

Table of Contents

Preface, Committees and Sponsors

Experiment and Discussion on Ultrasonic Vibration-Assisted Single Point Diamond Turning of Die Steels

X.D. Xie, Y. Li, C.V. Duong and A. Al-Zahrani 1

A Novel Orderly Arrangement Method Controlled by Magnetic Field for Diamond Abrasives of Grinding Wheel

S.H. Yin, F.J. Chen, J.W. Yu and M. Wang 6

Influence of Cup Wheel Grinding and Etching Pretreatment on Residual Stress and Surface Topography for Coated Cemented Carbide Tools

T.J. Song, Z.X. Zhou, W. Li and A.M. Tang 10

Precision Grinding of Structured Tungsten Carbide Mold

H. Suzuki, T. Furuki, M. Okada, Y. Yamagata and S. MORITA 15

Analysis on Kinematic Characteristics of Precision Balls Grinding

Y. Dai, D.H. Ding, X. Xiao, X.S. Liu, R.J. He and L. Li 20

Study on Machining Characteristics of Sawing Al₂O₃ Ceramic with Diamond Cut-Off Wheel

F.B. Zheng, M. Chen, J.Y. Shen, H. Guo and X.P. Xu 25

Wear Mechanism of High-Speed Turning Ti-6Al-4V with TiAlN and AlTiN Coated Tools in Dry and MQL Conditions

J.Y. Xu, Z.Q. Liu, Q.L. An and M. Chen 30

Study on Fracture Performance of *In Situ* Growth Whisker Toughened Composite Ceramic Tool

X.W. Chong, C.Z. Huang, B. Zou, L. Xu, G.L. Zhao and H.L. Liu 35

The Performances of Different Coated Carbide Drills when Drilling a Cast Nickel-Based Alloy

C. Xue and W.Y. Chen 41

New Approach for Noncircular Following Grinding of Crankshaft Pin

H.X. Yu, Y. Zhang, X.H. Pan and M.C. Xu 46

Study on the Process of Gear Shaft Formed by Cross Wedge Rolling Based on Deform

F.Q. Ying, J.D. Shen and L.D. Wu 56

Research on the Surface Roughness Predictive Model of Austempered Ductile Iron Based on Genetic Algorithm

T.T. Chen, X.H. Guo and H.J. Yang 61

Study on Dynamic Stiffness of Machine Tool with Consideration of Friction Damping in Guide

M. Shinagawa and E. Shamoto 68

Fabrication and Cutting Performance of CVD Diamond Coated Inserts with Different Coating Thickness in Dry Turning Aluminum Alloy

J.G. Zhang, L. Wang, B. Shen and F.H. Sun 73

Influence of Diameter and Number of Orifice on Static Characteristics of Radial-Thrust Aerostatic Bearing

F.H. Zhang, S.F. Wang, Q. Zhang and P.Q. Fu 78

Research on High Performance Vitrified Bond Diamond Wheel

Y.B. Liu, W. Liu, X. Huang and H.P. Zhang 83

Optimum Design for the Frame of Open Type Abrasive Flow Polish Machine

L.L. Yuan, K.H. Zhang and L. Min 89

Cutting Performance and Failure Mechanisms of Coated Carbide Tools in Face Milling Powder Metallurgy Nickel-Based Superalloy

Y. Qiao, X.L. Fu and X.F. Yang 94

Study on Dynamic Characteristics of a Hydrostatic and Hydrodynamic Journal Bearings for Small Diameter Grinding Spindle

