Table of Contents

Preface, Sponsors and Organizers

Chapter 1: Precision Mechanics Design

Design and Dynamic Simulating Analysis of Planet Gear Mechanism of Cap Screwing Machine	
M.N. Zhao, J.J. Gan and F. Wang	3
Position Stability Analysis of Gripper Bars on Die-Cutting Machine F. Wang, H. Chen and M.N. Zhao	7
Application of Genetic Algorithm in Numerical Solution of Analysis Model for Angular-Contact Ball Bearings H.H. Shi, Y.Y. Zhang, Z. Zhou and P. Wang	11
Synthetic Flow-Field Analysis of Main and Auxiliary Nozzles in Air-Jet Looms S.J. Song and D.F. Shen	16
Flyback Transformer Optimum Design and Simulation Y.C. Shang and X.T. Yang	21
Design and Research of Cap Sorter Mechanism of PET Bottle Automatic Cap Screwing Machine	
M.N. Zhao, M.X. Dong and F. Wang	25
Design of Intelligent Spray Equipment M. Chu, S.H. Tian and S.H. Yu	29
Dynamic Analysis of Three-Dimensional Flexibility of Gear Structure Based on Finite Element Method	
M. Chu, S.H. Tian, Y.C. Zhang and X.C. Pan	33
Research on the Key Technology of Multi-Target Evaluation for Products X. Zhou and Q. Zhao	38
Experimental Research on Thermal and Vibration Performance of High-Speed Spindle H.X. Wen and J.F. Su	42
Lightweight Design and Analysis of Beer Packaging Material W. Yuan, H. Yao and L.H. Xie	46
Parametric Design of Parallel Indexing CAM Based on VB T. Xia, P. Liu, X.Y. Jiang and Y. Huang	50
Finite Element Analysis of Engraving Machine as a Whole T. Feng and X.L. Jin	54
Structure Design of 2D Convert Probe by Single-Sensor J.B. Guo and J.C. Zhang	59
Research on Capsule Filling Machine Based on Virtual Prototype G.H. Wang, F. Xiao and W.S. Wang	64
Design and Research of High-Speed CNC Platform Based on DCG T. Xia, P. Liu, X.Y. Jiang and Y. Huang	68
A Small Magnetic Driving ECM Machine C.F. Zhang, F.G. Wang and S.Y. Xu	72
Triangular Mesh Simplification Based on Bounded Error X.M. Qian, Y. Cao and X.P. Lin	77
Development of Parametric Design System for Disc Cams with Translating Roller Followers L.Y. Wang, T. Shen, Y.B. Shen and S.K. Li	83
Static and Dynamic Characteristics Analysis of Precise Composite CNC Grinding Machine H.L. Zhao, Y.F. Sun, R. Chen, Y.M. Huang, G.P. Zhang, B. Wang, D.H. Mu and W.H. Li	88

Chapter 2: Precision & Ultra-Precision Machining

Study on Nozzle Burning for Engineering Ceramics Machining with Micro-Detonation of Striking Arc X.L. Tian, B.G. Zhang, K.L. Lin, F.Q. Li and F. Guo	97
Study of the Machining Principle and Influencing of Ultrasonic Lapping on SiC Single	
Crystal X. Qiang	102
Precision Machining of Ceramics Plunger Matching Parts with Double Helix Groove X.L. Tian, F. Guo, J.Q. Wang, B.G. Zhang, Y.T. Mao and K.L. Lin	107
Research of Surface Flattening Method Based on Triangle and Energy Model B. Sun, J.Q. Wang, Z. Liu and H. Chen	112
Precision Generating Cutting Research of Rectangle Spline Based on Parameters Superposition	
J.J. Jia, H.X. Wang and L. Wang	117
Design of a New Tool in Drilling Deep Steps Helly Hole F.J. Wu, R.Q. Cui, J.Z. Pang, Z. Li and Y.L. Fu	121
Finite Element Simulation of Linear Friction Welding X.Y. Wu	126
Analysis of Grinding Angle Based on Grinding Machine P. Li and B.J. Wang	130
Development of Calculating Grinding Wheel-Profile Software Applied to the Sharping Grinder Machine X.D. Chen, H.X. Wang and Q.C. Lao	135
Ultra-Precision Grinding Process and Experimental Research of the New Flotation Cushion B. Liu, X. Tu, X.Z. Zhang and J.A. Zhang	140
Calibration and Calculation of Interference in Hob Relief Grinding Q.C. Lao and J. Ge	144
A Kind of Mathematical Solution of Optimization for Turning F.Y. Li and J. Wang	149
Numerical Control Reformation for Gear Shaving Machine H.H. Gao, P. Li and Q.C. Lao	158
Research of Tool Wear Monitoring Based on Hurst Exponent Extraction of Cutting Surface Texture L.L. Sun and L. Zhao	163
Chapter 3: Precision Test & Control	
A Feeding System Control of NC Honing Machines Based on Fuzzy Neural Network J.L. Zhao, Z.J. Sun and N.D. Yang	169
Analyzing the Influence of Temperature on the Involute Gear Profile with ANSYS H.X. Wang, K. Li and F. Qin	174
Research on the PID-Based System of Emulsion Concentration Automatic Mixing X.L. Wang and Y.X. Wang	179
Research on Measurement of Human Head Motion Attitude P.G. Jia, S.M. Wang and X.F. Suo	183
Optimization of PID Parameters of Air-Bearing Stage Based on Genetic Algorithm F. Hou, D.F. He, B. Liu and J.A. Zhang	188
Classification Inversion Algorithm of Spheroidal Particle Size Distribution Based on the Light Extinction H. Tang and W.B. Zheng	193
Software and Hardware Realization of Network-Based CNC Engraving Machine Control System	100
W.H. Mu, X.L. Jin, D.L. Wang and H. Yang	198
A New Method on Illumination Measurement to Dynamic and Static Light Sources K.Q. Wang, G.Q. Ren and Z.F. Shao	203
Automotive Safety Monitoring Methods in Multiple Redundant K.Q. Wang, Z.F. Shao and G.Q. Ren	208

