

Table of Contents

Preace and Organising Committee

Chapter 1: Mechanisms of Machining Processes

| | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Sustainable High Speed Dry Cutting of Magnesium Alloys Y.B. Guo and Z.Q. Liu | 3 |
| Investigations of Transient Machined Workpiece Surface Temperature in High Speed Peripheral Milling Using Inverse Method Z.Q. Liu, F. Zhang and F.L. Jiang | 14 |
| Experimental Study on Turning of Titanium Matrix Composites with PCD Tools H.X. Huan, J.H. Xu, Y.C. Fu, H.H. Su, W.L. Bian and Y. Zhang | 20 |
| Preliminary Study on Carbon Fibre Composites Cutting Technology and Cutting Tools R.P. Shi, C.Y. Wang and X. Wang | 25 |
| Research on the Effect of Low Temperature on the Performance of Drilling Carbon Fibre Reinforced Polymer and Ti Stack Materials X. Wang, C.Y. Wang, R.P. Shi, Y.X. Song and Y.N. Hu | 30 |
| Experimental Study on Face Milling Austenitic Stainless Steel H.L. Liu, Q.G. Zhang, C.Z. Huang, B. Zou and H.T. Zhu | 35 |
| Analytical Modeling to Predict Adiabatic Shear Critical Condition for Orthogonal Cutting Q.B. Yang, Z.Q. Liu and Z.Y. Shi | 41 |
| Research on the Cutting Fluid Effect on Cutting Force and Surface Roughness in Rotor Milling J.L. Wang, L.L. Wu, J. Zhang, W.H. Zhao, Y.F. Jiang and Y. Shui | 50 |
| Cutting Performance and Tool Failure in Intermittent Turning Processes of an Al₂O₃-Based Micro-Nano-Composite Ceramic Tool Y.H. Zhou, J. Zhao and X.B. Cui | 56 |
| Formation and Control of the Cutting Vibration in High-Speed Machining J. Chen, Z.P. Song, G.C. Wang and C.G. Shen | 62 |
| Experimental Analysis on Spherical Chips in High-Speed Machining of Hardened AerMet100 G.S. Su and Z.Q. Liu | 67 |
| New Technologies of Green High Speed Dry Cutting L. Zhao, P.Q. Guo, Y.K. Cao, X.W. Wang and P. Zhang | 72 |
| Cutting Force and Tool Wear in Face Milling of Hardened Steel X.B. Cui and J. Zhao | 77 |
| A Review High-Speed Milling of Meshing Cylindrical Surface P. Zhang, P.Q. Guo, Y.K. Cao and X.W. Wang | 82 |
| Time Molding in Rough Milling of Circular Cavity X.P. Ren, Z.Q. Liu and Y. Wan | 87 |
| Experimental Studies on Machinability of 14 wt.% of SiC Particle Reinforced Aluminium Alloy Composites S. Qin, X.J. Cai, Y.S. Zhang, Q.L. An and M. Chen | 94 |
| Experimental Study of Serrated Chip in High Speed Cutting G.H. Li, H.J. Qi and B. Yan | 99 |
| Research on Chemical Transformation of Diamond with Fe Catalysis Based on Thermal Analysis L. Zou, G.J. Dong and M. Zhou | 105 |

Chapter 2: Simulation of Machining Processes

| | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| CFD Analysis on the Flow Field of Minimum Quantity Lubrication during External Thread Turning M. Chen, L. Jiang, B.W. Shi, Z.Q. Liu and Q.L. An | 113 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----|

