

Table of Contents

Preface, Conference Organizers

Chapter 1: Precision Metrology

A Fast Approach to Obtain High-Precision Measurement of the Minimum Circumscribed Cylinder Using Computer Drawing W.F. Chen and J.T. Chang	3
A New Method of Reducing the Measurement Blind Area for MPS C. Deng, Y.H. Kang, Q. Zhou and H. Li	9
Calibration for Laser Scanners Based on the NIM 80m Indoor Ranging Facility X.R. Deng, Z.Y. Qian and J.S. Li	14
Cutting Force Evolution and its Power Spectrum Analysis with Tool Wear Progress in Ultra-Precision Raster Milling G.Q. Zhang, S. To and G.B. Xiao	20
Decision Rules and Risk Analysis M. Krystek	26
Design and Development of a Novel Coordinate Measuring Machine with 3-PUU Parallel Mechanism S.Y. Li and P.H. Hu	34
Error Detection Technology for Calibrating Precision of Non-Contact Coordinate Measuring Machine Q.Z. Sun, J. Zhao, S.J. Ji, L. Zhang and S.H. Zhou	42
Evaluation of Straightness of Two-Axes Stage K. Iori, M. Ozaki and R. Furutani	47
High Resolution Self-A Rotary Table by the Interpolation Signal Calibration T. Watanabe, W. Samit, K. Vatcharanukul, A. Tonmueanwai and A.P. Drijarkara	53
High Speed Machining of Difficult-to-Machine Materials under Different Lubrication Conditions T. Obikawa, T. Ohno, R. Nakatsukasa, M. Hayashi and T. Tabata	60
High-Accuracy Calibration of CMM Using Temporal-Coherence Fiber Interferometer with Fast-Repetition Comb Laser N. Chanthawong, S. Takahashi, K. Takamasu and H. Matsumoto	66
Identifying the Microtopographic Features Generated by Different Ultra-Precision Machining Techniques by Power Spectral Density J.C. Chen and T. Sun	73
Metrology for Comparison of Displacements at the Picometer Level J. Stone, P. Egan, J. Hendricks, G. Strouse, D. Olson, J. Ricker, G. Scace and D. Gerty	79
Study of Air Temperature Correction for Optical Path Based on Large-Scale Laser Comparator J.S. Li, X.R. Huang, M.Z. He and L.F. Li	85
Study on Dynamic Measurement of Plane Distance W.C. Wang, D. Chen, H.T. Gao and Z.B. Yang	91

Chapter 2: Precision Machining

A Novel Method for Profile Error Analysis of Freeform Surfaces in FTS/STS Diamond Turning W.K. Neo, M.D. Nadhan, A.S. Kumar and M. Rahman	101
A Study of Minimal Quantity Lubrication with MWCNTs in Turning of AISI 304L Steel W.T. Huang, H.H. Tsai, D.H. Wu and W.T. Lee	108
A Study of the Cutting Temperatures in Milling Stainless Steels Using Chamfered Main Cutting Edge Nose Radius Worn Tools C.S. Chang	115