Sliding Mode Variable Structure Control of Active Magnetic Bearings Using Boundary Layer Approach	
Y.L. Yang and Z.X. Zhang	213
Study on Collision Algorithm of Virtual Gear Measuring Center J.H. Wang, C.C. Tan and F.Y. Zhang	218
Rectangle Spline Hob Error Analysis of Tooth Profile J.H. Wang and G. Zhang	222
Virtual Workpiece Modeling for the Virtual Gear Measuring Center J.H. Wang, H. Feng and Y.L. Bai	227
Study on the Control System of the Full-Automatic Plate Changing System on Offset Press Based on Microcontroller H.P. Hou, K. Liu and H.Y. Zhang	232
The Temperature Control System for the Fermentation Tank Based on Smith Predictor Y.X. Wang, E. Zhao and X.L. Wang	236
Radius Constraint Least-Square Circle Fitting Method Q. Zhu, G.H. Zhang and Z. Xu	241
Investigation of Mass Sensitivity for the Piezoelectric Diaphragm Biosensor S.K. Li, W. Ren, X.F. Chen and X. Yao	245
Dynamic Response of the Double Loop DC Motor Control System with the Different	
Moment of Inertia F. Sun, N. Wang and G.F. Zhang	250
Optimization of Velocity Loop Parameters in CNC Servo System B.G. Yu, L. Shi and K.Q. Wang	255
Design of Interpolation Algorithm in the Multi-Axis Motion Control System H.M. Shen, K.Q. Wang and Y.Y. Tian	259
Implementation Study about the Software CNC System Based on Windows L.Q. Lei, K.Q. Wang and J. Han	264
The Design of Actuating Cylinder Salt Spray Testing Device Based on Lab Windows/CVI and PLC Control G.H. Luo, Y. Wang and B.G. Yu	269
Research for Coiling Temperature Control System and Mathematical Model on Hot Strip Mill	
L. Zhang, H.G. Xu, C. Zhang and C.W. Duan	274
Study on Compliant Spring Based on Pseudo Rigid Body Model H.B. Qiang, Q. Wu and M.Y. Xue	279
The Design of an Intelligent Tracing Car Controller D.J. Li	283
Mathematical Model of Thermal Deformation in Precision Measurement and its Application	
X.L. Ma, H.B. Qiang and X.Z. Feng	287
Design of the PC-Based Open NC System for Engraving Machine Y.Q. Zhu, W. Han and B.J. Ma	292
Chapter 4: Non-Traditional Machining	
Design for Electrolyte Sedimentation Basin Based on COMSOL D.D. Li and Z.J. Fan	299
Design on Cathode and ECM Device of Gun Barrel Rifle J.L. Jia and N. Gao	303
Design on ECM Device of Engine Connecting Rod Hot-Forging Die J.L. Jia, J.H. Liu and S.S. Meng	307
An Experimental Study of Abrasive Waterjet for Deburring Z.M. Hou, W. Xia, D.H. Deng and Q.H. Wang	311
Research the Molybdenum Alloy Micro EDM Micro-Holes L. Chen	315
Discussing the Measure of Improving Pyrex Glass ECDM Removal Rate L. Tang and G.G. Zhao	319

