

Table of Contents

Sponsors

Preface

Progress of Research in Slicing Technology of Large-Scale Silicon Wafers L.G. Zhao, D.W. Zuo and Y.L. Sun	1
The Analysis on Movement of the Charged Particles in a Magnetic-Electrochemical Compound Polishing L.M. Shi, Y.Q. Chen and E.L. Liu	6
Study on Brittle-Ductile Transition Mechanism of Ultra-Precision Turning of Single Crystal Silicon M.H. Wang and Z.S. Lu	11
Initiation and Propagation Laws of Glass Cracks in Specimens under the Action of Cylindric Indenter Subjected to Normal Load Z.P. Wan, W.J. Deng and Y. Tang	17
Large Plastic Deformation and Ultra-Fine Grained Structures Generated by Machining W.J. Deng, W. Xia, Y. Li, Z.P. Wan and Y. Tang	21
Mechanism of Chip Deformation in Orthogonal Cutting the Wheel Steel K. Xue, X.M. Xu, G. Liu and M. Chen	26
The Influence of Tool Edge Radius on Size Effect in Orthogonal Micro-Cutting Process of 7050-T7451 Aluminum Alloy J. Zhou, J.F. Li, J. Sun and Z.P. Xu	31
Behaviors of Suspended Powder in Powder Mixed EDM Y.G. Wang, F.L. Zhao and Y. Liu	36
Study on Mechanism of Vibration Cutting F.Q. Tong, Y. Zhang, F.H. Zhang, J.Y. Lu, L.Z. Gu and Y.C. Chen	42
Study on the Polishing Mechanism of Low Temperature Co-Fired Ceramic for Microsystem Application J.J. Zhu, J.L. Yuan and S.S. Ang	47
Mechanism of Brittle-Ductile Transition of Single Silicon Wafer Using Nanoindentation Techniques Y.L. Sun, D.W. Zuo, D.S. Li, R.F. Chen and M. Wang	52
Theoretical Study on the Bending Deformation of Metal Plate Induced by Repetitive Laser Shot Peening J.Z. Zhou, S. Huang, X. Ji, J.J. Du, C.J. Yang and Y.K. Zhang	57
Experiment Study on Abrasive Waterjet Machining Mechanisms of Brittle Materials H.T. Zhu, C.Z. Huang, J. Wang, Q.L. Li and C.L. Che	62
Forming and Control of Feed-Direction Burr in Drilling G.C. Wang, S.T. Fan, Y.M. Zhu, H.J. Pei, H.J. Qu and Q.F. Li	67
Study on the Shaping Law of Precision Numerical Controlled Electrochemical Contour Evolution Machining M. Kang and J.W. Xu	72
The Key Techniques of Novel Miniaturized Ultrasonic Motor and its Application in Micro-EDM Y.J. Tang, Z.L. Wang, Z.N. Guo and Y.J. Zhang	77
A FEM and Experiment Study on High Speed Machining of Nickel-Based Superalloy GH4169 D.J. Zhang, C. Wang, G. Liu and M. Chen	82
Mechano-Chemical Modification of Nanodiamond with GW Y.W. Zhu, X.Y. Xu, B.C. Wang and J.L. Shen	87
Analysis of Interlayer between WC-Co and CVD Diamond Film W.Z. Lu, D.W. Zuo, M. Wang and F. Xu	92
Effect of Fabrication Parameters on Mechanical Properties of Al₂O₃ Ceramic Tool Materials B. Fang, C.Z. Huang, H.L. Liu and C.H. Xu	97

Cutting Performances, Mechanical Property and Microstructure of Ultra-Fine Grade Ti (C,N)-Based Cermets	
H.D. Yang, X.Q. Xia, W.L. Chen, N. Liu and C.G. Zhang	102
Analysis of the Axial Tensile Properties of Multidirectional Filament Wound Tubes	
X. Xie, Y.M. Jiang, G.X. Qiu, P. Wang and A.F. Xu	107
Dispersive Characteristics of Multi-Phase and Multi-Scale Nanocomposite Ceramic Powders	
H. Wang, C.Z. Huang, H.L. Liu, J.W. Yu and S.R. Xiao	113
Research on the Stress Intensity Factor of the Crack Parallel to and Lying on the Interface of Cermet Cladding Parts	
J.R. Yang, Z.Q. Li, C.Z. Huang, Y.K. Zhang and K.K. Qian	118
