

# Table of Contents

## Preface\_Committee and Sponsors

## Tribology Engineering and Applications

<b>Atomic Scale Friction in the Function of Modified Eyring Activation Energies</b> W.W.F. Chong and H. Rahnejat	3
<b>Boundary Friction for a Line Contact Model: An Empirical Approach</b> W.W.F. Chong and M. de La Cruz	8
<b>Effect of Castor Oil and Biodiesel on Tribological Performance of Engine Oil</b> Y.C. Lin, T.Y. Shen, M.J. Hsieh, Y.Y. Ku and K.W. Lin	13
<b>Study of Friction and Wear Behavior of C/C Composite under Electrical Sliding</b> S.G. Bao, Y.F. Wang, Z.H. Yang, Y.Z. Zhang, Y. Chen and L.X. Jia	19
<b>Effects of Tungsten Addition on Mechanical and Tribological Properties of Carbon Nitride Prepared by DC Magnetron Sputtering</b> Y.L. Su, Y.F. Lin, S.H. Yao and C.J. Hsu	24
<b>Tribology Behavior of Graphene Containing Ni-Based Composite Coating under Room Temperature</b> J.L. Li, J.J. Chen, D.S. Xiong, Y.K. Zhang, Y.K. Qin and Y. He	30
<b>The Effects of Environmental Temperature and Humidity on the Friction and Wear Performance of PTFE Braided Composites</b> Y. Chen, C.L. Zhu and J. Liu	34
<b>Studies on Centrifugal Clutch of Frictional Lining Materials</b> T.C. Li, Y.W. Huang and J.F. Lin	39
<b>Corrosion and Wear Resistance of Electroplating Trivalent Chromium-Carbon Coating</b> C.W. Liao, K.H. Hou, H.C. Wang, C.E. Lu and M.D. Ger	45
<b>Friction and Wear Characteristics of Hydrogenated and Hydrogen-Free DLC Coatings when Lubricated with Biodegradable Vegetable Oil</b> H.M. Mobarak, E. Niza Mohamad, H.H. Masjuki, M.A. Kalam and K.A.H. Al Mahmud	50
<b>Improving the Wear Resistance of Aluminum Fly Ash Composites by Multipass Friction Stir Processing</b> S.H. Juang, L.J. Fan and H.S. Chang	55
<b>Atomistic and Finite Element Contact Analysis of an Asperity and a Rigid Flat</b> C.M. Tan, C.M. Lin and H.J. Tsai	60
<b>Numerical Analysis of Annular Seal with Different Distribution of Surface Texture</b> A.N. Guo, X.J. Wang, S. Gang and D.F. Jiang	66
<b>An Experimental Study on the Tribological Properties of the Pressing Dies of WC and SKD11 in the High Viscosity Oil</b> Y.P. Chang, H.M. Chou, G. Wang and J.C. Wang	72
<b>A Comparative Study on the Tribological Properties for the Automobile Oil Regeneration</b> Y.P. Chang, J.H. Horng, T.C. Ho and C.J. Huang	78
<b>Influences of Various Zr Target Current on Tribological Behavior of a-C:H:Zr-x Coatings</b> W.X. Kao	84
<b>Numerical Simulation on Variable Load EHL Problems with Single Asperities</b> J.J. Zhang, C.L. Liu and F. Guo	89
<b>Surface Modification of Ultra-High Molecular Weight Polyethylene with Crosslinked Hyaluronic Acid and its Antiwear Performance</b> C.C. Chou, Y.H. Hao and F.Y. Hsu	94
<b>Tribological Characteristics of Silicon Nitride Ceramic in Three Water-Based Lubricants</b> J.L. Zhou, S.Y. Yang, C.S. Zhai, Z.M. Cheng, S.Q. Wu and G.Q. Wu	99
<b>Effects of Surface Forces on Pure Squeeze Elastohydrodynamic Lubrication Motion of Circular Contacts with Coated Layer</b> L.M. Chu, W.L. Li, Q.D. Chen, C.C. Yu and C.Y. Yeh	104
<b>Combined Diamond Disks in Chemical Mechanical Polishing</b> M.Y. Tsai, J.K. Ho and J.L. Zeng	110