Technique of ECM Deburring for Intersecting Holes of Pump L. Tang and G.G. Zhao	323
Experimental Research on Technological Parameters of Magneto-Rheological Finishing for Metal Materials	
J.H. Gao, Y. Yang and Z.W. Ren	327
Optimization and Analysis of WEDM Process Parameters Based on Nonlinear Regression Model H.B. Qiang and Q. Wu	331
	331
Experimental Study on 3-Phase Abrasive Waterjet Deburring Q.H. Wang, D.H. Deng and B. Huang	335
Current Research Progress of Micro Electrochemical Machining Technology C.F. Zhang, S.Y. Xu and F.G. Wang	339
The Investigation on the Abrasive Jet to Change the Contact Angle of Solid Material Surface	
Q.L. Zhang, F.Y. Li, X.X. Li and P. Liu	344
Forming Shape of Narrow Groove Machined by Electro Jet Machining X.X. Li, F.Y. Li and Q.L. Zhang	349
Chapter 5: Manufacturing Information Engineering	
Modular Process Planning in Sheet Metal CAPP System Y. Bai, C.Y. Li, Y. Cao and B. Sun	357
Outspread Sheet Metal Algorithm of Oblique Square Dome Pipe Considering Thickness Y. Bai, H. Min, H. Chen and Y. Cao	361
Development of the Performance-Driven Part Library of Cylindrical Spiral Spring Based on Pro/E J. Du and Y. Cao	365
Key Technology and Application of Workshop Production Management System Y.D. Fang, F. Wang and B. Sun	370
Research on Tool Management System Based on Web and Two-Dimensional Bar Code Technology	
B. Sun, G.T. Qin, Y.D. Fang and H. Chen	374
Research of Optimizing Ordering and Inventory Control of Supply Chain Systems Based on GA	•
Y. Gao, M.Y. Li and J.P. Wang	378
Dynamic Simulation Analysis of Stacker for Automated Warehouse Y.Q. Zheng, R.Z. Zhao, S.Z. Zhang and B. Peng	383
Assembly Modeling for 3D Component Based on Polychromatic Sets Y.L. Li, J.M. Gao, L. Shi and S. Wang	388
Research on Process Planning Method of NC Tube Bending J.R. Zhang, F. Li, Q. Zhu and Y.J. Wang	393
Research on CNC Process Parameters Optimization Based on Process Planning Knowledge X.B. Gao, Y. Xue and F.J. Wu	398
Order Parameters Evaluation Indexes and Quantitative Analysis Model on Order Degree of Manufacturing System	402
L. Yan, Q. Chen and R.Q. Hao	403
Application of Ant Colony Algorithm to Job-Shop Scheduling Problem Y. Cao, L. Lei and Y.D. Fang	407
System Development of a Simulated Annealing Algorithm for Job-Shop Scheduling Problem Based on Delphi	<i>)</i> 1 1
Y. Cao, S. Cao, L. Lei, Y. Bai and L. Shi	411
Method of Improving Production Scheduling Based on the Genetic Algorithm Y. Gao, M.Y. Li and J.P. Wang	415
The Assessment of Product Information Quality in Digitization Manufacturing Processes G.W. Yu, D.H. Deng, J.J. Zhao and X.L. Xu	419