A Supervisory System in Machining Process Leading to Electric Power Saving Y. Kondo, M. Yamaguchi, S. Sakamoto and K. Yamaguchi	123
Adaptive Identification and Control of Hysteresis in Piezoelectric Actuators X.S. Chen, X. Chen, X.D. Chen and M.S. Yang	129
An Investigation of the Vibration Testing Method for Small Diameter Endmills T. Ono	134
Development of a Small Rotary Multi-Jet Abrasive Fluid Jet Polishing Tool A.A. Tsegaw and F.J. Shiou	140
Development of Fixing System for 2-Axis Micro Deep Drilling Assisted by Low Frequency Vibration I. Burdukovskiy, J. Kaneko and K. Horio	149
Diffusion Wear Mechanism of Single Crystal Diamond Tool in Machining Die Steels L. Zou and M. Zhou	155
Dressing of Grinding Wheels for Ultra Precision Grinding of Diffractive Structures in Tungsten Carbide Molds T. Bletek, F. Klocke, M. Hüntten and O. Dambon	161
Dynamics Model of Micro-Displacement Stage Based on High-Frequency H.W. Zhou, X. Chen, X.D. Chen and K.T. Li	167
Estimation of Micro-Hole Shape in Laser Direct Drilling of High Heat Radiation Typed Printed Circuit Boards (Process Monitoring with a High Speed Camera) S. Onchi, T. Hirogaki, E. Aoyama and K. Ogawa	172
Experiment Study of the Fast Tool Servo (FTS) by Laser Interferometer R.L. Zhao, X. Chen, K.T. Li, X.D. Chen and Q. Liu	178
Fabrication of Comb Shape of Leading Edge Wing of Dragonfly S. Umezu, N. Tanabe and H. Hashimoto	182
Fabrication of Microstructured Surfaces by Five-Axis Ultra Precision Machine Tool D.X. Wu, G. Li, B. Wang, Z. Qiao and L. Lv	187
Finishing of 4H-SiC (0001) by Combination of Thermal Oxidation and Abrasive Polishing H. Deng, K. Endo and K. Yamamura	192
Improved GZO Thin Film Properties with SiO_x Buffer Layer by Atmospheric Pressure Plasma Deposition K.H. Yang, P.C. Ho, J.W. Lin, T.H. Chou and K.M. Chang	196
Influence of Machining Characteristics on Ultra-Precision Cutting of Aluminum Alloys D. Hirase, Y. Maeda, K. Iwatsuka and T. Yazawa	201
Influences of Closed Loop Control Components on the Performance of Ultra-Precision Machines C. Brecher, D. Lindemann and C. Wenzel	207
Monitoring of End-Mill Process Based on Infrared Imagery with a High Speed Thermography M. Shindou, H. Kodama, T. Hirogaki and E. Aoyama	213
Numerical Study of a 3-Axis Stage for Application of Fast Tool Servo Y.T. Liu and B.J. Li	219
Optimal Design of Piezoelectric Actuator for Precision Positioning Applications L.K. Chang and M.C. Tsai	224
Preliminary Investigation on Design and Fabrication of a Metallic-Ellipsoidal Neutron Focusing Mirror J. Guo, Y. Yamagata, S. Takeda, J. Kato, M. Hino, M. Furusaka and S. MORITA	230
Research on Light Intensity Modulation within KDP Crystal Based on Different Width of Gaussian Repaired Contour of Surface Defects Y. Xiao, M.J. Chen, W.M. Zhang, M.Q. Li and J. Cheng	234
Researches on the Measurement Rebuilding and Multi-Axis Flank Milling NC Machining of the Compressor Impeller W.F. Chen, J.T. Chang and J.H. Su	241
Satiny and Continuous-Curvature Corrugated Surface Generation by Integrating End-Milling Processes and Magnetic Polishing with a Machining Center T. Furuki, L. Ma, T. Hirogaki and E. Aoyama	247
Structural Analysis of an Orbital Grinding System for Grinding Crankshafts for 5ton 5m Class Ship Engines J. Jang, B.Y. Choi, H.S. Bang, W.C. Choi and S.J. Cho	253

The Development of an Displacement Sensor Embedded Voice Coil Motor Based Fast-Tool-Servo for the Machining of Micro-Structure	
Z.J. Yang, Y.D. Bai, S.J. Wang, X.D. Chen, Q. Liu, K.T. Li, H. Wang and X. Chen	258
The Error Analysis of Ultra-Precision Diamond Turning Machine Based on Tool Swing Feeding	
H.H. Yao, T. Sun and Z.Q. Li	262
Theoretical Analysis about Off-Axis Parabolic Surface Machining under Two Different Accurate Spiral Tool Paths	
S.J. Ji, H.J. Yu, J. Zhao, L. Zhang and D.P. Huang	267
Time-Varying Load Analysis on the Rotor-Bearing System for Twin-Screw Compressors	
Y.R. Wu and J.W. Chi	274
Tool Wear Characteristics for Near-Dry Cutting of Inconel 718	
T. Wakabayashi, Y. Maeda, K. Iwatsuka and T. Yazawa	282
Wireless Driving of Electrostatic Film Actuator by Pre-Charging Electrodes with DC High Voltages	
T. Hosobata, N. Yamashita, A. Yamamoto and T. Higuchi	288

