Table of Contents

Sponsors and Committees Preface	11 i
Surface Finishing Technologies and Applications	
Compound Finish Processes Using Burnishing and Ultrasonic Electrochemical Finishing on Hole-Wall Surface	I
P.S. Pa Simulation of Flows Field Characteristics in the Nozzle of Two-Phase Compulsive Circulation Flows Finishing S.Q. Yang, W.H. Li and S.C. Yang	9
Process Characteristics Research on Horizontal Spindle Barrel Finishing W.H. Li, S.C. Yang, S.Q. Yang and H.L. Chen	15
Modeling and Experiment of Anodic Smoothening in Electrochemical Finishing Based on Lateral Direction Dissolution G.B. Pang, X. Adayi, N. Ma, W.J. Xu and J.J. Zhou	21
Experimental Investigation on Electrochemical Finishing Machining of Stainless Steel in Passive Electrolyte Solution H. Ji and Z.Y. Li	27
Compliant Control at Micro-Displacement in Hydrodynamic Suspension Ultra-Smooth Machining J.M. Zhan, Z.Q. Cao, M.M. Wu and J.B. Zhang	33
Theoretical Analysis and Experimental Verification of Validity Finished by Abrasive Jet with Grinding Wheel as Restraint C.H. Li, S.C. Xiu, Y.C. Ding and G.Q. Cai	39
Computer Simulation on Centrifugal Barrel Surface Finishing Based on Discrete Element Method	
C.H. Song, S.C. Yang, J.M. Wang and Y.Q. Zhang Mechanism Research on the Swirling Air Flow Compounded with Magnetic-Field Finishing X.H. Li and S.C. Yang	45 51
Material Removal Mechanism in Vibration-Assisted Magnetic Abrasive Finishing S.H. Yin, Y. Wang, T. Shinmura, Y.J. Zhu and F.J. Chen	57
Internal Magnetic Abrasive Particles Surface Finishing Based on Permanent Magnetic Field H.L. Chen, S.C. Yang, J.M. Wang, W.H. Li and G.Y. Xiong	65
II. Deburring Theories and Technologies	
Finite Element Modeling of Burr Formation in Orthogonal Metal Cutting W.J. Deng, C. Li, W. Xia and X.Z. Wei	71
Formation and Simulation of Two-Side Burr in Orthogonal Cutting H.J. Qu, G.C. Wang, Y.M. Zhu and Q.X. Shen	77
Study on Burr Formation in Face Milling of Stainless Steel with Chamfered Cutting Tool L.L. Jing, Q.L. An and M. Chen	83
The Effect of Shear Strain on Transformation between Burr and Negative Burr Y.M. Zhu, G.C. Wang, Q.X. Shen, H.J. Qu and H.J. Pei	89
Numerical Study of the Effect of Tool Wear on Burr Formation in Blanking Process J. Zhang Transformation of Cutting Burr/Fracture in High-Speed Machining Al Alloy	95
Q.X. Shen, G.C. Wang, Y.M. Zhu and H.J. Qu	101