Chapter 6: MEMS/NEMS

Review of Fabrication Methods of Nanotube / Nanowire Devices M.M. Tan, Z.Y. Zhang, L.H. Zhao and J.C. Zhang	427
Mechanism and Effect of Charges Accumulation on Differential Capacitance Detector Diodes in MEMS Accelerometer P. Xiao, X.B. Wang, Z.B. Yan and J. Yang	432
Research on Dynamic Coupling Characteristics of Electrostatic Actuated Micro Beam Considering Gas Film Damping	
W.D. Wang, X. Ji and X.Y. Niu An Experimental Research of Gaseous Flow in Rough Microchannels T. Ren, L. Chang, J.Y. Zhao and G. Qin	437 442
Design of Silicon Based on Bio-Electrodes for Deep Brain Stimulation G. Qin, T. Ren and Z.W. Wang	447
Ballistic Characteristics of Non-Silicon MEMS Inertial Trigger Switch H.B. Liu, L.J. Niu and Y.Q. Song	452
Failure Analysis and Design Improvements of MEMS Explosive Interrupter Z.W. Tian, X. Zhao and C.Y. Fan	456
Simulation and Analysis of Measurement Method for Projectile Axial Acceleration by MEMS Sensor P.F. Huo, C. Wang and K.Y. Qi	461
Chapter 7: Optical Instrument and Technology	
Achieving the Measurement of Tool Diameter by the Boundary Tracing Algorithm Based on Model	
Y.S. Lai, M. Shi, J.W. Tian and G. Cheng	469
Fabrication of Fine-Line Pattern with Image Reversal Process S. Bao, A.H. Gao, H. Liu and W.G. Liu	474
Research on the Tool Images Evaluation Based on Auto-Focus Technology Y.S. Lai, M. Shi, J.W. Tian and G. Cheng	478
A Rapid Separation Method for Nonuniform Image Segmentation J.Q. Liu, F.J. Wu, J.W. Tian and X.B. Gao	483
Design of High Speed and Parallel Compression System Used in the Big Area CCD of High Frame Frequency Y.Y. Liu, Y.H. Gao, G.N. Li, W.H. Wang, R.F. Zhang and L.X. Jin	488
FCM Clustering Segmentation Algorithms Based on Spatial Constraint J.W. Tian, Y.L. Yu and T. Shen	497
Chapter 8: Material Science & Technology	
Structure and Properties of Bi _{0.5} Na _{0.5} TiO ₃ -BaTiO ₃ Compound Ceramics X.J. Li, Z.Z. Xi, W. Long, Z.G. Zhang and J. Zhang	503
Application of Response Surface Methodology to Optimize Quenching Process Parameters of 17Cr2Ni2Mo Steel	500
C.J. Liu, D.B. Tang and H. He Application of Multi-Scale Morphology Gradient in the Foreign Fibers Recognition S.F. Jin and J.C. Yuan	508 514
Research for the Influence of Canopy Mesh Fabric Perforation Structure on its Mechanical Properties	
S.H. Tian, Z.Y. Hu and H.S. Chen Analysis and Application of Phase Change Materials on Energy Saving in Buildings A. Wang, M.W. Hu, D.K. Tao and J. Wang	518 523
Evolutions of Microstructure for Multilayered Al-Mg Alloy Composites by Accumulation Roll Bonding (ARB) Process	
B. Zhang, Z.W. Chen, S.Q. Yuan and T.L. Zhao	527

Calculation of Phonon Dispersion for 3d Transition Metals Cr and Fe by Modified Analytic Embedded Atom Method Y. Xie and J.M. Zhang	532
A Study on the Laser Induced Damage of Diamond-Like Carbon Film S.J. Wu and J.H. Su	537
Wearability of Non-Smooth Surface with Laser Treatment in the Different Cooling Media Z.W. Yu, W.C. Xiu and L. Chen	542
Correlation between Fractal Dimension and Impact Strength for Wood Plastic Composites T. Qiang and D.M. Yu	548
Inhibition of Mild Steel by Conducting Coal Based Polyaniline W.L. Lin, Y.Q. Deng and S.J. Wu	552
Chapter 9: Others	
Overview on Emotion-Affected Behavior Selection Mechanism G.F. Zhang and N. Wang	559
Data-Driven Approach for Equipment Reliability Prediction Using Neural Network F. Ding and X.B. Han	563
Fault Diagnosis for Speed-Up and Speed-Down Process of Rotor-Bearing System Based on Volterra Series Model and Neighborhood Rough Sets X.R. Zhu, Y.Y. Zhang, G.L. Zhang and Z. Zhou	567
Machinery Fault Detection Using Geodesic Distance Based on Genetic Clustering Algorithm G. Li, H.X. Wang and J. Zhuang	572
Wear Trend Prediction of Gearbox Based on Oil Monitoring Technology W. Cao, W.J. Wang and R. Wang	576
Research on Relationship between Weight Filter Function and Stiffness Filter Function Z. Shang and Y.K. Sui	580
Analysis and Implementation of TrueFFS Based on VxWorks System G.N. Han and Y.F. Li	584
Solving Job-Shop Scheduling Problem by an Improved Genetic Algorithm Y.L. Yang and W.W. Ke	588
Analysis and Prospect of Wireless Sensor Network Routing Technology Q. Duan and A.N. Zhao	592
A Shape Retrieval Study Based on Geometric Signature J.F. He and J.Y. Peng	597
A New Binocular Camera Calibration Method Based on an Improved Genetic Algorithm X.K. Jiang	602
Implementation of an Intelligent ${\bf CO}_2$ Meter via RS-485 with Modbus Protocol Z. Chen and X.Y. Chen	609
Analysis of Degree of Depolarization of Atmospheric Scatter J. Liu, Y.Y. Lei and K. Yi	613
Key Technologies of Computer Aided Color Design System for the Color Blind X. Zhou and Q. Zhao	617
Study on Modeling of Digital Machining Process and its Condition Monitoring & Diagnosis Method	(22
H.R. Cao, B. Li and Z.J. He An Artificial Immune Inspired Hybrid Classification Algorithm and its Application to Fault	622
Diagnosis G. Li, M. Yang and J. Zhuang	626
Research on Web Press Printing without Ink Detector Y.J. Chen, E.G. Kou and Q.H. Zhao	630
Optimization Model of the Extensive Use of Electric Cars in the World Y. Wang and R. Wu	634