Z.Q. Hou, W.L. Xiong, X.B. Yang and J.L. Yuan 99

Current Research Trends on Resin Bond Used for Abrasive Products

Q.F. Deng, Z.X. Zhou, Y.G. Ren, B.H. Lv and J.L. Yuan 105

Influence of Soluble Filler on the Mechanical Properties of Porous Self-Generation Superabrasive Tool	
B.H. Lv, C.W. Wang, C.S. Wang, Z. Wu and J.L. Yuan	110
Research on Soil Vibratory Cutting with ALE Finite Element Simulation Method	
J.D. Jiang, J. Gao and W.B. Hoogmoed	115
Transient Heat Transfer Simulation in Rapid Heat Cycle Molding with Electric Heating	
S.F. Jiang, Y. Kong, J.Q. Li and G.Z. Chai	121
Tool Breakage Feature Extraction in PCB Micro-Hole Drilling Using Vibration Signals	
Z.H. Ren, X.H. Zheng, Q.L. An, C.Y. Wang and M. Chen	126
Effects of Process Parameters on Surface Gloss in Rapid Heat Cycle Molding Process	
J.Q. Li, C. Chen, S.F. Jiang, G.Z. Chai and Z.B. Lian	132
New Measurement Concept of Nanometer-Level Defects on Si Wafer Surface by Using Micro Contact Sensor	
W.J. Lu, Y. Shimizu and W. Gao	137
Absolutely Testing of Off-Axis Aspherical Mirror Using Dichotomy Computer-Generated Holograms	
C. Xie, S.Y. Li and S.Y. Chen	142
Dual-Servo Mechanism of STM for Measurement of Sub Millimeter Deep Trench Structures	
W. Zhang, C. Jin, Y.L. Chen and B.F. Ju	146
The Acoustic Micro Integrated Detection Technique for Silicon Wafer Processing	
A.Y. Sun and B.F. Ju	151
XTEM Observation of 4H-SiC (0001) Surfaces Processed by Plasma Assisted Polishing	
H. Deng and K. Yamamura	156
Plasma Chemical Vaporization Machining of Silicon Carbide Wafer Using Flat-Bar Electrode with Multiple Gas Nozzles	
Y. Sano, K. Aida, H. Nishikawa, K. Yamamura, S. Matsuyama and K. Yamauchi	160
Simulation of Large Scale KDP Crystal Polishing by Computer Controlled Micro-Nano Deliquescence	
H.P. Zhang, D.M. Guo, X. Wang and H. Gao	165
Study of Magnetorheological Brush Finishing (MRBF) for Concave Surface of Conformal Optics	
Y. Zhang, J.F. Zhi, Y.W. Yu, X.X. Zhu and W. Zuo	170
The Composite Ultra-Precision Processing Technology for the Small Aspheric Mould of Stainless Steel	
S.H. Yin, Z.Q. Xu and J.W. Yu	176
Analyze and Verify Cutting Depth Distribution of Different Grits Size SFAP	
X. Lv, Z.X. Li and Q.F. Deng	180
CVD Diamond Film Polishing Based on Accelerant Theory	
L. Zhang, S.J. Ding, D.H. Wen, Z.H. Xu and S.M. Ji	185
A New Method for Free Surface Polishing Based on Soft-Consolidation Abrasive Pneumatic Wheel	
S.M. Ji, X. Zeng and M.S. Jing	190
A Study of the Solid-State Reaction for Polishing Sapphires	
Q.F. Deng, Z.X. Zhou, Z.Z. Zhou, J.L. Yuan and J.C. Wang	195
Study on Polishing Technology of GaAs Wafer	
Q.F. Deng, T. Kong, G. Li and J.L. Yuan	200
New Researches for Fabrication of Micro-Pin in Micro-ECM	
M.H. Wang, T. Wang and W. Peng	205
Three-Dimensional Surface Error Reconstruction and Ion Beam Figuring of Optical Hemisphere	
W.L. Liao, Y.F. Dai, X.H. Xie, L. Zhou, Z.W. Zheng and C. Xie	210
Experimental Research on Microburrs of High Speed Drilling of PCB Using Microdrill	
X.H. Zheng, Z.Q. Liu, C.Y. Wang, Q.L. An and M. Chen	215
Ultrashort Pulsed Laser Micromachining of Polycrystalline Diamond	
Z.Q. Li, Q. Wu and J. Wang	220
Fabrication of Polycrystalline Diamond Tools by Micro Electrodischarge Machining	
Z.Y. Zhang, H.M. Peng, J.W. Yan and T. Kuriyagawa	225