Chapter 3: Optical Measurement

A Differential Evolution Stereo Matching Method in Digital Image Correlation	
L. Chen, R.S. Lu, Y.Q. Shi and J.S. Tian	297
Automatic Optical Measurement of High Density Fiber Connector	
C.L. Chang, C.J. Chen and W.H. Wu	305
Comparison Measurement between Fizeau Interferometer and Scanning Deflectometric Profiler	
Y. Kondo and Y. Bitou	310
Identification of Fluids by the Color of Surface Plasmon Polaritons	
M. Ozaki, T. Sakai, H. Murata and R. Furutani	316
Length Traceability Using Optical Frequency Comb	
D. Wei, K. Takamasu and H. Matsumoto	322
Measurement of Step Height Using White Light Spectral Interferometry	
T. Guo, L.F. Ni, L. Ma, J.P. Chen, X. Fu and X.T. Hu	326
Study on Chemical Interaction Analysis of Reactive Fullerenol Molecules in Cu-CMP Using High-Sensitive Raman Spectroscopy	
R. Murai, Y. Takaya, T. Hayashi and M. Michihata	332
The Assembly and Measurement of Corrector Lens of a Cassegrain Telescope	
P.H. Huang, M.Y. Hsu, T.M. Huang, R.J. Guo, J.Y. Lin and Z.Y. Chen	339
The Spatial Synchronization of Areal Measurement Data Sets by Multi-Probes	
D.H. Lee, M.G. Kim and N.G. Cho	346

Chapter 4: Manufacturing Systems and Machine Tools

Binder-Free Green Composite Using Bamboo Fibers Extracted with a Machining Center-Investigation of Optimal Bamboo Fiber Length	
S. Imura, K. Ogawa, T. Hirogaki and E. Aoyama	355
Development of a CAM System with Linear Servo Motor for Automation of Metal Hammering	
H. Tanaka, K. Hoshino and N. Asakawa	360
High Efficiency AGV Transportation System Based on Knowledge of Taxis: Strategy for AGV Behavior at Intersections	
T. Ito, E. Aoyama, T. Hirogaki, K. Ogawa and D. Mitsuoka	366
High Efficiency Tool Path Generation for Freeform Surface Machining Based on NURBS Subdivision	
J. Zhu, A. Hozumi, T. Tanaka and Y. Saito	372
Identification of Flow Stress Applicable for FEM Simulation of Orthogonal Cutting Process	
N. Wahab, Y. Inatsugu, S. Kubota, S.Y. Kim and H. Sasahara	378

Performance of the Partially Porous and the Fully Porous Aerostatic Journal Bearings with Incompressible Air Flow	
T.Y. Huang, S.Y. Hsu, B.Z. Wang and S.C. Lin	384
Positioning Calibration of a Parallel Mechanism Worktable with 6-DOF	
Y.R. Zhang, S. Nagase, J. Zhu, T. Tanaka and Y. Saito	392
Study on the Fast Tool Servo (FTS) with the Replaceable Flexible Hinge	
K.T. Li, X. Chen, X.D. Chen, Q. Liu and H.W. Zhou	398
Toolpath Planning and Simulation for Cutting Test of Non-Orthogonal Five-Axis Machine Tool	
J.N. Lee, C.H. She, C.W.B. Huang, H.S. Chen and H.K. Kung	402

Chapter 5: Motion Control/Polishing and Grinding

A New Prediction Model for Thermally Induced Errors of a Turning Center	
H.W. Chi and Y.R. Lin	411
Design of an Optimal PID Controller by Genetic Algorithms for a Pantograph Type XY Platform	
Y.H. Fan, C.E. Chen and H.W. Liao	417
Identification on Nonlinear Friction Model and Tracking Control for a Ball-Screw Actuated Stage Using Modified Charge System Search	
C.J. Lin, S.K. Yu, B.Y. Ho and C.S. Chen	423
Micro lens Array Fabrication by 3D Diffuser Lithography for Light Enhancement of Organic Light-Emitting Devices	
H.Y. Lin, Y.S. Sun, S.L. Chen and M.K. Wei	430
A Study of Computer Controlled Ultra-Precision Polishing of Silicon Carbide Reflecting Lenses for Enhancing Surface Roughness	
Z.L. Li, W.B. Lee, B.C.F. Cheung, L.T. Ho and Y.G. Fu	437
An Investigation of Factors Affecting and Optimizing Material Removal Rate in Computer Controlled Ultra-Precision Polishing	
L.T. Ho, C.F. Cheung, L. Blunt and S.Y. Zeng	446
Complex Trajectory Planning for Lapping of Diamond Cutting Tool	
N. Yang, Z.Q. Li, W.J. Zong and T. Sun	453
Investigation of Removal Mechanism of Sapphire in Plasma Assisted Polishing	
K. Monna, H. Deng, K. Endo and K. Yamamura	458
Modeling of Vertical Micro Grinding	
A. Perveen, M. Rahman and Y.S. Wong	463
Study on the Key Parameters in Etching of Fused Silica Using Atmospheric Inductively Coupled Plasma	
Q. Xin, B. Wang, H.L. Jin, N. Li, D. Li and G. Li	469
Ultrasonic Vibration Assisted Grinding of Microstructures on Binderless Tungsten Carbide (WC)	
B. Guo, Q.L. Zhao, Y. Hou, C. Ge and X. Yu	475

