

Table of Contents

Sponsors, Committees and Preface

Development in Laser Polishing of Polycrystalline Diamond Tools Q. Wu and J. Wang	1
Recent Development of the Aero-Engine Impeller and Blade Surface Polishing Technology H. Gao, Z. Zhao and Y.W. Sun	7
An Experimental Study on the Kerf Characteristics of Silicon Cut with Micro Abrasive Air Jet Q.L. Li, C.Z. Huang, J. Wang, H.T. Zhu and Z.W. Liu	13
Ultra Smooth Planarization Polishing Technique Based on the Cluster Magnetorheological Effect Q.S. Yan, J.W. Yan, J.B. Lu and W.Q. Gao	18
Effect of Abrasive on the Machining Performance the EMR-Effect-Based Tiny-Grinding Wheel J.B. Lu, Q.S. Yan, H. Tian and W.Q. Gao	24
Study on the Effect of Nonionic Surfactant in Copper CMP Slurry F.W. Huo, Z.J. Jin and R. Zhang	30
Convex-Shape Tool in Nano-Fabrication of Digital-Paper Display P.S. Pa	36
Geometric Modeling for Five-Axis CNC Machining of Mold Surface with Flat-End Tool W.Q. Gao, B. Xie, Z.Y. Huang and C.T. Qing	41
Research on the Constraint Mechanism of Abrasive Particle of MR Effect-Based Tiny-Grinding Wheel J.F. Chai, Q.S. Yan, L.Y. Kong and M. Li	46
Study on the Influence of Geometrical Parameters of Abrasive Grains in Abrasive Flow Machining Z.M. Xu and Y.W. Luo	52
Polishing of Small Workpiece with Complicated Surfaces by Electro-Magnetic Grinding Method K.Q. Yu, T.H. Jin, X.X. Dong and Y. Chen	58
A Study on the Surface Microstructural Integrity of Ceramics Milled with Abrasive Waterjet Y.X. Feng, C.Z. Huang and J. Wang	64
Effect of Material Properties on Aspheric Surfaces Polishing by Compliant Hybrid Position/Force Controlling J.M. Zhan and S.H. Yu	69
Temperature Distribution of IFA Polishing Single Silicon Wafer Y.L. Sun, D.W. Zuo, W.Z. Lu, Y.W. Zhu and J. Li	73
Analysis of Ultrasonic Honing Chatter Vibration Trajectory J.Q. Wang, X.J. Zhu, Q. Cheng and Y. Wang	79
The Contact Pressure Distribution and its Effects on the Magnetic Disc Substrate Surface Profiles in Chemical Mechanical Polishing Y.S. Lu, Q.L. Shu and J. Wang	84
Study on Friction Force Distribution on Silicon Wafer Surface in CMP Process J.X. Su, Y.X. Zhang, J.X. Du and R.K. Kang	90
Statistical Analysis of Cutting Forces in Turning Inconel 718 with Coated Carbide Tools X.L. Zhu, S. Zhang, T.C. Ding and Y.W. Wang	96
The Research of the Logarithmic Spiral Axis and NC Machining N. Luo, Y.Y. Zheng, G.T. Han and K. Jiang	102
Mechanism Research on Cylinder Liner Groove of the Ultrasonic Plateau-Honing Q. Cheng, X.J. Zhu, J.Q. Wang and Z.M. Lu	107
Improving the Precision of Gear Honing with External Honing Ring Using Diamond Dressing Gear T. Yu, Y.X. Qian, K. Dong and S.Y. Wang	111