Ultra-Wide Cur Lens Optimization Based on Low-Tg Aspheric Glass Y.J. Zhu, J.X. Na, J.F. Sun and S.H. Yin	230
Size Effects on Transferability and Mold Change of Glass Molding Press for Microgrooves T.F. Zhou, J.W. Yan and T. Kuriyagawa	235
Finite Element Analysis on Non-Isothermal Glass Molding K.J. Zhu, S.H. Yin, J.W. Yu, Y.J. Zhu, S. Jin, Y.F. Wang and J.J. He	240
Application of Orthogonal Test in Numerical Simulation of Glass Lens Molding D.C. Zhang, K.J. Zhu, Y.J. Zhu, S.H. Yin and J.W. Yu	245
Study on Material Removal Rate of CMP 6H-SiC Crystal Substrate (0001) C Surface Based on Abrasive Alumina (Al₂O₃) J.X. Su, J.X. Du, X.L. Liu and H.N. Liu	250
Effect of Pad Surface Asperity on Removal Rate in Chemical Mechanical Polishing M. Uneda, Y. Maeda, K.I. Ishikawa, K. Shibuya, Y. Nakamura, K. Ichikawa and T.K. Doi	256
Development of Novel Groove Patterns for CMP Pad T. Yamazaki, T.K. Doi, S. Kurokawa, O. Ohnishi, M. Uneda, K. Seshimo and H. Aida	264
Research on Process Parameters Intellectual Decision Support System for High Efficiency and Precision CMP Function Ceramics Z.H. Hu, M.K. Gao, J.L. Yuan and X.J. Yang	268
Experimental Study of Material Removal Rate for Rotary Curved Surface Workpieces of Si₃N₄ in Chemical-Mechanical Polishing Using Taguchi Technique L.L. Wan, Z.H. Deng, S.C. Li and P. Long	273
Study on Groove Shape of CMP Polishing Pad: A Review C.L. Lou, H.Y. Di, Q. Fang, T. Kong, W.F. Yao and Z.Z. Zhou	278
Research on the Fracture Property of Glass Plate under Uniform Pressure Z. Wu, B.H. Lv, J.L. Yuan, C.W. Wang, D.N. Nguyen and P. Zhao	284
FEA on Deformation Behavior of Glass Plate in Elastic Deformation Machining Process D.N. Nguyen, B.H. Lv, J.L. Yuan, Z. Wu and P. Zhao	289
Research on Ultra-Precision Machining of Silicon Nitride Ceramics: A Review S.J. Dai, Y.G. Ren, T. Kong and Y.L. Hu	294
Research on Tool Wear and Surface Characteristics in Ultrasonic Milling Carbon Fibre Reinforced Carbon Composite G.F. Gao, Y.Y. Zhao and X.H. Ma	299
Optical Performance of a Laser Point Source Strongly Emitted by an Aspheric Expander S.C. Park, T.K. Doi, S. Kurokawa and O. Ohnishi	304
Nanoparticulate-Reinforced Ti-Base Composites Prepared by Laser Cladding W.F. Wang	311
Electrochemical Machining of Micro Slots Using Shaped Electrode X.L. He, Y.K. Wang, Z.Q. Zeng, Z.L. Wang and W.S. Zhao	315
CAD/CAM System of Micro-WEDM for a Micro-Air Journal Bearing Fabrication Z.Q. Zeng, Y.K. Wang, X.L. He and Z.L. Wang	320
Numerical Simulation on Vibration-Assisted Ultra-Precision Cutting of Steel AISI 1045 with PCD Tool A. Al-Zahrani, X.D. Xie and Y. Li	324
Research on Processing Mechanism of Multi-Cell-Disc L. Li, Y. Dai, R.J. He and D.H. Ding	329
A Study on Feeding Technology of Motorbike Crankcase in Multidirection Squeeze Casting T.H. Peng, Y. Wang, L.D. Wu and L.Y. Li	334
Research and Simulation of the Temperature on Multi-Squeeze Casting H.P. Xu and L.Y. Li	339
Influence of Low-Temperature Freezing Treatment on Micro-Area Hardness and Residual Stress of SiCp/Al Composites X.L. Yu, S.T. Huang, W.Z. Zhao and L. Zhou	344
Simulation on Hydraulic Performance of Two Kinds of Coring Diamond Bits with Different Crown Y. Chen, Z.Y. Liu and L.C. Duan	350
Numerical Simulation for Cold Extrusion of Bevel Gear Q.H. Yang, J. Pan, J.X. Zhang, W.B. Chen and B. Meng	356

Development of Electric Rust Preventive Machining Method - Correspond to Difference of Water in World: Use of Deionized Refined Water	
N. Nishikawa, Y. Sato, K. Kudo, T. Murase, T. Sawa, H. Kato, N. Yoshihara, H. Okawai, K. Karita, T. Iyama, M. Mizuno and S. Tsukamoto	365
Development of Electric Rust Preventive Machining Method - Correspond to Difference of Water in World: Use of Adjusted Synthesized Water	
N. Nishikawa, Y. Sato, K. Kudo, T. Murase, T. Sawa, H. Kato, N. Yoshihara, H. Okawai, K. Karita, T. Iyama, M. Mizuno and S. Tsukamoto	373
Path Optimization of the Drilling Hole Based on Genetic Algorithm	
J.M. Chen and W.G. Guo	382
Gasify Micro-Oil Ignition Technology Based on Level Set Methods	
B. Wang, Y. Xie and J.G. Xiong	387