

# Table of Contents

## Guest Editorial

## Chapter I: Machining Technologies and Materials Engineering

<b>Modeling and Optimization of Laser Direct Joining Process Parameters of Titanium Alloy and Carbon Fiber Reinforced Nylon Based on Response Surface Methodology</b> Y. Cai, C. Huang, H.X. Liu, D.D. Meng, Y.W. Wu and X. Wang	3
<b>Modeling and Optimization of Mask Assisted Laser Transmission Micro Joining Process</b> Z.G. Zhao, H.X. Liu, Y. Cai, Y.W. Wu and X. Wang	10
<b>Experimental Research on Laser Transmission Micro-Joining Based on the Mask</b> C.L. Fan, H.X. Liu, Z.G. Zhao, Y.W. Wu and X. Wang	17
<b>Molten Depth Modeling of Laser Transmission Welding Based on Temperature Distribution of Moving Point Heat Source</b> Z. Yan, Y.Y. Lin, H.X. Liu, P. Li and Y. Cai	23
<b>Numerical Investigation on Laser-Assisted Flow Forming Process</b> L.Y. Sun and C. Yang	29
<b>Impact Analysis of the Force Environment on the KDP Crystal Harmonic Loss Considering the Frame Surface Topography</b> H.R. Wang, H.T. Liu and Y.C. Liang	35
<b>Experimental Study of Laser Direct Joining of Metal and Carbon Fiber Reinforced Nylon</b> C. Huang, X. Wang, Y.W. Wu, D.D. Meng and H.X. Liu	42
<b>Study of Form Control Algorithm in Atmospheric Pressure Plasma Processing</b> D. Li, B. Wang, J. Wang and Q. Xin	49
<b>Influence of Cracking Damage on Deflection Basin Test Data of FWD</b> X. Qiu, X.H. Luo and Q. Yang	55
<b>Molecular Dynamics Simulation of Surface Effect on Tensile Deformation of Single Crystalline Copper</b> Q. Gao, Y.B. Guo, Y.C. Liang and Q.C. Zhang	61
<b>Mechanical Properties Comparison of Different La Content in AZ91</b> Y.Y. Zhang, C.X. He, H. Yang and J.X. Liu	67
<b>Experimental Study on Dry Finishing of Low-Speed WEDM</b> T. Wang, Y.M. Lu, S.F. Wang, H.S. Yin and J. Ge	73
<b>Research on Laser-Driven Flyer Microforming in Warm Condition</b> Y.J. Ma, X. Wang, P.H. Xu, Q. Zhang, H.X. Liu and Y.X. Gu	83
<b>Safety and Reliability of High-Speed Milling Cutter's Evaluation and Control Methods</b> B. Jiang, S.Z. Sun, M.H. Zhang, G.L. Cao and B. Sun	90
<b>Frequency Domain Error Analysis in Ultra-Precision Flycutting</b> G.D. Chen, Y.C. Liang, H.R. Wang, Y.Z. Sun and J.X. Chen	96
<b>3D Finite Element Simulation of Inclined Cutting of Hardened 45 Steel</b> G.H. Li, Y.J. Cai and H.Y. Li	104
<b>Oil Film Flow-State Analysis of Hydrostatic Vertical Guideway of CNC Vertical Lathe Rail Head</b> Y.Q. Zhang, Z.Y. Yu, W.W. Li, X.D. Yang, J.P. Shao and X.D. Yu	110
<b>Melted Characteristics Effects of Shielding Gas on Laser Deep Penetration Welding</b> Q. Wu, L.Y. Xu and Y. Mao	116
<b>Control of Solidification Process and Surface Microstructure of Large Size Ingot ZALCu5MnA Alloy</b> L.Y. Xu, Q. Wu and Y. Tang	122
<b>Experimental Study on Ultrasonic Assisted Grinding of C/SiC Composites</b> K. Ding, Y.C. Fu, H.H. Su, T. He, X.Z. Yu and G.Z. Ding	128
<b>Experimental Study on Tertiary Piezoelectric Effect of X-Cut Quartz Crystal</b> H.B. Zhang, Z.H. Zhang, Y.D. Jin, H.L. Jiang, L.J. Fan and X.C. Yu	134

<b>Acoustic Properties of Materials for Vibration Reduction and Resistance on Ultra-Precision Machine</b>	
D. Huang and Y. Wang	140
<b>Research on Ultrasonic Propagation at the Contact Interface in Ultrasonic Machining</b>	
M. Zhang, F. Jiao and Y.Q. Wang	146
<b>Design and Simulation Analysis of Low Temperature Air Deep Hole Processing System</b>	
H. Peng and Q. Wang	154
<b>Experimental Study on a Piezoelectric Energy Generator Excited by Rotating Magnets under Different Holding Conditions</b>	
X.F. Jin, S.Y. Wang, J.W. Kan, F.S. Huang, J. Yu and J. Qian	160
<b>Design of a Detecting System for the Welding Surface of Forging Steel Structure Piston Based on Ultrasonic</b>	
H.Y. Zhang, S.P. Zhai, M.M. Qu and P. Zhai	166
<b>A Highly-Efficient Method of Manufacturing Metal Fiber</b>	
Z.F. Chen, L. Zhang and B.Y. Ye	173

