

Table of Contents

I. Integrated Diagnostics

An Induced Shaft Deflection for Rotating Shaft Crack Detection Z. Kulesza	3
Diagnosing Propulsion Systems of a Vessel in Varying Marine Conditions A. Charchalis	9
Diagnostics Problems and Decisions of Low Rotation Speed Rotors with Antifriction Bearings V. Barzdaitis, P. Mažeika and V.V. Barzdaitis	15
Estimation of External Forces in the Rotating System with an Active Magnetic Suspension M. Gizelska, D. Kozanecka, Z. Kozanecki and J. Łagodziński	21
Fundamental Laws of Rolling-Element Bearing Mechanics and Diagnostic Methods FAM-C and FDM-A A. Gębura and T. Tokarski	27
Identification of Operational Damages of Air-Turbine Engines Using Visual Diagnostics A. Szczepankowski and J. Szymczak	33
Knowledge Acquisition and Management for Marine Diesel Engine Diagnosis A. Charchalis and R. Pawletko	43
Mining for Knowledge to Build Decision Support System for Treatment of Plano-Valgus A. Dardzińska-Głębocka and J. Pauk	49
Modular System for Testing the Stability and Safety of Specialised Height Rescue Vehicles S. Kozioł, E. Matras and A. Żbrowski	55
Studies of the Modelling Accuracy of Steam Turbine Control Systems for Diagnostic Tests of Automatic Synchronizers G. Redlarski, J. Piechocki and M. Dąbkowski	61
The Influence of Diagnostic Signal Measurement Period on Blades Technical Condition Images Determined from Phase Shift Difference R. Grądzki	67
The Method of Assessment of Suitability of the Bearing System Based on Parameters of Technical and Adjustment State P. Lindstedt and T. Sudakowski	73
The Multilevel Prognosis System Based on Matrices and Digraphs Methods M.P. Hetmańczyk	79
The Reliability Model of AC-Asynchronous Drive Based on the Multilevel Prognosis System Supported by Matrices and Digraphs Methods M.P. Hetmańczyk	85

II. Failure Analysis

Evaluation of Fatigue Life of Cylindrical Geared Wheels J. Drewniak and J. Rysiński	93
Harmonic Balance Analysis for the Rigid Finite Element Model of the Rotating Cracked Shaft Z. Kulesza	99
Simulation-Based Study on the Dynamics of Wing-Flap Actuating Hydraulic Circuit A. Gronczewski	105
Statistical Diagnostic Thresholds of Rolling Bearings with Correlation of the Bearings Signal and its Environment Based on Cauchy Product P. Lindstedt	111
The Analysis of Finishing Tooling Influence on Contact Fatigue Researched by Profilometer W. Labuda and A. Charchalis	117

Validity Check of the Assessment of a Jet Turbine Engine Regulation in Flight Using a Computer Simulation

K. Golak

123

III. Tribology in Mechatronic Systems

An Application for Analysis of Temperature during Cold Rolling	131
O. Yevtushenko	
Effect of Temperature and Deformation Rate on the Dynamic Viscosity of Ferrofluid	137
M. Frycz	
Graph-Based Models of Compound Planetary Gear Boxes	143
J. Drewniak and S. Zawiślak	
Measuring and Analyzing the Moment of Friction in Double-Row Ball Bearings	149
R. Korbut and J. Nachimowicz	
Precision Assessment of Surface Coating Roughness Height 3D Parameter St	155
M. Kumermanis and J. Rudzitius	
Research on Tool Temperature Dependence on Lapping Grains Size	159
J. Molenda, A. Charchalis and A. Barylski	
Stochastic Model of Durability of Rolling Bearings Considering Assembly Innaccuracies	165
J. Tomaszewski	
Structure and Properties of Diamond-Like Carbon Coatings Deposited on Non-Ferrous Alloys Substrate	170
T. Tański, K. Labisz and K. Lukaszkowicz	
Temperature and Adhesion Influence on the Microbearings Operating Parameters	176
K. Wierzcholski and A. Miszczałk	
The Influence of Oil Ageing on the Change of Viscosity and Lubricity of Engine Oil	182
G. Sikora and A. Miszczałk	
The Influence of Temperature and Shear Rate on the Viscosity of Selected Motor Oils	188
A. Czaban	
The Influence of Workpiece Hardness on Plate Temperature during One Side Lapping	194
J. Molenda, A. Charchalis and A. Barylski	
Tribological Aspects in Aperture Shaping Process	200
J. Nachimowicz and D. Jabłoński	
Tribological Behavior of Aerosol Particles in Acoustic Field	205
V. Vekteris, I. Tetsman, V. Striška and V. Mokšin	
Tribological Characteristics of Anodic Oxide Coat (AOC) Modified - Sealed up the Polymer	209
G. Ślużałek, P.J. Duda and H. Wistuba	