Study of the Thermal and Intrinsic Stress of Large Area Diamond Film Prepared by HFCVD	
F. Xu, D.W. Zuo, W.Z. Lu, M. Wang and H.Y. Zhang	123
Development of Self-Toughening Silicon Nitride Matrix Nanocomposite Ceramic Tools and Cutting Performance	
C.Z. Huang, B. Zou and H.L. Liu	128
Research on the Advanced Ceramic Die Materials and Their Properties	
C.H. Xu, G.C. Xiao, R.B. Zhang and Y.M. Feng	133
Effect of Boron Concentration on Adhesion and Cutting Performance of Diamond-Coated Cemented Carbide Tools	
C.Z. Yao, F.H. Sun, Z.M. Zhang and M. Chen	138
Surface Properties of 3000°C High Melting Point Material by Powder Mixed EDM	
F.Q. Hu, H. Zhang, W.S. Zhao, Z.L. Wang, D. Hu and Y. Yu	143
Experimental Study of Mechanical Properties of Electroformed Nanocrystalline Ni-Mn Alloys	
J.M. Yang and D. Zhu	148
Micro-Forming Process and Microstructure of Deposit by Using Micro EDM Deposition in Air	
Z.L. Peng, Z.L. Wang and B.D. Jin	153
Study on the Cutting Technology Based on Green Manufacturing	
Z.G. Jiang, H. Zhang and X. Luo	158
Development and Application of Cermet Cutting Tools Material	
T. Fu, Q.X. Yu, B. Liu and Y.G. Wu	163
Development & Application of Polycrystal Cubic Boron Nitride Cutting Tool Material	
J.Y. Zhang, Q.X. Yu, S.Q. Pang, S.S. Meng, T.S. Wang and J.T. Hu	168
The Effect of Superheated Water Vapor as Coolant and Lubricant on Chip Formation of Difficult-to-Cut Materials in Green Cutting	
R.D. Han, Y. Zhang, Y. Wang, G.F. Cao and J. Liu	172
Study of Experiments on Cutting Difficult-to-Machine Materials with Ultrafine-Grained Waved-Edge Milling Insert	
Z.G. Wang, Z.J. Li, D.H. Zhu, R.M. Zhu and Y.N. Li	177
The Influence of Material Constitutive Constants on Numerical Simulation of Orthogonal Cutting of Titanium Alloy Ti6Al4V	
J.L. Chen, J.F. Li, J. Sun, Z.Q. Wang and Z.P. Xu	182
Effect of Chamfered PCBN Tool Edge Geometries on Hard Turning Process	
T. Chen, F.G. Yan, C.Y. Wu, H.M. Pen and X.L. Liu	187
Experimental Research on Orthogonal Cutting and Oblique Cutting of Hardened Steel GCr15	
Y. Wang, P. Wang, H.M. Pen, Y.F. Li and X.L. Liu	192
Experimental Investigation on Air Cooling of GCr15	
J.S. Hu, D.X. Liu, Y.Z. Liu, C.X. Yue and X.L. Liu	197
Research of Grinding Revolving Curved Surface with Arc Envelope Grinding Method	
L.Y. Kong, Q.S. Yan, X.G. Zhou and J. Dai	201
Study on Chip Breaking Behavior of 3-D Complex Groove Insert in Machining Carbon Constructional Steel at High Cutting Speeds	
H.P. Zhang, Z.J. Li, E.L. Liu and G.L. Wei	206
An Experimental Study on Diamond Cutting of Optical Glass	
H. Zhao and M. Zhou	211

Characterization of Diamond Spherical Shell Thick Film by DC Plasma CVD D.S. Li, D.W. Zuo, Y.L. Sun, R.F. Chen, W.Z. Lu, B.K. Xiang and M. Wang	216
Theoretical and Experimental Research on Tapping of GH4169 and TC4 with Modified-Tooth Taps Y.L. Tang, R.D. Han and J.B. Ju	221
Theoretical Research on Tooth Profile Modification with Electroplated CBN Hard Honing Wheels M.D. Zhang, M. Lv and S.Q. Yang	226
Experimental Investigation on Cutting Force and Tool Wear of Carbide Tools in Ti6Al4V Turning X.Q. Wang, X. Ai, J. Zhao and T.T. Li	231
Influence of Drill Geometry in Drilling Carbon Fiber Reinforced Plastics C.C. Tsao	236