| | |
|----------------------------------------------------------------------------------------------------------------------------------------|-----|
| A 3D Cohesive Element Model for Fracture Behavior Analysis of Ceramic Tool Materials Microstructure | |
| H.B. Yu, C.Z. Huang, H.L. Liu, B. Zou, H.T. Zhu and J. Wang | 119 |
| Research on the Method of Error Prediction in Milling Thin-Walled Impeller Blade | |
| Z.G. Liu, H.J. Qi and Y.J. Cai | 124 |
| Rapid Toolpath Correction for Five-Axis High Efficiency Machining Based on Image Analysis | |
| L.Q. Zhang and D.Z. Wang | 130 |
| Determination of Constitutive Equation Parameters for Face Milling 3-D Simulation via Pressure Bar and Orthogonal Cutting Tests | |
| S. Liu, J.F. Zhang, P.F. Feng, D.W. Yu and Z.J. Wu | 136 |
| Turbine Blade Distortion Analysis during Spiral NC Milling Based on FEM | |
| Y. Wan, Z.X. Wu, Y. Wang and Z.Q. Liu | 143 |
| Predicting Range of Chip Breaking of 3D Complex Groove Turning Inserts with Neural Networks | |
| X.M. Feng and G.Y. Tan | 148 |
| Tool Path Planning of 5-Axis Finishing Milling Machining for Closed Blisk | |
| J.C. Huang, X.L. Liu, C.X. Yue, Y.N. Cheng and H. Zhang | 153 |
| The Experimental Modal Analysis of High Speed Machining Tool System Based on Integral Polynomial Recognition Method | |
| F. Xiao, X.L. Liu, Y.X. Wang, L.J. Liu and D. Qu | 159 |
| Drilling Simulation of High Manganese Steel Processing Based on the J-C Constitutive Relation | |
| L. Yang, L. Xu, Z.H. Shi and T. Teng | 164 |
| Using the Flat-End Mill in the Strip Width Machining | |
| C. Zhao, Y.F. Guan and Y.Y. Guo | 170 |

Chapter 3: Surface Integrity of Machining Processes

| | |
|---------------------------------------------------------------------------------------------------------------------------|-----|
| Experiment Study of Tool Wear and Surface Integrity in High Speed Milling of a New Damage-Tolerant Titanium Alloy | |
| Q. Shi, Y.F. Yang, N. He, L. Li and W. Zhao | 177 |
| Influence of Tool Flank Wear on Surface Integrity in Orthogonal Milling of Powder Metallurgy Superalloy | |
| J. Du and Z.Q. Liu | 182 |
| Investigation into Roughness of Surface Polished by Abrasive Waterjet with Taguchi Method and Dimensional Analysis | |
| T.X. Chen and C.Y. Wang | 188 |
| The Optimization of Cutting Parameters for Surface Roughness in High Speed Milling Based on Taguchi Method | |
| P.N. Li, M. Chen, X.J. Kang, L.N. Zhang and M. Zhou | 196 |
| A Practical Study on the Surface Integrity of High-Speed Cylindrical Grinding of SiC | |
| J.M. Ni, B.Z. Li and J.Z. Pang | 202 |
| Influence of Milling Parameters on Surface Residual Stresses of 7050-T7451 Aluminum Alloy | |
| Y. Wan, C. Li, Z.Q. Liu and S.F. Sun | 208 |
| Study on Surface Roughness in Ultrasonic High-Speed Milling of SiCp/Al Composites | |
| D.H. Xiang, G.X. Yue, H.T. Liu and B. Zhao | 214 |
| Influence of Material Flow Stress on Surface Roughness in High-Speed Machining | |
| S.Y. Wang, W.J. Yang and W.C. Wang | 219 |

Chapter 4: Machine Tools and Cutting Tools

| | |
|-----------------------------------------------------------------------------------------------------|-----|
| An Integrated Approach to the Design and Analysis of an Ultra-High Speed Air-Bearing Spindle | |
| S.Y. Gao, H. Ding and K. Cheng | 227 |