IV. Signal and Image Processing

A New Model of the Neuron for Biological Spiking Neural Network Suitable for Parallel Data Processing Realized in Hardware	217
A. Świętlicka, K. Gugała, M. Kolasa, J. Pauk, A. Rybarczyk and R. Długosz	
Analysis of Significant Prognostic Factors of Patients with Bladder Cancer Using Self-Organizing Maps	223
M. Kolasa, R. Długosz, W. Jóźwicki, J. Pauk, A. Świętlicka and P.A. Farine	
Calibration of Cameras and Fringe Pattern Projectors in the Vision System for Positioning of Workpieces on the CNC Machines	229
S. Domek, P. Dworak, M. Grudziński and K. Okarma	
Filtering Algorithms for 3D Range Image Analysis	235
A. Sioma	
Finding Bearing in Robot Navigation with the Use of the Kalman Filter	241
A. Sioma and S. Blok	
Low Power, Low Chip Area, Digital Distance Calculation Circuit for Self-Organizing Neural Networks Realized in the CMOS Technology	247
R. Długosz, M. Kolasa, T. Talańska, J. Pauk, R. Wojtyna, M. Szulc, K. Gugała and P.A. Farine	

V. Measurement Techniques

An Investigation of the Automatic Relative Gravimeters	
E. Parseliunas, P. Petroškevičius, R. Obuchovski and R. Birvydiene	261
Application of Hybrid Vision Method for the Hot Aluminium Surface Inspection	
T. Giesko and P. Garbacz	267
Application of the 'Iterative Closest Point' Algorithm for Determination of Rotation Axis of a Turntable	
I. Wróbel	273
Control Curves Method of Airframe Geometry Modeling	
S. Kachel	279
Detection of Cesium from Pollucite Using Laser-Induced Breakdown Spectroscopy	
S. Ikezawa, M. Wakamatsu and T. Ueda	285
Determination of the Shot Energy Characteristics of the Pneumatic Gun by Means of High Speed Imaging Method	
W. Jóźwik and A. Zbrowski	291
Effect of Cross Section Size on Ductility and Fragmentation of Copper Ring at High Strain Rate Loading Conditions	
J. Janiszewski	297
Experimental Shear Stress Analysis of the Thin Walled Aluminum Hollow Shaft under Torsion	
R. Gürbüz, M.A. Donertas and M. Yavuz	303
Force Sensor for Laparoscopic Tool of RobIn Heart Robot	
A. Kobierska	309
Influence of CNC Machine Tool Technical Condition on the Geometrical Accuracy of Freeform Surfaces	
L. Czerech and R. Kaczyński	315
Influence of Flexible Body Contact Deformation on the Linear Dimension Measurement Precision	
A. Avišāne, J. Rudzitis, G. Upītis and J. Vilcāns	321
Laboratory Station for Research on Angular Translocation in Human Lower Limbs	
M. Ostaszewski and F. Siemieniako	326
Mechatronic Elements for Measuring Systems	
V. Giniotis, M. Rybokas, G. Dmitrijev, D. Sabaitis, L. Šiaudinytė and J. Janulevičius	332
Surface Structure of Components Created by Stereolithography	
S. Dzionk	338
The Computer Simulation of Digital Measurement	
K. Dzierżek	344
The Digital Pre-Operative Planning of Hip Surgical Interventions	
M. Michalíková, T. Tóth, V. Rajtúková and J. Živčák	350
Using 9-Axis Sensor for Precise Cardiosurgical Robot Master Angular Position Determination	
P. Žák	356