<b>Experimentally Investigate the Vortex Ferro-Viscosity under Directional Field</b> J.E. Ho, C.L. Yen and J.X. Lin	115
<b>Thermal Effects of Mechanical Polishing and Conditioning on Polishing Pads</b> H.J. Tsai and C.H. Chuang	120
<b>The Friction and Wear of Silicon Nitride Ceramic with BSA Lubricant</b> J.L. Zhou, C.S. Zhai, S.Y. Yang, S.Q. Wu, G.Q. Wu and H.L. Xu	125
<b>Effects of Aluminum Content on Oxidation Behavior of W-Al Nanolayer Coatings</b> S.H. Yao, S.H. Hung, Y.L. Su, W.X. Kao and Y.F. Lin	130
<b>The Deposition Rate, Hardness and Tribological Properties of a-C:H Coatings with a Tungsten Filament-Assisted Ionized Reaction Gas</b> W.X. Kao, Y.L. Su, J.H. Horng and H.C. Huang	135
<b>The Influence of Velocity Variation on the Adhesive Contact Behavior and the Deformation of Substrate Based on Molecular Dynamics Method</b> J.J. Chen, J.M. Huang, Y. Liu, S.F. Gao and N. Li	141
<b>Tribological Properties and Nanomechanics of Cu-BTA Composite Nanooils</b> M.J. Kao and F.C. Hsu	147
<b>Analysis of the Thermo-Mechanical Coupling of Elasto-Plastic Rough Body during Rotating Process</b> J.J. Chen, J.M. Huang, C.H. Gao and X.Z. Lin	152
<b>Structural, Electrical, and Resistance Force Characteristics of Ga-In-Sn Eutectic Alloys</b> Y.F. Shen, J.H. Horng, C.C. Wen and J.S. Fang	162
<b>Tribology Management and Applications in China Steel</b> Y.S. Huang	168
<b>Tribological Characteristics of Diamond like Carbon Coating in the Presence of Environment Friendly Vegetable Based Oils</b> K.A.H. Al Mahmud, M.A. Kalam, H.H. Masjuki and H.M. Mobarak	174
<b>Tribological Characteristics of Amorphous Hydrogenated DLC in the Presence of Commercial Lubricating Oil</b> K.A.H. Al Mahmud, M.A. Kalam, H.H. Masjuki and H.M. Mobarak	179
<b>Mechanical and Tribological Properties of <math>W_{(100-x)\%}C_{x\%}</math> Coatings Deposited by DC Magnetron Sputtering</b> Y.L. Su and Y.F. Lin	184
<b>Development of Mixed Lubrication Cold Rolling Model</b> Y.J. Hwu, J.T. Lee and Y.R. Jeng	190
<b>Ball Screw Device Applied to Heavy Loading Condition</b> S.H. Tsai, Y.C. Hwang, C.Y. Kang and H.C. Chen	196
<b>Studies of Micro-Hole Burr Improvement for Aluminum Alloy Materials Using Vibrated Abrasive Grinding Machining</b> S.C. Yang, T.F. Mao, F.C. Tsai and H.C. Huang	202
<b>Feasibility Study of Micro-Hole Wall Grinding by Micro-Elastic Abrasive Particles</b> F.C. Tsai, S.C. Yang, T.F. Mao, H.C. Huang and T.L. Li	207
<b>The Study of Thermal Raising and Transmission Torque of High Speed Ball-Screw Lubricated by Different Greases</b> Y. Haung and C.C. Wei	212
<b>The Surface Parameters Analysis of Magnesium Alloys Sheet during Warm Isothermal Forming</b> T.S. Yang, Z.X. Yang and S.Y. Chang	217
<b>Analysis of Sliding Friction for Surface with Micro-Scale Circumferential Grooves</b> H.C. Wang and J.C. Tsai	222
<b>Dynamic Frictions between AISI 316L and 3M<sup>TM</sup> Trizact<sup>TM</sup> Structured Abrasive Belts during Mirror-Like Polishing</b> B.S. Yang, J.C. Yeh, M.S. Tsai, J.L. Liao, S.Y. Wu, J.H. Hsu and H.H. Tsai	227
<b>The Effect of CNT Content on the Tribological Properties of CNTs Doped Diamond-Like Carbon Films</b> C.H. Wei, J.F. Yang and C.I. Wang	231
<b>The Study of Band Sawing Vibration and Cutting Performance</b> C.C. Wei, H.Y. Chung and J.B. Zhang	236