III. Lapping and Polishing Technologies and Applications

Polishing of Free-Standing CVD Diamond Films by the Combination of EDM and CMP Z.W. Yuan, Z.J. Jin, B.X. Dong and R.K. Kang	111
Analyzing on Nonuniformity of Material Removal in Silicon Wafer CMP Based on Abrasive Movement Trajectories	
J.X. Su, X.Q. Chen, J.X. Du, D.M. Guo and R.K. Kang	119
Friction-Based <i>In Situ</i> Endpoint Detection of Copper CMP Process C. Xu, D.M. Guo, R.K. Kang, Z.J. Jin and F.W. Huo	125
Research on Mechanism of Chemical Mechanical Polishing Process for Silicon Nitride Balls with CeO ₂ Abrasive	
C.R. Zhu, B.H. Lv and J.L. Yuan	131
Polishing Processing to Internal Surface of Non-Magnetic Pipe by Magnetic Abrasive Finishing Y. Chen, X. Wang and C.J. Zhang	137
Surface Lapping by Semi-Bonded Abrasive Grinding Plate for Copper Substrates of Amorphous Ni-Pd-P Alloy Films	1.41
J.L. Yuan, L. Tao, Z.W. Wang, Q.F. Deng, F. Chen and P. Zhao Study on the Evaluation Method of Lapping Uniformity for Ceramic Balls	141
Z.Z. Zhou, J.L. Yuan, B.H. Lv and J.J. Zheng	147
Development of a New Plate Polishing Technique with an Instantaneous Tiny-Grinding Wheel Cluster Based on Magnetorheological Effect Q.S. Yan, A.J. Tang, J.B. Lu and W.Q. Gao	155
Experimental Validation of the 'Trap' Effect of the Semibonded Abrasive Grinding Plate J.L. Yuan, D.Q. Yu, Z.W. Wang, Y. Yang, M. Qian and B.H. Lv	161
Effect of Ice Counterparts on the Friction Behavior of Single Crystal Silicon Wafer Y.L. Sun, D.W. Zuo, Y.W. Zhu, M. Wang, H.Y. Wang and L.G. Zhao	167
Machining Characteristics of Semibonded Abrasive Grinding Plate J.L. Yuan, Y. Yang, Z.W. Wang, D.Q. Yu, M. Qian and Y. Dai	173
The Analysis for Materials Removal Mechanism of Ultrasonic Auxiliary Gear Honing L. Ma, M. Lv, G.X. Liang and S.Y. Wang	179
Test Research on the Optimizing Technological Parameters of the Ultrasonic Vibration Honing	
X.J. Zhu, Y.X. Gao, Q. Chen, J.Q. Wang and Z.M. Lu	185
Research on System Design of Ultrasonic-Assisted Honing of Gears S.Y. Wang, M. Lv and G. Ya	191
Study on the Database about Floating Polishing Technological Parameters X.C. Xu, W.B. Zheng, B. Jiang and S.C. Yang	197
IV. Grinding Technologies	
Influence of Grinding to the Surface and Subsurface Quality of KDP Crystal D.J. Wu, B. Wang, H. Gao, R.K. Kang and X.S. Cao	203
Study on Effect of Grinding Fluid Supply Parameters on Surface Integrity in Quick-Point	
Grinding for Green Manufacturing S.C. Xiu, Y.D. Gong and G.Q. Cai	209
Passivation Model of Diamond Wheel for Grinding Si ₃ N ₄ Ceramics X.L. Tian, Z.Y. Wu, Z.F. Yang and A.Y. She	215
The Finite Element Analysis of Surface Temperature on Dry Belt Grinding for Titanium Alloys W.G. Huo, J.H. Xu and Y.C. Fu	219
W.G. Fluo, J.H. Au and T.C. Fu Modeling and Computer Simulation of Grinding for Ball-End Milling Cutter with Equal Normal Rake Angle	219
F.J. Chen, S.H. Yin and S.J. Hu	225
Grinding at Very Low Speed B.F. Feng, L. Zheng, P. Wang, Q.F. Gai, D. Li and G.Q. Cai	231
Experiment Study on Vitrified Bonded Wheels of Quick-Point Grinding Z.R. Pang, T.B. Yu, C. Su, J.R. Wang and W.S. Wang	237