Research on Heating Density Function of Milling Insert with 3D Complex Groove M.Y. Wu, Q.X. Meng, G.Y. Tan and Q. Liu	241
Experiment Study of Combining Micro EDM with USM B.X. Jia, D.S. Wang, Z.L. Wang and W.S. Zhao	248
Experimental Research on Microelectroforming with Ultrasonic Agitation P.M. Ming, D. Zhu, Y.Y. Hu and Y.B. Zeng	253
Research on the Force Characteristics in Ultrasonic Grinding Nano-Zirconia Ceramics G.F. Gao, B. Zhao, D.H. Xiang and Q.H. Kong	258
Material Removal Rate Characteristics in Ultrasonic Aided Lapping of Engineering Ceramics Based on Single-Point Scratch F. Jiao, B. Zhao, C.S. Liu and X.S. Zhu	263
Experimental Investigation on Ultrasonic Face Machining of Glass with Free Abrasives S.Y. Zheng and X.P. Xu	268
Optics Manufacturing Using Magnetorheological Finishing G.W. Kang and F.H. Zhang	274
Chemical Mechanical Polishing of Transparent Nd:YAG Ceramics J. Li, Y. Zhu and C.T. Chen	278
Research on Chemical Mechanical Polishing for Silicon Nitride Ceramics C.R. Zhu, J.L. Yuan, Q. Xu and B.H. Lv	283
The Molding Study of Polyimide Polishing Film X.C. Xu and Z.J. Yuan	288
Effects of Conditioning Parameters on Pad Performances X. Wei, H. Yuan, W. Xiong and X.Z. Xie	293
Fabrication of Cylindrical Tungsten Microelectrode by Electrical Machining B.G. Zhu, Z.L. Wang and B.X. Jia	298
Study on Technology of Block Electro-Discharge Grinding with Lower Working Voltage for Fabricating Micro Electrode Z.L. Wang, W.L. Zeng and Q. Gao	303
Design of Freeform Surface Finish Using Synchronous Processes of Electrochemical Finishing and Burnishing P.S. Pa	308
Electrical Discharge Machining (EDM) Phenomena of Insulating ZrO₂ Ceramics with Assisting Electrode Y.F. Guo, G.Q. Deng, J.C. Bai and Z.S. Lu	313
Research on Micro Electrochemical Milling X.H. Li, Z.L. Wang, J.F. Wang and X.R. Wang	318
Preparation and Performance of Ceramic Coatings Formed by Micro Arc Oxidation on Titanium Alloy Y.X. Yao, L.Q. Li and J.J. Xi	323
The Effects of Laser Texturing Parameters on Wear Properties of Rollers with Fractal Geometry H.B. Liu, D.P. Wan and D.J. Hu	328
Affected Characteristics Analysis of the Pulsed Laser Forming of Metal Sheet L.J. Yang and Y. Wang	333

Experimental Investigation on the Nickel-Based Metal Components Fabricated by Laser Cladding	
X. Ji, J.Z. Zhou, H.F. Guo and D.P. Xu	338
Theoretical and Experimental Study on Laser Compound Forming of Plate	
S. Huang, J.Z. Zhou, Y.B. Chen, Y.Q. Sun and J.J. Du	343
Nano-SiC Modified Plasma Sprayed Ceramic Coatings Prepared by Laser Sintering	
Z.J. Tian, L.D. Shen, Y.H. Huang and G.R. Hua	348
Study on Integrated Method of Medical Implant Manufacture Based on Rapid Prototyping Technology	
W.P. Wang, S. Sekou, Y.X. Liu, D.C. Li, B.H. Lu and J. Wang	353
Study on Inner Micro-Grooves of Heat Pipe Spinning Process and Multi-Tooth Mandrel	
Y. Li, Y. Tang, X.B. Li, W.J. Deng and Z.X. Zeng	358
Laser Surface Coating-Texturing of Cold Roll with Hard Dimples	
D.P. Wan, H.B. Liu, D.J. Hu and H.F. Wang	364
Dynamic Characteristics Analysis of Diamond Saw Blade with Multi-Hole Base and Different Segment Width	
Y.N. Hu, C.Y. Wang, S.S. Hu, B.D. Chen and C.X. Chen	369