| | |
|--------------------------------------------------------------------------------------------------------------------------------|-----|
| Effect of (Ni,Mo) and (W,Ti)C on the Microstructure and Mechanical Properties of TiB₂ Ceramic Tool Materials | |
| T.C. Yang, C.Z. Huang, H.L. Liu, B. Zou, H.T. Zhu and J. Wang | 233 |
| A Computer-Based Intelligent System for Automatic Tool Selection | |
| X.P. Ren, Z.Q. Liu and Y. Wan | 238 |
| Experimental Study on Orthogonal Cutting of Ti6Al4V with Surface Micro-Groove Textured Cutting Tool | |
| B.Y. Qi and L. Li | 243 |
| Experimental Study on Nano-TiAlN Coated Carbide Tools in Turning Austenitic Stainless Steel | |
| H.D. Yang and Z. Ding | 247 |
| Measurement Method of HSK Tool Holder's Unbalance in HSM | |
| J.J. Yu, S.L. Wang, J. Chen and G.C. Wang | 252 |
| Development of Al₂O₃/TiC/CaF₂ Graded Self-Lubricating Ceramic Cutting Tool Materials | |
| G.Y. Wu, C.H. Xu, Y.L. Zhang and M.D. Yi | 258 |
| Modal Experiment and Analysis of HSK Tool-Holder and Thin-Disk Cutter | |
| W. Song, L. Yang, G.C. Wang and C.G. Shen | 264 |
| Analysis of Vibration Signals Caused by Unbalance of the HSK Shank | |
| G.C. Wang, J.J. Yu, J. Chen and W. Song | 269 |
| The Heat Performance Analysis of HSK Shrink Toolholder | |
| J. Chen, G.C. Wang, W. Song and G. Liu | 275 |
| Cutting Performances of Boron-Doped Diamond Coated Milling Tools in Machining PCB | |
| L. Wang, J.G. Zhang, B. Shen, F.H. Sun and M. Chen | 280 |
| Research on NC System of Flame Cutting Machine Based on Trio Motion Control Card | |
| S.F. Zhang, Y. Wang, J.F. Mao, W.G. Wang and Z.H. Sha | 286 |

Chapter 5: Difficult-to-Machine Materials

| | |
|-----------------------------------------------------------------------------------------------------------------------|-----|
| Experimental Study on Milling Parameters Regression and Optimization of Super High Strength Steel 30CrMnSiNi2A | |
| M. Chen, C.D. Wang, L. Jiang and Q.L. Niu | 293 |
| Numerical Analysis of Face Milling Ti6Al4V with Different Tool Materials | |
| Z.Q. Liu and Q. Lin | 299 |
| Experiment on Optimal Selecting for Cutting Tools in Milling of High Hardened Steel | |
| K.P. Zhang, C.Y. Wang, Y.N. Hu and Y.X. Song | 305 |
| Study on the Coated Tool Wear Mechanism of High Speed Milling Ni-Base Superalloy GH625 | |
| W. Wang, M.H. Wang and X.P. Li | 311 |
| Experimental Study on Spray Cutting Ni-Based Superalloy | |
| Y. Wang, Y.S. Zhai, F.G. Yan and X.L. Liu | 317 |
| Drilling of SiCp/Al Composites with Electroplating Diamond Drills | |
| L. Zhou, S.T. Huang, D.S. Bai and L.F. Xu | 322 |
| Experimental Study on Exit Edge Defects in Two Dimension Cutting of SiCp/Al Composites | |
| D.J. Zou, S.T. Huang, L. Zhou, L.F. Xu, N. Hou and J.L. Wang | 326 |
| Investigation of Trochoidal Milling Nickel-Based Superalloy | |
| B.H. Wu, C.Y. Zheng, M. Luo and X.D. He | 332 |
| Design of Database for High Speed Cutting of Difficult-to-Cut Materials | |
| L.J. Liu, W.G. Wu and M. Lv | 337 |
| The Effect of Cutting Speed on Precision Hard Turning of Hardened Steel | |
| T. Chen, S.Y. Li, D.K. Jia, H. Sun and L. Guo | 343 |
| Experimental Research on Damaged Layer of High Strength Alloys in Precision Cutting | |
| Y.S. Zhai and Y. Wang | 348 |
| Effect of Holding Time on Microstructure and Properties of VC/Fe Composite | |
| G.J. Zhang, Z.P. Sun and L.Y. Zou | 353 |
| The Application of Magnetorheological Damper in Machining the Impeller Blades of High Temperature Alloy | |
| C. Zhao, Z. Ren, C.R. Tang and T.S. Zhang | 358 |