Post Processing Algorithm of Ultrasonic-Magnetorheological Combined Finishing for Aspheric Surfaces	
F.H. Zhang, X.B. Yu and Y. Zhang	116
Investigation into the Process of Selective Laser Melting Rapid Prototyping Manufacturing for Space-Curve-Meshing-Wheel	
Y.Z. Chen, L.H. Sun, D. Wang, Y.Q. Yang and J. Ding	122
The Relationship between the Distribution Characteristics of Cutting Speed at the Contact-Point and the Surface Quality of Gear Teeth	
G.X. Liang, M. Lv and X.X. Gao	128
Fabrication of Micro Aspheric Mould Integrated Ultra-Precision Grinding and Magnetorheological Finishing	
S.H. Yin, H.N. Tang, J.W. Yu, K. Tang, F.J. Chen, Z.Q. Xu and J.B. He	134
Study on Contact Friction between Polishing Disk and Workpiece during Face Polishing with ANSYS	
X.C. Xu, Y.G. He, X.K. Xin and B. Lin	139
Study on the Friction Behavior of HFCVD Diamond Films on Silicon Nitride Substrates	
B. Shen, F.H. Sun and G.D. Yang	143
Experimental Study of Two-Phase Compulsive Circulation Flows Finishing	
W.H. Li, S.Q. Yang and X.H. Li	149
Effect of Grinding Process Parameters on Surface Layer Residual Stress	
Y.Q. Xu, T. Zhang and Y.M. Bai	154
Improving the Sediment Stability of Fluid Magnetic Abrasives Based on Nanometer SiO₂	
H.W. Sun and W.Y. Chen	159
Researches on Burr Formation in Milling Al-Alloy	
M. Chen, B. Rong and G. Liu	164
Research on Thermal Error Modeling of CNC Machine Tool	
Q.J. Guo and J.G. Yang	170
The Analysis of Fracture Formation on Exit Edge in Precision Machining	
G.C. Wang, Q.X. Shen and Y.M. Zhu	174
Study on the Optimized Blanking Allowance of Fine-Blanking with Negative Clearance for AISI-1020 and AISI-1045	
J.H. Li, W.F. Fan and Z.M. Zhang	179
Application of Laser Shock Processing to Improving the Fatigue Performance of Compressor Blade	
Q.P. Li, Y.H. Li, W.F. He, W. Li and Y.Q. Li	184
Process Parameters Optimization for Micro-Arc Oxidation of Hot-Dip Aluminum Coating on Stainless Steel	
Z.W. Niu, Z.Y. Li, F.F. Wang, J.Y. Zhang and A.H. Wang	190
Progress in Theory and Application Research on Microscale Laser Shock Peening	
D.H. Wei, J.Z. Zhou, S. Huang, Y.J. Fan and M. Wang	194
Numerical Simulation of Temperature Field for Rack Grind-Hardening	
R.B. Zhang, P.Q. Ge, L. Zhang, B. Li and C. Zhao	200
Study on Laser-Clad Al/Cr₃C₂ Compound Powders on the Titanium Alloy Substrate	
G.J. Liu, X. Wang, A.J. Li and F.Y. Hu	205
The Effects of Laser Shock Peening on Fatigue Life in Ni-Based Superalloy	
W.F. He, Y.H. Li, Q.P. Li, H.L. Liu, Y.Q. Li and R.J. Liu	209
Study on the Process of Pure Shearing and Fracture for AISI-1020 and AISI-1045 Blanking with Negative Clearance	
W.F. Fan, J.H. Li and Z.M. Zhang	215
Experimental and FEM Study on Surface Quality in High Grade Petroleum Pipe Turning	
X.H. Zheng, Q.L. An, M. Chen, G. Liu and Y.S. Zhang	220
An Investigation on PRMMC Polishing with Electrochemical Mechanical Machining Process	
G.Y. Liu, Z.N. Guo, Y.B. Li and Z.G. Huang	226
Surface Roughness and Cutting Force of Inconel 718 Machined by Different Cutting Tools	
G.S. Geng, J.H. Xu, S.N. Galyshev and B. Y	232
Simulation and Experiment on the Residual Stress in Super-High Speed Grinding	
Y.M. Liu, Y.D. Gong, W. Ding and T.C. Han	238

Investigation of Surface Roughness during Turning Process Based on Response Surface Methodology	
S. Han, Q.L. An, M. Chen, G. Liu and Y.S. Zhang	243
Optimization of Magneto Rheological Damper Based on the First Order Optimization	
P. Ma, Y.B. Tang and Z. Gong	249
Study on Super-Precision Grinding Processing to the Spindle with CBN Slipstone	
J.H. Cui, J.R. Shi and J.F. Chen	255
Experimental Study on Ultrasonic Vibration Dressing Wheel	
D.H. Xiang, X.T. Zhi, G.X. Yue, B. Zhao and Q.T. Fan	260
Experimental Study on Turning of Alloy Cast Iron with Coated and Uncoated Tools	
Q.C. Wang, Q.L. An, M. Chen, G. Liu and Y.S. Zhang	265
Interface Temperature Measurement and Experimental Studies of Super-High Speed Polishing of CVD Diamond Films	
S.T. Huang, L. Zhou and L.F. Xu	271
Study of Surface of Edge Grinding of Ceramic Tile by Diamond Cup Wheels	
Y.P. Cheng, C.Y. Wang, Y.N. Hu and W.Z. Si	277
Surface Generation and Chip Formation when Ultra-Precision Turning of SiC_p/Al Composites	
Y.F. Ge, J.H. Xu and Y.C. Fu	282
Design and Implementation of the Cutting Dynamometer System Based on Virtual Instrument Technology	
Z.D. Zheng, Z.Q. Zhang and S.B. Chen	288
Process Parameter Optimization and Experimental Study of Micro-Holes in Electrochemical Micromachining Using Pulse Current	
Z.Y. Li and Z.W. Niu	293
An Approximate Solution of Energy Partition in Grind-Hardening Process	
L. Zhang, W.B. Bi and R.B. Zhang	298
Experimental Study on the Characteristics of Surface Roughness in Ultrasonic Aided High-Speed Lapping of Engineering Ceramics	
F. Jiao, B. Zhao and X. Liu	303
Study on Axial Turning of Engineering Ceramics	
X.L. Tian, F. Guo, J.F. Yang, B.G. Zhang and Y.T. Mao	309
Quantitative Evaluation of the Uniformity of Abrasive Distribution Based on Image Processing	
B.S. Pan, B. Wan and X.H. Fang	314
Simulation and Design of Experimental Equipment for Two-Phase Compulsive Circulation Flows Finishing	
S.Q. Yang, W.H. Li and S.C. Yang	319
A Deterministic Method to Predict Geometrical Interference between Grinding Wheel and Workpiece for Ultra-Precision Aspherical Grinding	
S.H. Yin, Z.B. Wang, Y. Wang, F.J. Chen and J.W. Yu	325
Experimental Study on Deburring, Form Error and Surface Roughness in Orbital Drilling of Hardened Steel	
S.F. Chen, J. Xie and Y.W. Zhuo	331
Mechanical Properties and Experimental Study of a Composite Polishing Plate during Super-High Polishing	
L. Zhou, S.T. Huang and L.F. Xu	337
Study on Surface/Subsurface Crack Mechanism in Ultrasonic Vibration Added Grinding of Ceramics	
B. Zhao and L.Z. Kong	343
Optimal Design of Rotary Ultrasonic Vibrator and Research on its Machining Experiments	
Y.J. Tang, C.M. Chen, Y.J. Zhang and G.Y. Liu	349
Optimization of Segmented Grinding Wheel Matrix Based on Super High-Speed Grinding	
J.Q. Zhang, Z.R. Pang, P. Guan, W.S. Wang and H.Z. Pi	355
The Measurement of the Velocity Outside the High Pressure Water Jet and Abrasive Water Jet Nozzle Based on the Energy Transfer Method	
R.G. Hou, C.Z. Huang, H.T. Zhu and Z.W. Niu	361

