica X-Ray Mirror with ELID-Grinding	
W.M. Lin, H. Ohmori, Y. Yamagata and S. Moriyasu	143
A New Longitudinal Mode Ultrasonic Transducer with an Eccentric Horn for Micro Machining	
A. Sharma, S. Mishiro, K. Suzuki, T. Imai, T. Uematsu and M. Iwai	147
Development of an On-Machine Observation and Profile Measurement System with an AFM and its Properties	
Y. Watanabe, S. Moriyasu, K. Katahira, W.M. Lin, H. Ohmori, A. Makinouchi and H. Tashiro	153
Experimental Investigation of the Characteristics of a Laser Beam Passing through the Coolant Fluid of Various Concentrations for Surface Profile Measurement	
Y. Gao, Z. Tao and S. Tse	157
Computational Investigation of Coolant Flow Patterns Using CFX	
Y. Gao, S. Tse, W. Li, S. Chan and Z. Tao	163
B-Spline Based Wavefront Reconstruction for Lateral Shearing Interferometric Measurement of Engineering Surfaces	
X. Liu and Y. Gao	169
Evaluation of Surfaces of Single SiC Crystal Polished with Various Kinds of Particles	
J. Watanabe, M. Fujimoto, Y. Matsumoto, N. Kuroda and O. Eryu	175
Grinding Performance Improvement by a Special Coolant Superimposed with Megasonic Vibration	
K. Suzuki, H.B. Qun, S. Mishiro, K. Tanaka, T. Imai, A. Sharma, T. Uematsu and M. Iwai	183
Effects of Megasonic Coolant on Cylindrical Grinding Performance	
H. Sakamoto, S. Shimizu, K. Suzuki, T. Uematsu and A. Shimotokube	189
Effects of the Supplied Cold-Air Condition on Grinding Temperature in Cold-Air Jet Grinding	
S. Ohmori, M. Tateno and K. Kokubo	195
An Improved Technique to Determine Coolant Flow Patterns for In-Process Measurement	
S. Tse, Y. Gao, Y. Kuen and Z. Tao	199
Behavior of the Coolant in Grinding with a Floating Nozzle	
S. Ninomiya, S. Tooe, K. Suzuki and T. Uematsu	205
Application of an Oscillating Spindle to Machining Processes	
H.S. Lee, S. Sasaki, T. Yamada, K. Mizukawa and Y. Ono	213
Ultra Precision Polishing with Oscillation Speed Control: an Analysis of the Pressure Distribution and Profile	
K. Yoshitomi, A. Une and M. Mochida	219
Physical and Chemical Characteristics of the Ceramic Conditioner in Chemical Mechanical Planarization	
J.Y. Park, D.H. Eom, S.H. Lee, B. Myung, S.I. Lee and J.G. Park	223
Kinematic Analysis of Chemical Mechanical Polishing and its Effect on Polishing Results	
H.J. Kim, H.Y. Kim, H.D. Jeong, S.H. Lee and D. Dornfeld	229
Material Removal Mechanism in Dynamic Friction Polishing of Diamond	
K. Suzuki, M. Iwai, T. Uematsu and N. Yasunaga	235
An Analysis of the Pad Deformation for Improved Planarization	
T. Horng	241
A Study of Nano-Polishing of Injection Molds Using a Fixed Abrasive Pad	
J.Y. Choi, H.Y. Kim, J.H. Park, H.D. Jeong and H. Seo	247
Development of New Mica Abrasives Suitable for High Performance Mechanochemical Polishing of Si Wafers	
N. Yasunaga and S. Okada	253
Development of a Polishing Disc Containing Granulated Fine Abrasives	
H. Nakamura, J.W. Yan, K. Syoji and Y. Wakamatsu	257
Autonomous Tool Path Generation in Robotic Polishing of an Aluminum Alloy	