Research on Surface Roughness and Micro-Topography of Nano-ZrO ₂ Plate in Two-Dimension Ultrasonic Grinding B. Zhao, M.L. Zhao and G.F. Gao	243
Experimental Research on the Cooling Effects of a New High Efficiency Green Cooling Method	
Q.L. An, Y.C. Fu and J.H. Xu	249
Study on Fiber Laser Assisted Truing and Dressing of Diamond Wheel In-Process Y. Wang and S.M. Wang	255
V. Measurement, Evaluation and Control of Surface Integrity	
Measurement and Evaluation of the Geometric Error of Precision Machined Spherical Surface	
G.Y. He, H.J. Zheng, Y. Tian and J. Liu Novel Measurement Technique on 3D Surface Topography of Polishing Pad	261
D.M. Guo, N. Qin, R.K. Kang and Z.J. Jin Surface Topography Characteristics in Ultrasonic Aided High Speed Lapping of	265
Engineering Ceramics F. Jiao, B. Zhao, T.P. Li and Y. Zhao	273
Study on the Effect of Grinding Parameters to the White Layer Formation in Grinding SKD-11 Hardened Steel	
W.W. Ming, Q.L. An and M. Chen	279
The Properties and the Influence Factors of the White Layer in the Surface Grinding C. Mao, Z.X. Zhou, D.W. Zhou and D.Y. Gu	285
The Characteristics of Surface Residual Stresses by Plane Grinding Invar and the Effects of Them on Structural Stability Y.P. Qiao, R.K. Kang, Z.J. Jin and D.M. Guo	293
Simulation System for Quality Prediction and Parameters Optimization when Machining	293
Ceramics Die Material Z.W. Niu, Z.Y. Li, F.F. Wang and D.Z. Sun	299
Surface Integrity and Fatigue Property of a High Speed Milled Titanium Alloy G.S. Geng and J.H. Xu	305
Surface Integrity Induced by Abrasive Machining Sapphire Wafer D.H. Wen, Y.H. Wan and T. Hong	311
VI. Enhancement of Component Surface Properties	
Study on Variable Spot Cladding for Large Area Laser Surface Modification M. Wang, S.H. Shi, D.W. Zuo and M. Wang	319
Cone-Shaped Hard Carbon Films Grown by Inductively Coupled RF Plasma with RF or DC Bias Voltage	
G.F. Zhang, N. Ren, Y. Ren, X.D. Hou and V. Buck	325
Influence of Surface Morphology of Diamond Films on their Frictional Behaviors in Dry and Water Environments B. Shen and F.H. Sun	331
Laser Power Characterization Method for Fabrication of Centrosymmetric CR-DOEs	
Mask D.S. Wang, C.T. Luo, T. Chen, Y.Q. Xiong, H.K. Liu and Z.Y. Ye	337
Characteristic of Si-Doped DLC Films on TC4 and Cr12 Substrates D.C. Zhao, G.J. Xiao, Z.J. Ma and S.H. Wu	343
A New Solar Selective Absorbing Structure of Al-Al ₂ O ₃ Cermet Composite Films by Pulsed Direct Current Magnetron Sputtering L.W. Zhu, Y.D. Feng, Y. Wang, Z.M. Wang, K. Zhao, X.M. Su and J.W. Qiu	349

VII. Other Novel Technologies

A Study of Cavitation Induced Surface Erosion in Abrasive Waterjet Cutting Systems J. Madadnia, D.K. Shanmugam, T. Nguyen and J. Wang	357
Study on Removal Mechanism of Nanoparticle Colloid Jet Machining X.Z. Song, Y. Zhang and F.H. Zhang	363
2D Simulation of the Gas-Solid Two Phase Flow inside the Abrasive Jet (AJ) Nozzle R.G. Hou, C.Z. Huang, Y.S. Feng and Y.Y. Liu	369
Temperature Dependence and Effect on Surface Roughness in Abrasive Flow Machining G.Z. Song, Y.Z. Li and G. Ya	375
Research on Small Dimension Precision Turning Technology for Internal Spherical Surface Y.D. Gong, J.Y. Yang, Y.C. Zhang and W.S. Wang	381
Dry WEDM in Improving LS-WEDMed Surface Quality T. Wang, Y.M. Lu, S.Q. Xie, S.S. Hao and H. Zhao	387
A Study on Abrasion-Assisted Electrodeposition of Bright Nickel X.L. Li, D. Zhu, Z.W. Zhu and S.D. Yu	393
Optimization of Cutting Force by Exponential Model in Milling Heat-Resistant Steel F91 Z.J. Wang, F.H. Sun and G.W. Zhao	397
Effects of Non-Electrical Parameters on Material Removal Rate of High-Speed Small Hole EDM Drilling	
M.R. Cao, Y.Q. Wang, S.C. Yang, S.Q. Yang and W.H. Li	403
Numerical Simulation of Liquid-Solid Two-Phase Flow Field in Discharge Gap of High- Speed Small Hole EDM Drilling	
Y.Q. Wang, M.R. Cao, S.Q. Yang and W.H. Li	409
FEM Analysis and Experimental Study on Residual Stress Induced by Form-Milling and Rolling of Rotor Steel 26NiCrMoV145	
J.L. Li, Q.L. An and M. Chen	415
Parameter Selection Rules for Error Separation by Multi-Probe Method	
L. Zhang, X.M. Yang, L. Ba and Y. Zhang	421