Chapter 6: Micro-Cutting Technologies

| | |
|-----------------------------------------------------------------------------------------------------------------------------------------|-----|
| Tool Wear Characters in Micro-Milling of Fully Sintered ZrO₂ Ceramics by Diamond Coated End Mills | |
| R. Bian, E. Ferraris, J. Qian, D. Reynaerts, L. Li and N. He | 365 |
| Experimental Investigations of Size Effect on Cutting Force, Specific Cutting Energy, and Surface Integrity during Micro Cutting | |
| T. Zhang, Z.Q. Liu, C.H. Xu, N. He and L. Li | 371 |
| An Experimental Study on Micro-Cutting Machining of Pure Tungsten | |
| W.F. Wu, L. Li, N. He, M.J. Chen and M. Zhao | 377 |
| Method of Precise Tool Setting for Micro Turning | |
| K.B. Zheng, N. He, L. Li, M. Zhao and Z.Q. Liu | 383 |
| Analyses of Size Effect on Surface Roughness in Micro Turning Process | |
| M. Zhao, N. He, L. Li, Z.Q. Liu, W.F. Wu and K.B. Zheng | 389 |
| Actually Geometry of Milling Tool Involved in Cutting Process | |
| Z.Y. Shi, Z.Q. Liu and B. Wang | 394 |
| Experimental Study on Cutting Force of High-Speed Micro-Drilling Flexible Printed Circuit Board | |
| X. Zhang, C.Y. Wang, L.J. Zheng, L.F. Wang and Y.X. Song | 401 |
| Effect of Grain Size of CVD Diamond Film on Cutting Performance of Diamond Coated Micro Drills | |
| X.L. Lei, L. Wang, B. Shen, F.H. Sun and M. Chen | 407 |
| Design and Dynamic Analysis of Micro Milling Machine | |
| X.Z. Li, J.D. Yang, L.M. Wang, Q.H. Ma and F. Qiu | 412 |

Chapter 7: Grinding and Non-Traditional Machining Technologies

| | |
|------------------------------------------------------------------------------------------------------------|-----|
| A New Approach to Five-Axis CNC Flute Grinding of Solid End-Mills | |
| M.M. Rababah, Z.Z.C. Chen and L.M. Wang | 421 |
| Temperature Measurement and Burn Mechanism of Stainless Steel 1Cr11Ni2W2MoV in Grinding | |
| H.X. Zhang, W.Y. Chen, X.Z. Fu and L.X. Huang | 433 |
| Load Distribution Balance Principle of Petroleum Buttress Casing Thread and its NC Machining Method | |
| X.W. Wang, P.Q. Guo, L.Y. Zhao and P. Zhang | 439 |
| Development and Key Technologies of High-Speed Grinding | |
| Y. Yu, P.Q. Guo, Y.K. Cao, X.W. Wang and P. Zhang | 445 |
| The Key Process Technology Research of Open Impeller Processing | |
| K. Guo, X.L. Liu, Z.P. Jiang, W.D. Li and J.C. Huang | 450 |
| ZTA Ceramics Tensile Fracture Test Analysis under Ultrasonic Vibration Based on Nonlocal Theory | |
| B. Zhao, F. Chen and J.L. Tong | 456 |
| Experimental Study on Drilling Force during Mandible Drilling Process | |
| Y.Y. Wei, X.H. Zheng, D.D. Yu, D.P. Dong and M. Chen | 460 |
| Application of Alternating Rotating Magnetic Field to Electromagnetic Barrel Finishing | |
| Z.Q. Liu, Y. Chen and J. Teng | 466 |
| Effects of Permanent Magnet Electromagnetic Stirring on TA15 Laser Metal Deposition | |
| W. Wang, P. Qi, G. Yang, G. Wang, L.Y. Qin, H.Y. Bian, L. Cai, Q. Wei and L.J. Jiang | 471 |
| Experimental Study on Water-Jet Guided Laser Machining Magnesium Alloy | |
| C.Q. Li, L.J. Yang and Y. Wang | 476 |
| Study on Drilling Force of Carbide Drill with Different Edge Preparation | |
| G. Liu and Z.X. Mao | 481 |