<b>Surface Roughness and Magnetic Effect of Magnetized Journal Bearings Lubricated with Ferrofluid</b> T.C. Hsu, J.H. Chen, T.L. Chou and H.L. Chiang	242
<b>Elastic-Plastic Analysis of Fretting Contacts</b> C.H. Kuo	248
<b>The Effect of Surface Modification of Polytetrafluoroethylene (PTFE) on the Properties of POM/PTFE Fiber Composites</b> C.Y. Huang, M.C. Kuo and M.L. Roan	253
<b>Observation of the Tribo-Film Formation Derived from ZnDTP by Using FT-IR</b> H. Watanabe, C. Tadokoro and S. Sasaki	259
<b>Tribological Study of PCL-PEG-PCL Polymer on SiN<sub>x</sub>H<sub>y</sub> Base</b> C.Y. Hsu, C.C. Wei and C.P. Jiang	264
<b>Optical Measurement of EHL Film under Oscillating Needle Roller Contacts</b> X.J. Shen, Z.M. Song and X.Y. Chen	270
<b>Surface Roughness Effects on Fluid Flow between Two Rotating Cylinders</b> S. Srirattayawong and S. Gao	275
<b>Analysis of Stress and Strain for Multiply Asperity Sliding Contact Surface</b> S.Y. Chern, Y.C. Lin, P.W. Hsu, C.L. Lee and C.H. Tsai	281
<b>Fabrications of Electroless Ni-P Composite Coatings before and after Annealing and Tribological Analyses</b> C.S. Chang, K.H. Hou, M.D. Ger, C.K. Chung and J.F. Lin	286
<b>An Experimental Investigation of the Torque Efficiency in Small Supr Gears</b> J.S. Lee, J.H. Horng and M.Y. Chiu	292
<b>Effects of the Nano-Diamond Additives on the Tribological Performance Improvement of Lubricating Grease</b> P.H. Tsai and H.Y. Chu	298
<b>Effects of the Ultra-Dispersed Nano-Diamond Additive on the Grease Boundary Lubrication Performance in the Reciprocating Journal Bearing Test</b> H.T. Hsieh, G.L. Chen, P.H. Tsai and H.Y. Chu	303
<b>Study of Thermal Expansion of a Vertical Motion Ball-Screw System Operated at High Rotational Speed</b> S.H. Hung and C.C. Wei	307
<b>The Effect of Rotational Speed on Fluid Compressibility and Gap Pressure of a Partially Porous Aerostatic Thrust Bearing</b> T.Y. Huang, S.C. Lin, S.C. Shen and S.Y. Hsu	311
<b>A Synchronous Approach for Numerical Simulation of Machine Tools</b> Y.L. Hwang and V.T. Truong	317
<b>Vibration Suppression Evaluation of Smart Journal Bearing Using Giant Magnetostrictive Actuators</b> W. Wang, S.Z. Cai, C. Wu and P.L. Wong	323
<b>Analysis of Hydrodynamic Porous Bearing with External Pressure Supply</b> D. Shaw, H.A. Hsieh and C.Y. Lo	328
<b>Contact Calculation for Rolling Bearings in Quarter-Spaces</b> Z.J. Wang, X.J. Shen and X.Y. Chen	333