Specific Energies in Sawing with Diamond Segments and Grinding of a Diamond Segment	
Y.Q. Yu, Y. Li and X.P. Xu	375
Fundamental Study on Diamond Spherical Shell Film for Polishing of Concave Spherical Surface	
D.S. Li, D.W. Zuo, R.F. Chen, Y.L. Sun, B.K. Xiang and W.Z. Lu	380
Technique Project and Theoretic Research on Surface Finishing to the Wheel Hub	
W.H. Li, S.Q. Yang and S.C. Yang	385
Experimental Research on Aluminum Alloy Blade's Surface Roughness of Integrate Rotor Based on Four-Axis High Speed Milling	
G.B. Bu, C. Zhao and D.W. Zuo	390
Research on Micro Characteristics of Surface and Subsurface Layer in Two-Dimensional Ultrasonic Grinding Nano-Composite Ceramics	
B. Zhao, G.F. Gao, Y. Wu and F. Jiao	395
Study on Surface Performance of Carbon-Aluminum-Carbon Electrode of Super-Capacitor in Dry WEDM	
Y.F. Guo, J.C. Bai, L.Q. Li and C.J. Li	401
Surface Roughness in High Feed Turning with Wiper Insert	
Z.Q. Liu, P. Zhang, P. Guo and X. Ai	406
Influence of Turning by Burnishing on Surface Integrity to Analyze Feasibility of Hybrid Process	
F.L. Li, W. Xia, Z.Y. Zhou and T. Zhang	411
Study on Dry WEDMed Surface Quality of Mould Steel	
T. Wang, X.F. Zhang and X.F. Zhao	416
Study on Influencing of Technological Parameter with Tools Wear during Turning Fluorophlogopite Glass-Ceramics	
L.J. Ma	421
Wear Characteristics of Micro-Diameter Cutter in High Speed Machining Micro Parts	
Q.S. Bai, C.L. Yang, Y.C. Liang, L.D. Tong and Y. Zhao	425
Influences of SiC Particle Size and Content on the Mechanical Properties and Wear Resistance of the Composites with Al Matrix	
Y.Y. Tao, X.L. Ge, X.J. Xu and Z. Jiang	430
Tool Wear in High-Speed Milling of Ti-6Al-4V Alloy	
S. Zhang, J.F. Li, F.S. Liu and F. Jiang	435
Study on Erosion Wear Mechanism of SiC/(W,Ti)C Gradient Ceramic Nozzle Material	
L.L. Liu and J.X. Deng	440
Analysis of Optimal Clamping Schemes for Aero-Multi-Frame Monolithic Components	
H. Guo, D.W. Zuo, G.X. Tang, M. Wang and Y.J. Guo	445
Model and Simulation of Slurry Velocity and Hydrodynamic Pressure in Abrasive Jet Finishing with Grinding Wheel as Restraint	
C.H. Li, Y.L. Hou, S.C. Xiu and G.Q. Cai	449
Research on Dynamic Physical Simulation of HSC Comprehensive Characteristics	
D.C. Xu, P.F. Feng, J.F. Zhi, D.W. Yu and Z.J. Wu	454

Study on Impact Disrepair Mathematic Model and Groove Optimization of Cutting Tools for Machining Carbon Structural Steel Y.N. Cheng, Z.J. Li, Y.G. Zhao and W.J. Sun	459
Theoretical Model of Surface Roughness for Polishing Super Hard Materials with Abrasive Waterjet C.L. Che, C.Z. Huang, J. Wang, H.T. Zhu and Q.L. Li	465
A Study of Exit-Burr Formation Mechanism Using the Finite Element Method in Micro-Cutting of Aluminum Alloy D. Lu, J.F. Li, Y.M. Rong, J. Sun, J. Zhou and Z.Q. Wang	470
Building and Simulation of the Digital Polishing Path of Mold Free-Curved Surface J.F. Ding, K.H. Zhang, G.Y. Mei and F.J. Yu	474
Study on the Correlativity between Grinding Parameters and Surface Residual Stresses in Ceramic G.X. Zhang, B. Lin and Z.P. Shi	480
Control and Analysis of Nonlinear Error for 5-Axis Machining of Hybrid Machine Tool H. Shi, W. Xu and G.Q. Cai	485