## **Chapter II: Mechanical Engineering and Engineering Design**

<b>Face 3D Modeling Based on Projective Rectification</b>	
K. Zhang and Z. Gao	181
<b>Parametric Design of Key Components in Downhole Motor</b>	
S.Z. Zhou and H.Y. Zeng	187
<b>Research and Application of PV Intelligent Control System of Sustainable Supply</b>	
Z.X. Wang, Y.G. Wei and Y.L. Song	193
<b>Study on the Influences of the Structural Parameters of Hydraulic Engine Mounts on their Vibration Isolation Characteristics</b>	
Q. Li, Y. Sun, Y.Y. Huang, G. He and D.L. Zhu	200
<b>Strength Calculation Method and Parametric Method of the Turbine Shaft</b>	
S.Z. Zhou and W.J. Yi	206
<b>The Study on the Effect of Driving Parameters on the Movement of the Stick-Slip Driving Stage</b>	
B.W. Zhong, Z.H. Wang, Z.Q. Jin and L.N. Sun	212
<b>Research of Matching Power for Photovoltaic Charging Control System</b>	
X.S. He, Z.C. Dai, C.F. Gao and S.T. Deng	220
<b>The Theoretical Analysis and Experimental Study on the Distribution Characteristics of Motion Parameters in the Process of Honing Gear</b>	
C. Zhang, G.X. Liang, M. Lv and S.Y. Wang	225
<b>Analysis of a 3-DOF Micro-Positioning Stage</b>	
D.D. Zhai, S.X. Fan and D.P. Fan	234
<b>Research on Elastic Damping Control Strategy at High Speed for a Vehicle Electronic Power Steering System Stability</b>	
X.L. Ma, Y.F. Guo, P. Shi and Y. Guo	240
<b>Experiment and Optimization of Settling Effect of Drip Streaming Filter</b>	
S.Z. Wu and H. Yang	246
<b>Comparison of Several Common Types of Grease Performance Based AR 2000ex Remoter</b>	
C.X. He, S.Z. Wu, H. Yang and J.X. Liu	254
<b>The Connector Blanking Fracture Surface Quality Prediction in Progressive Stamping Based on Support Vector Machine</b>	
L.Z. Gu, L. Wang and T.Q. Zheng	263
<b>Diamond-Bead Wire Classification and Spectrum with POS Part I: Classification with Process and Object</b>	
L.Z. Gu and S.J. Wei	269
<b>Study on Geometrical and Working Properties of the Parabolic Moldboard</b>	
P. Li and L.Z. Gu	275
<b>The Optimal Design of Composite Bead Wire Saw Frame Based on SUMT</b>	
L.Z. Gu, P. Li and T.M. Xiang	282