Chapter 6: Advanced Moulding and Precision Forming/Advanced Technologies

Developing in Biodegradable Stents Technology	
S.Y. Lin, C.S. Chen, Y.S. Chen and S.F. Ma	483
A Framework of a Continuous Injection Direct Rolling Process for Precision Manufacturing Plastic Plates with Patterned Microstructures	
L.B. Kong, J.B. Li, C.F. Cheung, Y. Lou, C.S. Wang, H.W. Peng, C.H. Mak and D. Li	489
Automated Bin-Picking with Active Vision	
W.C. Chang and C.H. Wu	496
Bending Method for Forming Curvature and Various Cross-Section Shapes	
N. Utsumi and M. Yoshida	505
Electro Discharge Machining of Al_2O_3 Based Ceramic	
S.K. Elmenshawy, M.A. Younes and H. El-Hofy	511

Improvement on Die-Casting Efficiency and Property of Aluminum Alloy Casing. Q.C. Hsu, A.T. Do, K.C. Yeh and J.H. Ye	518
Molecular Dynamics Simulation of Pressure Generated inside Melting Area in EDM X.D. Yang, X. Han and M. Kunieda	525
Performance Stability of Recycle Amine-Free Water-Soluble Coolant in Long Term Operation K. Yamaguchi, Y. Kondo, S. Sakamoto, M. Yamaguchi and R. Nakazawa	530
Technology Evolution of Lower Extremity Exoskeleton from the Patent Perspective R.J. Lai and M.F. Li	536

Chapter 7: Non-Conventional Machining

A Proposal of Process Strategy for Micro-Cutting Edge Fabrication: Effects of Shape Formation after Laser Hardening K. Ogawa, H. Tanabe and H. Nakagawa	545
Basic Study on Etching Selectivity of Plasma Chemical Vaporization Machining by Introducing Crystallographic Damage into Work Surface Y. Sano, T. Doi, S. Kurokawa, H. Aida, O. Ohnishi, M. Uneda, Y. Okada, H. Nishikawa and K. Yamauchi	550
Characteristics of Electrical Discharge Machining in a Working Fluid Mixed with Micro-Bubbles H. Takezawa, K. Suzuki and N. Mohri	554
Edge Effect and Compensation Method Research of the Template Electrochemical Etching H.Y. Wei, Z.N. Guo and G. Wang	559
FEM Simulation on the Effect of Cutting Parameters in the Driven Rotary Cutting W. Takahashi, H. Sasahara, H. Yamamoto and Y. Takagi	564
Figuring and Finishing of Reaction-Sintered SiC by Anodic Oxidation Assisted Process N. Shimozono, X.M. Shen, H. Deng, K. Endo and K. Yamamura	570
Improvement of Accuracy in Micro-EDM of Tungsten Carbide Using Deionized Water M.D. Nguyen, Q.Y. Neo, M. Rahman and Y.S. Wong	576
Improvement of Drill Life for Nickel Super Alloy by Ultrasonic Vibration Machining with Minimum Quantity Lubrication H. Isobe and K. Hara	581
Influence of Ultrasonic Assisted Processing on the Ductility of Binderless Tungsten Carbide B. Bulla, F. Klocke and O. Dambon	587
Material Removal Rate Control in Open-Air Type Plasma Chemical Vaporization Machining by Pulse Width Modulation of Applied Power Y. Takeda, Y. Hata, K. Endo and K. Yamamura	593
Surface Characteristics Produced by Multi-Wire Sawing of GFRP S. Sakamoto, M. Yamaguchi, Y. Kondo, K. Yamaguchi and A.J. Nomura	597
Ultrasonic Elliptical Vibration-Assisted Micro-Groove Turning C. Zhang, K. Ehmann, Y.G. Li and P. Guo	603
Ultrasonically Assisted Micro Drilling for Acrylic Resin μ-TAS K. Hara, A. Asahi and H. Isobe	607