Fractal Characterization and Simulation of Surface Microtopography Machined with Abrasive Jet Precision Finishing with Grinding Wheel as Restraint F. Liu, Y.D. Gong, C. Ke and G.Q. Cai	490
Studying the Expansion Uniformity of Intravascular Stents by the Effect of Laser Cutting Error J. Yang, N. Huang and Q.X. Du	495
Gap Phenomena of Ultrasonic Vibration Assisted Electrical Discharge Machining in Gas Q.H. Zhang, J.H. Zhang, S.P. Su and Q. Gao	500
A Micro Milling Model Considering Metal Phases and Minimum Chip Thickness J.S. Wang, J.S. Shi, Y.D. Gong, G. Abba and G.Q. Cai	505
Simulation of Surface Topography in Ball-End Milling Considering the Tool Deflection and Runout J. Zhao, X. Ai, W.Y. Fang and S.G. Han	510
Tool Cutting Force Modeling in High Speed Milling Using PSO-BP Neural Network J.X. Zheng, M.J. Zhang and Q.X. Meng	515
Investigation on Simulation for Grind-Hardening Temperature Field of Non-Quenched and Tempered Steel S.S. Li, B. Xiao, S.X. Qin, Z.H. Song, H.H. Su and H. Gong	520
Study on the Temperature Field of Cemented Carbide Substrate in Miniature EACVD System H.X. Wang, D.W. Zuo, W.Z. Lu, F. Xu, D. Zeng and J.L. Shen	525
The Research of Remote Monitoring and Intelligent Maintenance System for Large Asphalt Mixing Plant S.L. Song, C.Y. Xiao, Q.C. Zhou, W.L. Li, Y.Q. Tang, X.X. Liu and T. Feng	530
Recognition for Spindle Speeds of Drill Press Based on Sound Signals Produced from Drilling X.F. Li, G.L. Yang and D.W. Zuo	535
Precision Enhancement of Ucp710 5-Axis Machine Tool by Real Time Thermal Error Compensation X.S. Wang, J.H. Shen and J.G. Yang	539
Study on Checking and Measurement of Double-Ball Bar for Thermal Error of CNC Machine Tools Y.X. Li, Y.Y. Li, H.T. Cao, Y.Q. Jin and J.G. Yang	544
The Influence of Thermocouples on the Measurement of Grinding Temperatures C.F. Fang, H. Huang and X.P. Xu	549
Detection of the Tool Wear Condition Based on the Computer Image Processing Y.L. Wang, S.M. Ji, L. Zhang, S.S. Jin and Y. Chen	553
On-Machine Measurement for Touch-Trigger Probes and its Error Compensation X.M. Qian, W.H. Ye and X.M. Chen	558
Prediction of Multiple Frequencies Chatter Stability in High-Speed Milling System Q.H. Song, X. Ai, W.X. Tang and Y. Wan	564
The Study of Five-Axis Graphic Simulation by Swept Volume Algorithm L.Q. Zhang, Y.H. Wang and M. Chen	569

A Cutting Process Parameter Optimization Expert System for Difficult-to-Cut Materials Z.B. Wang, Z.J. Li and D.H. Zhu	574
Calculation and Optimization of Cutter Position for Flank Milling Spatial Cam Based on NURBS R.Y. Ge, X.Y. Feng and X.C. Song	578
A Study on Fractal Dimension of Grit Protrusion Topography of Diamond Grinding Wheel J. Xie and Y.G. Zhong	583
A Terminal Sliding Mode Tracking Control Algorithm for Mobile Robots Y.H. Zhao, J.P. Zhou and R.F. Chen	588
Safety Prediction of High Speed Face Milling Cutter with Indexable Inserts B. Jiang, M.L. Zheng, F. Xu and Y.G. Li	593
Study on the Wavelet Transform Based Monitor Signal Processing Method for Grinding Wheel Dull G.J. Liu, Q. Wang and R.K. Kang	598
Numerical Analysis on the Process of Laser Continuous Peen Forming of Metal Plate S.Q. Jiang, J.Z. Zhou, S. Huang, J.J. Du, Y.Q. Sun and J.C. Yang	603