A.A. Akbari and S. Higuchi	263

Development of an Ultra-High Speed Cutting Wheel S. Yamazaki, K. Syoji, T. Kuriyagawa, Y. Ogura, T. Fukunishi and M. Miyake	271
Development of Grinding Wheels by Stereolithography and Investigation of their Characteristics T. Tanaka and K. Okushima	277
The Effects of Hard Lubricant Coatings on the Performance of Electro-Plated Superabrasive Grinding Wheels S.C. Salmon	283
Effectiveness of Laser Cleaning for Grinding Wheel Loading X. Chen and Z.M. Feng	289
The Effect of Porosity on the Grinding Performance of Vitrified CBN Wheels R. Cai, W.B. Rowe and M.N. Morgan	295
Measurement of Vitrified CBN Grinding Wheel Topography R. Cai, W.B. Rowe, M.N. Morgan and B. Mills	301
Friction and Wear Properties of an ELID-Grinding Wheel based on CCD Microscope Observation T. Kato, H. Ohmori, K. Katahira, N. Itoh, N. Mitsuishi and A. Nemoto	307
ELID Grinding with a Tape Type Electrode N. Itoh, H. Ohmori, N. Mitsuishi, W.M. Lin and A. Nemoto	315
A Study of the Machining Accuracy of the Round-Off Truing Method: Effects of the Set-Up Angle for the Brake Truer S. Okuyama, K. Yamashita, T. Kitajima, A. Yui and S. Hanasaki	321
Electrocontact Discharge Dressing of a Resin-Bonded CBN Grinding Wheel and its Grinding Performance J. Tamaki, A. Kubo, J.W. Yan and K. Narita	327
Process Characterisation of Grinding AISI 52100 with Vitrified CBN S. Ebbrell, W.B. Rowe and M.N. Morgan	333
Finishing of Tiny Nozzles by a Gyration Flow Finishing Method H. Sugimori, T. Kurobe and Y. Yamada	341
High Speed Slurry Flow Finishing of the Inner Wall of a Stainless Steel Pipe T. Kurobe, Y. Yamada and H. Sugimori	345
Development of an Ultrasonic Torsional Vibration Tool Utilizing the 3rd Order Wave Mode S. Mishiro, H.B. Qun, T. Imai, A. Sharma, K. Suzuki, T. Uematsu and M. Iwai	349
A New Centerless Grinding Technique without Employing a Regulating Wheel Y.B. Wu, Y.F. Fan, M. Kato, J. Wang, K. Syoji and T. Kuriyagawa	355
Deformation Patterns of a Micropositioning Table under a Moving Force Y. Gao, S. Tse, S. Ko and W. Chan	363
A Study of the Form Error Compensation for Aspherical Lens Machining P.L. Tso and H.C. Chuang	369
A Self-Tuning Based Fuzzy-PID Approach for Grinding Process Control Z. Yang, Y. Gao, D. Zhang and T. Huang	375
Development of a Micro Machining Technology for Fabrication of Micro Parts T.J. Je, J.C. Lee, D.S. Choi, E.S. Lee and B.S. Shin	383
Development of a Desktop Micro Injection Molding Machine M. Asami, K. Yoshikawa, Y. Ohi, H. Ohmori, Y. Yamagata, Y. Uehara, W.M. Lin, T. Sasaki and Y. Pan	389
Diamond Turning of Single Crystal Germanium with an Oscillating Rotary Tool O. Horiuchi, R. Itabashi, Y. Mitoma, H. Shibutani and H. Suzuki	395
Rapid Manufacturing of 3D Shaped Products by Multi-Face High-Speed Machining B.S. Shin, D.Y. Yang, D.S. Choi, E.S. Lee, T.J. Je and K.H. Whang	399
Selective Removal of Carious Dentine with the Micro Abrasive Jet Technology T. Kuriyagawa, O. Kinbara, S. Horiguchi, J. Tagami, K. Syoji and T. Yamada	405