VI. Multifunctional and Smart Materials

Laboratory Tests of Shape Memory Alloy Wires	
W. Rączka, J. Konieczny and M. Sibielak	365
Wear Model in Milling Compacted Graphite Iron with Different Lead Angle Using Ceramic Cutting Tools	
Ş. Karabulut and A. Güllü	371

VII. Metallic Alloys

Analysis of the Influence of Drawing Speed on the Amount of Retained Austenite in TRIP Steel Wires	
S. Wiewiórowska and Z. Muskalski	379
Ballizing Process Impact on the Geometric Structure of the Steel Tubes	
T.C. Dyl	384
Corrosion of Ni-Al and Ni-Al-Al₂O₃ Plasma Sprayed Coatings in 0.01 M H₂SO₄ and 3.5% NaCl Solutions	
R. Starosta	390
Effect of Cutting Parameters on Surface Texture of Flame Sprayed Coatings	
R. Starosta	396
Effect of Magnetohydrodynamical Stirring Method on Deformation Resistance of AlSi7Mg Aluminium Alloy	
M. Krakowiak, T. Bajor and D. Rydz	402
Effect of Thermo-Mechanical Treatment on Mechanical Properties of AlCuMg Alloys	
T. Bajor, M. Krakowiak and D. Rydz	407
EIS Research of AW-7020 Alloy Joints Welded by FSW	
K. Dudzik and A. Charchalis	412
Evolution of Microstructure in Martensitic GX12CrMoVNbN9 – 1 Cast Steel after Low Cycle Fatigue	
G. Golański and J. Kępa	418
Influence of Heat Treatment on Stress-Corrosion Resistance of EN AW-AlZn5Mg1,5CuZr Alloy	
L. Kyziol and K. Czapczyk	424
Influence of Friction Stir Welding on Hardness Distribution in Joints of AlZn5Mg1 Alloy	
K. Dudzik and A. Charchalis	430
Influence of Rolling Reduction, Strip Shape and Asymmetry Factor on the Strip Curvature	
A. Kawałek, H. Dyja, M. Knapiński, M. Kwapisz and K.B. Laber	436
Investigation of Wear of Ceramic Coating on Tool Steel 105WCr6	
L.A. Kuliasas	442
Investigation of W-Re-Ni Heavy Alloys Produced from Plasma Spheroidized Powders	
T. Majewski	448
Metallographic Analysis of Bimetallic Ribbed Bars Produced from Feedstock Mill of the Surfacing Method TIG and of the Method ESS LM Received	
S. Sawicki, H. Dyja and S. Mróz	454
Modelling of Titanium-Steel Bimetallic Composite Behaviour under Mechanical Cyclic Loading	
A. Karoleczuk, M. Kowalski and G. Robak	460
Modelling the Magnetic Characteristics and Temperature Influence on Construction Steels	
D. Jackiewicz, R. Szewczyk and J. Salach	466
Numerical Modelling of Ploughshares Rolling Process from Scrapped Railway Rail	
P. Szota, S. Mróz, A. Stefanik and H. Dyja	472
Numerical Modelling of the Cooling Ability of Device for the Plates Accelerated Cooling Process	
K.B. Laber, M. Knapiński, A. Kawałek and M. Kwapisz	478
Physical Simulations of the Controlled Rolling Process of Plate X100 with Accelerated Cooling	
M. Knapiński, H. Dyja, A. Kawałek, M. Kwapisz and B. Koczurkiewicz	484
Research of Spheroidization Processes of W-Re Powders	
T. Majewski	490
Surfaces Modification of Al-Cu Alloys by Plasma-Assisted CVD	
K. Kyziol, Ł. Kaczmarek and S. Jonas	496
The Active Thermography Method as Used to Assess the Bearing of Temperature on Thermophysical Properties of Superalloy of a Gas-Turbine Blade	
J. Błachnio and A. Kułaszka	502

The Analysis of Al-Cu Bimetallic Bars Bond Layers Joined by the Explosive Method	508
S. Wąsek, S. Mróz, G. Stradomski and K.B. Laber	
The Analysis of the Impact Relative Rolling Reduction at the Area Connector Bimetallic Plate after the Rolling Process	514
D. Rydz, M. Krakowiak, T. Bajor and G. Stradomski	
The Basic Research of Experimental Steels for Pipelines	518
M. Knapiński, B. Koczurkiewicz, H. Dyja, A. Kawałek and M. Kwapisz	
The Mechanical Properties and Structure Evolution for High-Manganese TWIP Steel Wires	524
Z. Muskalski, S. Wiewiórowska and M. Pełka	