Automatic Testing Equipment and Experiments Based on the Quantitative Shadow Method for Measuring Sub-Nanometer Deformations on Aspheric Surface K. Xin, W. Zuo and J.F. Zhi	608
Study on Balance Precision of Ultra-High Speed CBN Grinding Wheel System S.C. Xiu, J. Liu, C.H. Li and G.Q. Cai	614
Analysis of the Effects of Multi-Clamps Fixture on Workpiece Location Errors G.H. Qin, S.P. Sun, Z.X. Chen, T.J. Wu and Z.Q. Ao	619
Study on Fuzzy Data Fusion for Real-Time Intelligent Recognition of Tool Wear State B.Y. Ye, J.P. Liu, R.T. Peng, Y. Tang and X.Z. Zhao	626
Static and Dynamic Analysis of Carbon Nanotube Cantilever Based on Molecular Dynamics Simulation N. Gong, Y.C. Liang, Y.X. Yao and B.G. Liu	631
Clamping Behaviour of Modern Jaw-Chuck with Centrifugal Force Compensation during High Speed Turning P.F. Feng, D.W. Yu, Z.J. Wu and E. Uhlmann	636
Design and Simulation of Spring-Driven Lock-Unlock Mechanism for Spaceborne Flexible Appendages B.H. Wu and Z.Q. Deng	643
On the Dynamics of Piezoelectric-Driven Stick-Slip Actuator X.B. Chen, D. Kong and Q.S. Zhang	648
The Effect of Clamping Force on Static and Dynamic Characteristics of Spindle-Tooling System W.G. Wu, G.C. Wang, C.G. Shen, L.J. Ma and S.L. Wang	653
Experimental Study of the Ultrahigh Speed Grinding Spindle System with a Squeeze Film Damper T.B. Yu, Y.D. Gong, S. Liang, G.Q. Cai and W.S. Wang	658
Research on Dynamic Cutting Performance of High Speed Face Milling Cutter M.L. Zheng, B. Jiang, J. Liu and C.Y. He	663
Cutter Selection in the Milling of Thin-Web Components Considering the Machining Errors Control K. Wu and N. He	667
Experimental Research on Machining Performance of Parallel Machine Tool H.B. Wu, D.W. Zuo and Y.W. Liu	672
Design of Energy-Controllable Pulse Generator on Micro WEDM G.X. Chi, G.H. Cao, S.C. Di and Z.L. Wang	677
Design of the Intelligent Turning Tool System with Adjustable Tool Geometry W.G. Wu, Z.Q. Liu and Y.P. Cheng	681
Design of Rapid Powder Switch in Laser Cladding Rapid Manufacturing M. Wang, D.W. Zuo, M. Wang, S.H. Shi and C. Yao	686
Investigation on Strain Films in the Thin Film Resistance Strain Gauge R.F. Chen, D.W. Zuo, Y.L. Sun, D.S. Li, W.Z. Lu and M. Wang	690

Development of the High Efficient Scanning Mechanism Using in Optical Space Remote Sensor	695
H.Y. Yu, X.Z. Han, Z.J. Liu and S.F. Tang	
Research on Asymmetric and Negative Offset Mechanism of Large-Scale Steel Plate Rolling Shear	700
Y.G. Li, L.F. Ma, Q.X. Huang and S.Q. Pang	
Development of Vision Guided Grinding System for Diamond Turning Tools	705
Z.J. Qiu, L.B. Zhou, H. Eda, T. Imai and M. Yamada	
Study on the Distance between the Substrate and Hot Filament in the Development of Diamond Coated Cutting Tools	710
M. Chen, W.M. Lin and H. Ohmori	
Research on Energy-Saving EDM Pulse Power Supply	714
Y.K. Wang, B.Y. Song, Z.L. Wang and W.S. Zhao	
Post-Processing Development of a New PTS-X Hybrid Kinematics Machine	719
X.J. Yang, B. Li and D.L. Zhang	
Research on the Influence that Stop Position of Cerpet Tufting Machineto Yarn Tension and the Method of Elimination Stop Mark	724
Z. Meng, J.J. Sun, T.Z. Zhou and S.H. Gu	
Research on a Framework of Agent-Based Collaborative Job-Shop Scheduling	729
G.M. Jiao, D.W. Zuo and M. Wang	