<b>Model Construction and Finite Element Simulate Based on Experiment Study of Magneto Rheological Finished Machine</b>	288
H. Yang, P. Li, L.Z. Gu and H.J. Guo	
<b>Research on Nonlinear Driving Control and Driving Force Calibration of Pure Electric Vehicle</b>	297
H.B. Zhou, J.B. Cao, Z.X. Zhou, T. Wang, L.L. Jin and X.L. Yu	
<b>How Coupler-Knuckle's Surface S Angle Impact on Coupler Operation Performances</b>	306
B.H. Lu, W.Y. Wei and B.Z. Qu	
<b>Research on Energy Recovery Damping Device of Vehicle Based on E-ACE</b>	312
Y.Q. Cai, J.B. Cao, Z.Y. Liu, S.J. E, Z.Y. Wu and H.B. Zhou	
<b>Research on Brake Shoe Eccentric Wear Mechanism by Analytical Method and Virtual Experiment</b>	318
B.Z. Qu, H.B. Zhang, B.H. Lu and Z.M. Liu	
<b>Chaotic Particle Swarm Optimization for Automatic Surface or Curve Localization</b>	324
J.F. Wu and D.L. Qin	
<b>Control System Design of New Nanoelectric Boiler</b>	329
J.F. Shen, H.P. Luo, J.B. Cao, R.K. Wang, S.J. E and C. Xu	
<b>Design of Body Structure for New Type Lightweight Electric Vehicle</b>	335
L.X. Wang, T.F. Zhao, J.B. Cao, J.F. Shen, Y.B. Xiao and Z.X. Zhou	
<b>Design of Experimental Apparatus for Asynchronous Motor Principle</b>	341
Y. Shen, J.B. Cao, X.H. Zhu, X.J. Lei, Q.L. Ye, M.J. Yan, K. Chen and Z. Gao	
<b>Research on MRF Shear Stress Measurement Method under Non-Uniform Magnetic</b>	347
S.Q. Ren, C.F. Gao, P. Huang, X.S. He, H.Y. Wang and W.Z. Chen	
<b>Diamond-Bead Wire Classification and Spectrum with POS Part II: Classification with Structure and Spectrum with POS</b>	351
L.Z. Gu and S.J. Wei	
<b>Research on Non-Circular Gear Hobbing Simulation Based on Piecewise Cubic Spline Fitting</b>	357
D.Z. Li, L. Xia, Y.Y. Liu and J. Han	
<b>Linear Motor Control Algorithm and Experimental Research Based on Feedforward Fuzzy PID</b>	363
L. Xia, J. Qiu and J. Han	
<b>Design on Measuring System of New Type Electrical Resistivity Imaging Exploring Ground Instrument</b>	369
Y. Jiao, J. Wang and G. He	
<b>Design and Experiment of Hand-Push Vibration Picking Machine of Lowbush Blueberry</b>	375
Y.D. Bao and Y.L. Guo	
<b>Research on the Kinematic Characteristics of Digging Tree Mechanism of Tree Transplanter</b>	381
D.J. Zhao, Y.L. Guo and W.L. Song	
<b>Study on Modal Change Dual Planetary Composite Transmission System</b>	388
X.Z. Zhao, X.G. Wang and Y.M. Wang	
<b>Modal Analysis around the Sun Wheel Non Equidistant Arrangement of Double Branch</b>	395
X.Z. Zhao, X.G. Wang and Y.M. Wang	
<b>Project Decision-Making for Conceptual Design Based on Rough Set</b>	402
M.H. Yuan, S. Cheng, Z.Y. Dai and A.M. Ji	
<b>Capture Process Simulation for a Prone-Cone Microsatellite Docking Mechanism</b>	411
Y. Dai, R.D. Ma, Y.T. Yu and B.C. Xie	
<b>Numerical Research on High-Strength Rectangular Section Steel Tube in Rotary-Draw Bending</b>	417
Z.W. Xing, Z.W. Xu, H.L. Yang and C.X. Lei	
<b>Modeling of Harmonic Drive System with Low-Frequency Resonance</b>	424
M. Hei, Q.K. Zhou, H.B. Liao, S.X. Fan and D.P. Fan	
<b>The Strength Reliability Analysis at Connecting Region of Cylinder and Skirt of Coke Tower Based on Stochastic Finite Element</b>	431
Y.X. Zhang, Q. Gao and X.Z. Xu	
<b>Rotational Velocity Influence Research on Pressure Field of Hydrostatic Bearing with Constant Flow</b>	437
C.X. Dai, J.P. Shao, Y.Q. Zhang, X.D. Yu and B. Wu	

<b>Research on the Adaptive Zero Phase Error Tracking and Proportion Composite Controller of Continuous Rotary Electro-Hydraulic Servo Motor</b> X.J. Wang, G.T. Sun, C.F. Xian, S. Li, J. Cao, C.L. Wan and L.W. Xiu	443
<b>Fractional Order PID Control of Railway Rescue Crane Leveling System</b> J.P. Shao, L. Zhang, Z.H. Jin and X.D. Yang	449
<b>Study on Control of Automatic Feeding in Condom Detection Line</b> Z. Ying and Y.L. Fu	456

### **Chapter III: Industrial Robot Technology**

<b>A sEMG Recording System</b> Y.S. Gao, J. Bai, S.X. Wang, J. Zhao and X.Y. Li	465
<b>Design of Fruit Picking Device Based on the Automatic Control Technology</b> D.H. Zhao, H. Zhang and J.X. Hou	471
<b>Design of New-Style Book Trolley Based on Electric Drive for Library</b> Z. Liu, T.F. Zhao, J.B. Cao, L.L. Jin, J.J. Chen and J.W. Tang	478
<b>Design of Underwater Welding Robot Used in Nuclear Plant</b> X.M. Lv, Y.F. Liu, H.B. Gao, L. Ding, J.G. Tao, K.R. Xia and Z.Q. Deng	484
<b>Kinematics of a 6-DOF Feeding and Unloading Manipulator</b> D.X. Zhao, E.C. Di, G.Z. Shou and Y.Q. Gu	490
<b>Modeling and Motion Control of Hydraulic Biped Robot</b> J.P. Shao, B.W. Gao and J.Y. Li	496
<b>Motion Control for a Stingray-Like Robotic Fish with Undulating Pectoral Fins</b> Y.W. Wang, B.T. Gu, J.B. Tan and P.F. Sang	502