VIII. Biomaterials

Application of the NanoLC-MS/MS Technique for Protein Analysis of Biofilm on Surface of Mandibular Fixation with X-Ray Detection of Metallic Ions Relocation to the Osseous Tissue	528
J. Mystkowska, P. Suder, J. Silberring, A. Drabik, J. Sidun, S.Z. Grabowska, J. Borys and J.R. Dąbrowski	
Changes in UHMWPE Morphology and Structure after Irradiation with an Electron Beam and Thermal Treatment	531
J. Maszybrocka, J. Cybo, A. Barylski and P. Czaja	
Changes of Free Radical Content in Exposed to Electrons GUR1020 and GUR1050 Polyethylene Types Intended for Endoprosthesis Acetabular Cups	538
P. Czaja, J. Maszybrocka, J. Michniowski, J. Cybo and A. Barylski	
Evaluation of the Possibility of Mucin Adsorption onto Implantation Materials	544
J. Mystkowska, P. Suder, A. Drabik, A. Bodzon-Kułakowska, J. Silberring and J.R. Dąbrowski	
Fretting-Corrosion of 316L Steel Metallic Biomaterial Methodological Aspects	550
E. Kulesza	
Surface Modification of Titanium by Plasma Assisted Chemical Vapor Deposition (PACVD) Methods	556
M. Januś, J. Konefał-Góral, A. Małek, S. Kluska, W. Jastrzębski, S. Zimowski and S. Jonas	
Tribological Properties of Selected Self-Made Solutions of Synthetic Saliva	561
J. Mystkowska, M. Jałbrzykowski and J.R. Dąbrowski	

IX. Functional Composites

Axisymmetric Heat Conduction Problem for a Half-Space Covered with a Laminated Coating of Periodic Structure	575
W. Kołodziejczyk and R. Kulchytsky-Zhyhailo	
Destruction of Epoxy Coatings under the Influence of Climatic Factors	581
D. Kotnarowska	
High Power Diode Laser Cladding of Wear Resistant Metal Matrix Composite Coatings	587
D. Janicki	
Multiscale Modelling Method for Chosen Functionally Graded Material	593
D. Miedzińska, R. Panowicz and P. Jóźwicki	
Testing of Fibreglass-Metal Laminates in Epoxy Warp Connected by Means of the Adhesive Layer	599
S. Zolkiewski	

X. Nanomaterials

Generation of Protective Low-Friction Layers in Tribological Processes	607
A. Kotnarowski	

XI. Ceramics and Glasses

Influence of Flat Lapping Kinematics on Machinability of Ceramics	
A. Barylski and M. Deja	615
Spectral and Statistical Analysis for Ceramic Plate Specimens Subjected to Impact	
T.C. Akinci, S. Seker, R. Gürbüz and E. Guseinovienė	621
Technological Problems in Lapping on Flat Surfaces of Ceramic Parts	
A. Barylski	627
Wear of Electroplated Tools Used for Flat Grinding of Ceramics	
M. Deja	633

XII. New Trends in Mechatronic and Materials Science Education

Partition of the Optimality Problems in Mechatronics	
W. Tarnowski	641
Teaching in Automatic Control and Robotics Discipline in Terms of Changes in Higher Education System: Experiences and Suggestions	
L. Podśwadowski, A. Kobierska, M. Sikora, L. Fraczak, A. Niewola, M. Zawierucha and P. Żak	648

XIII. Teaching Materials and Laboratory Facilities

Control of the Hydrostatic Load Unit with the Electronic Control System	
M. Banaś	657
Didactic Models Used on Mechatronic Courses	
M. Kelemen, A. Gmíterko, T. Kelemenová, F. Trebuňa, L. Miková and Z. Bobovský	661
High Pressure Nano-Destruction of a Brittle Polymeric Materials Surface	
A. Svirydzonak, S. Chizhik and M. Ihnatouski	667