Influences of Properties of Fixed Abrasive Tool on the Lapping Process of Stainless Steel Substrate	365
C.R. Zhu, B.H. Lv and J.L. Yuan	
Modeling the Material Removal Rate in Micro Abrasive Water Jet Machining of Glasses	370
J.M. Fan, C.M. Fan and J. Wang	
Modeling of Thickness of the Oxide Film in ELID Grinding	376
H.L. Zhang, J.C. Kuai and F.H. Zhang	
Preparation of Magnetic Abrasive by Sintering Method	382
Z.D. Zhao, Y.H. Huang and Y.G. Zhao	
Development of High Performance Monolayer Brazed Diamond Grinding Tool for Ceramics	388
B. Zhang, H.J. Xu, Y.C. Fu and H.H. Su	
Modification of Resin and its Application to Resin-Bonded Diamond Wire Saw Manufacture	393
W.B. Bi, P.Q. Ge, S.Q. Song, Y.F. Gao, Z.S. Wang and L. Zhang	
Fillers and Dissolvent in Porous Self-Generating Fine Super-Hard Abrasive Tool	398
H.W. Fan, B.H. Lv, J.L. Yuan, Q.F. Deng and W.F. Yao	
Study on Heavy CNC Belt Grinding Technology of High Precision Controllable Pitch Propeller	404
Z. Huang, L. Zhang, Y. Huang and J.Q. Wu	
Discussion on Laser Cleaning of Optical Surface Machined by Magnetorheological Finishing	409
G.W. Kang	
Research of Electrochemical Polishing Mixed with Powder and Related Experiments	413
Y.J. Zhang, Y.J. Tang and F. Li	
Process Parameter Optimization and Experiment Study of Aero-Engine Blade in Electrochemical Machining	418
Z.Y. Li and Z.W. Niu	
Study on Effect of Gases as Coolant and Lubricant on Machined Surface	424
Y. Zhang, L. Han, T.L. Sun, Q. Liang and X.C. Zhang	
Mathematical Model of Hydrodynamic Fluid Pressure on Smooth and Real Surface	429
C.H. Li, L.L. Wang and G.Y. Liu	
Coupled Thermal-Structural Finite Element Simulation of Ti-6Al-4V Alloy during Electrical Discharge Machining	435
Y. Wang and F. Gao	
Research on Minimum Mechanism of Roughness of ELID Grinding	441
J.C. Kuai, H.L. Zhang, F.H. Zhang and Y. Zhang	
Study on Electrolysis Performance of Bamboo Charcoal Bonded Grinding Wheel	447
W. Li, J. Wu and B.G. Geng	
Study on Properties of Grinding Fluid Jet and Nozzle Position for Super-High Speed Point Grinding	452
S.C. Xiu, J.M. Luo and Z.L. Sun	
Experimental Study on Micro-Nano Scratching of Mono-Crystalline Silicon Wafer	458
X. Wei, Z. Chen, X.Z. Xie and Q.L. Ren	
CFD Analysis and Experimental Investigation of Jet Orientation in MQL Machining	462
H.J. Pei, C.G. Shen, W.J. Zheng and G.C. Wang	