### **Chapter IV: Computer Integrated Manufacturing System and Contemporary Integrated Manufacturing System**

<b>A Kind of Active Control Damping Shock Absorber</b> H. Yang, P. Li, L.Z. Gu and H.J. Guo	511
<b>Adaptive Video Image Enhancement Algorithm Based on FPGA Design</b> L.M. Wu, S.L. Yang, F.J. Li, X. Luo and B.J. Li	516
<b>Application Analysis of Machining Simulation and Post-Processing of NC Turning Center</b> S.Y. Ge, X.H. Qiao, Y. Ye, H.H. Chen and Y.X. Li	522
<b>Bearing Check Analysis for Automobile Transmission Based on the Software MASTA</b> Y.X. Li, L.H. Jin, J.L. Sheng and F.J. Yu	528
<b>Cross Language Query Expansion Approach for CIMS Based on Weighted D-S Evidence Theory</b> X.B. Wang, F. Zhao, X. Li and R.H. Zhang	534
<b>Cutting Data Modeling Based on Artificial Neural Network</b> J. Wang, F.Q. Yu and F.H. Wu	544
<b>Design and Implementation of Keyboard Module in V-Groove CNC System Based on LPC1343</b> J.B. Luo, J.Q. Liu, W.Q. Gao and X.D. Chen	550
<b>Design of Virtual Machine Assembly Simulation System in Single-Channel Immersion</b> J. Li, S.S. Bai, Y.L. Wang, P. Xi and B.Y. Li	556
<b>Development of Interface Card Drivers Based on Matlab/xPC Target</b> Y.L. Bi and D. Yang	563
<b>FRACAS Based Failure Information Management for High-Speed Train</b> B.Z. Qu, B.H. Zhang and B.H. Lu	569
<b>Hardware Development of CNC System Based on OMAPL138 and FPGA</b> J.J. Li, J.Q. Liu, P. Zhang and W.Q. Gao	575
<b>Intelligent Testing System for AC Load Based on PLC</b> Y.X. Chu, Y.L. Zou and J. Zhang	581

<b>Precision Measurement and Error Evaluation of Connecting Rod Standard Gauge Block Based on CMM</b>	587
W.M. Pan, N.N. Kong and X. Ye	
<b>Prediction of Surface Roughness Based on Least Square Support Vector Machine in Low-Frequency Vibration Cutting Process</b>	592
W.W. Du, L.Z. Gu and J.T. Wang	
<b>Fuzzy Self-Tuning PID Controller for Pressure Control in VCM</b>	598
Y.Y. Liu, F.P. Wan, H.G. Zhang, Z.Y. Zhang and Q.X. Hu	

## **Chapter V: Other Related Topics**

<b>A Probability Distribution Model for Optimal Selecting Cooperators in Supply Chains</b>	607
G.R. Chen and J.L. Deng	
<b>A Resilient Novel Compressed-Domain Audio Recognition Method for Anti-Linear Speed Change</b>	613
L.M. Wu, W. Han, Y.F. Li, S.B. Zhou and S.C. Chen	
<b>A Sequential Numbering Power Flow Calculation Method for Distribution Network</b>	619
A.B. Meng and Q.Y. Huang	
<b>A Study on Energy Consumption Optimization for Cooperative Beamforming in Wireless Sensor Networks</b>	625
G.Y. Yang, X. Gan, T. Zheng and Z.Y. Ma	
<b>Analysis and Evaluation of Artillery Fire Simulation Test</b>	632
T. Gao, C. He, Z.J. Fan and H.L. Guo	
<b>Conceptual Design of Mobile Phone Based on TRIZ Theory</b>	638
J.Y. Zhang, J.G. Jiang, Q. Lv and D.Y. Xu	
<b>DCM Oriented Operation and Maintenance Expense Model for High-Speed Train</b>	644
B.H. Lu and Y.K. Li	
<b>Determination Method of Optimal Preventive Maintenance Measure of Based on Decision Matrix Principle</b>	650
X. Qiu, Q. Yang and S.L. Xiao	
<b>Diagnosis and Recognition of Pavement Structural Defects Based on Acoustic Emission Principle</b>	656
G. Shen, Y.J. Hu, R.F. He and X. Qiu	
<b>Finite Element Simulation Application for Vibration Characteristic of Violin</b>	662
C.Z. Zhang, B.Y. Ye, X.Z. Hu, X.Z. Zhao and Y.F. Cao	
<b>GA-Based Proactive-Reactive Scheduling Mechanism for a Flexible Job Shop Problem under Multi-Uncertainty</b>	668
J.L. Wang, J. Zhang and W. Qin	
<b>Identification Control Based on the 2.4 GHz Active Technology</b>	676
Y. Hong	