Chapter 8: High Precision Mechatronics/Robotics

Development of a Piezoelectric-Actuated Drop-on-Demand Droplet Generator Using Adaptive Wavelet Neural Network Control Scheme J.W. Liang and H.Y. Chen	615
Integrated Control System Based on MCU for the Temperature and Sampling of Helical Microfluidic PCR Detection System Y. Yang, T. Chen, S.B. Liu and J. Wu	621
Visual Servoing of Automatic Alignment System Using Model Predictive Control C.Y. Lin and Y.S. Zeng	627
Design of Wrist Rehabilitation Device for Hemiplegic Patients T.S. Park, D.H. Shin, C.P. Jeong, J.H. Choi, J.I. Moon and S.H. Yang	633

Kinematic Design Consideration Based on Actuator Placement of Five-Bar Planar Robot for Arm Rehabilitation	
J.H. Choi, D.H. Shin, T.S. Park, C.P. Jeong, J.I. Moon and J.N. An	638
Study of Adjusted Rapid Upper Limb Assessment for Evaluating of Rehabilitation Effects	
C.P. Jeong, D.H. Shin, T.S. Park, J.H. Choi, J.I. Moon and S.H. Yang	644

Chapter 9: Others

Formation of Aluminum Nitride Films by Gas Nitriding	
M. Yoshida, Z. Tao and N. Utsumi	651
Fabrication and Mechanical Properties of C/C-HfC-SiC Composites	
Y. Yano, K. Wada, T. Aoki, T. Ogasawara and S. Umezu	657
Composite Characterization of Engineering Ceramics Ground Surface	
Z.L. Qi, B. Lin, Y.B. Zhang, X.H. Liang and X.Y. Li	662
Using Rayleigh-Taylor Model to Predict Surface Tension of Static Ferro-Fluid	
J.E. Ho	668
Design Life Analysis of KTX Running Gear Systems on Various Operating Conditions	
C.W. Lee and D.H. Lee	674
Dielectrophoresis Tweezers for Single Cell Manipulation Using Metal Coated Chemically Etched Fiber	
K. Taguchi, K. Aritoshi, K. Nishimoto and S. Fukutomi	678
Dynamic Performance Measurement of Proximity Sensors for a Mobile Robot	
T.T. Tsung and N. Hoai	683
Evaluation of Running Safety for Railway vehicles Based on Vibration Acceleration of Bogie	
Y.S. Ham	689
Experimental Investigation of Cell Cloning Efficiency after Optical Trapping	
K. Taguchi and T. Hayashi	695
Numerical Simulation Research of an Ultra-Micro Dispensing	
C. Xu, Q. Zhang, W.J. Huang and H. Aoyama	700
Optical Simulation of Omnidirectional Inspection System for Screw Threads	
K. Park, C.H. Lee and S.W. Ra	706
Study of Mechanism for Wear Adjustment with Electro Wedge Brake	
D.H. Shin, T.S. Park, S.H. Jin, J.I. Moon and S.H. Yang	712
Swirl-Based Control Method of Cell Orientation-Impact on Control Performance with Eccentricity	
Q. Zhang, J.H. Wang, W.J. Huang and H. Aoyama	717
Tuning the Shear Modulus of Single-Walled Carbon Nanotube by Feeding Van Der Waals Molecules	
B.H. Chen, W.H. Chao and R.J. Wu	722
Visual-Servoing Control of Robot Hand with Estimation of Full Articulation of Human Hand	
M. Tomida and K. Hoshino	728
Wettability of Polymeric Bionic Surface Replicated from Ginkgo Leaves	
X.L. Zhao, W.W. An, J.C. Yan, H.C. Yu and L.Q. Wang	736
A Study of Cutting Strategy in Single-Point Diamond Turning of Micro V-Groove Patterns on Precision Roller Drums	
C.H. Mak, C.F. Cheung, M.J. Ren, L.B. Kong and S. To	742
Analysis and Optimization of a Vibration Isolation Platform Based on 6-DOF Parallel Mechanism	
T.D. Yi, B. Li and N. Wang	748
Chemically Etched Axicon Fiber as a Sensor Probe of Optical Coherence Tomography	
K. Taguchi and M. Takatsu	754