

Table of Contents

Preface

Chapter 1: Innovative Materials and Materials Processing Technologies in Mechanical Engineering

The Concept of the System for Parameterization of Functionalized Membranes J. Skowroński, M. Bojarska and M. Neska	3
Effect of Laser Welding Parameters of DUPLEX 2205 Steel Welds on Fatigue Life R. Softysiak	11
Preliminary Assessment of the Influence of the Type of a Curing Agent upon Impact Loading of a Multi-Layered Composite P. Przybyłek, A. Komorek and W. Kucharczyk	19
The Influence of UV Radiation upon the Properties of Fibre Reinforced Polymers A. Komorek, P. Przybyłek and D. Brzozowski	27
Application of an Integrated Database System for Processing Difficult Materials J. Gawlik, A. Kielbus and D. Karpisz	35
Dimensional Structure of Non-Metallic Inclusions in High-Grade Medium Carbon Steel Melted in an Electric Furnace and Subjected to Desulfurization T. Lipiński and A. Wach	46
Synthesis and Thermal Characterization of Dysprosium Zirconate M. Mikuśkiewicz, M. Stopyra and G. Moskal	54
The Use of Topology Optimization in Shaping the Strength of Castings S. Pysz, M. Małysza and J. Piekło	62
The Research on the Ablation Casting Technology for Aluminium Alloys P. Dudek, A. Fajkiel and T. Reguła	70
Mechanical Properties of AlSi9Mg Alloy with a Sodium Modifier T. Lipiński and P. Szabracki	78

Chapter 2: Novel Engineering Solutions in Surface Engineering

Modelling of Heat Flow in Bundles of Round Steel Bars Including the Formation of Scale Layer A. Benduch, R. Wyczółkowski and J. Jowsa	89
Investigations on the Thermo-Mechanical Properties of CrN/CrCN Gradient Coatings Using a Thermo-Dilatometric Method Ł. Szparaga, P. Myśliński, A. Gilewicz and J. Ratajski	100
Corrosion Resistant Layers Produced in Vacuum Titanizing Process on a Low Carbon Steel Surface Coated Electrolytically with Cobalt E. Kasprzycka	110
Diffusion Carbide Layers Produced on Tool Steel in Chromium Chloride Atmosphere at Low Pressure B. Bogdanski	119
The Influence of Thickness of Layers in the Multilayer Coating of the PN + AlCrTiN_{multinano} Hybrid Layer on Tribological Properties J. Kacprzyńska-Gołacka, K. Rydzewska, A. Mazurkiewicz, J. Kusiński, J. Smolik, H. Garbacz and P. Wieceński	127
The Effect of Al and Si Additions on the Resistance Properties of Magnetron-Deposited FeCrNi Coatings B. Kucharska and M. Spalik	137
Prototype System for Plasma Film Surface Modification P. Domanowski, S. Bujnowski, T. Marciniak and Z. Lutowski	146

Chapter 3: Innovative Technologies for Research and Design of Machines and Mechanisms

Test Stand for Durability Tests of Rotating Elements of Office Chairs A. Zbrowski and K. Matecki	155
Research Works on the Influence of Substituting the Refrigerant R22 with Propane (R290) on the Condition of the State of Sliding Surfaces Occurring in Piston Compressors P. Tyczewski and W. Zwierzycki	163
Innovative Design of a Longwall Shearer's Haulage System with Highly Loaded Components of a Tribological Pair Manufactured According to the Precise Casting Technology A. Zachura and R. Żuczek	171
The Innovative Design of Suspension Cast Components of Vehicles Made from High-Strength AlZnMgCu Alloy Resistant to an IED Type Threat R. Żuczek, S. Pysz, P. Sprawka and T. Muszyński	181
Problems of Producing Thin-Walled and Elastic Elements by Selective Laser Sintering T. Kozior	191
Methods of Prototyping Process Using Modern Additive Technologies J. Bochnia and T. Kozior	199

Chapter 4: Novel Methods for Measurement and Control in Technical Processes

X-Ray Tomography in the Diagnostics of Roller Bearing Rings A. Zbrowski	211
Robot Actions Planning Algorithms in Multi-Agent System D. Ledziński, T. Marciniak, M. Maszewski and D. Boroński	221
Quality Parameters in Wireless Distributed Control Systems Ł. Zabłudowski, B. Marciniak, Z. Lutowski and S. Bujnowski	231
The Use of Thermography in Verification Tests of a Prototype Calorimeter Chamber T. Samborski and A. Zbrowski	238
Influence of the Gap between Measuring Head and Tested Object on the Results of an Eddy Current Test Method A. Zbrowski and W. Jóźwik	246
Monitoring the FSW Processes Using a Multispectral Vision Method J. Mężyk and P. Garbacz	255
Application of Optical Inspection Method for Testing the Correctness of Ball Bearings Assembly P. Garbacz and P. Czajka	264
Model of Intelligent Design and Optimisation of Structures of Vision Systems for Surface Inspection T. Wójcicki	272
Differential Ion Mobility Spectrometry in Application to the Analysis of Gases and Vapours M. Maziejuk, W. Lisowski, M. Szyposzyńska, T. Sikora and A. Zalewska	283
Innovative Optical System for the Inspection of Manufacturing Processes Using the Wavelet Approach B. Marciniak, M. Maszewski, Ł. Zabłudowski and D. Ledziński	291
The Development of the "Terra AFM" Microscope S. Pawłowski, G. Dobiński, M. Smolny, A. Majcher, A. Zbrowski and M. Mrozek	299
System for the Measurement of Efficiency of Heat Recuperation in Ventilation Systems in Energy Efficient Buildings S. Kozioł and A. Zbrowski	308
Thermography Testing of a Test Stand for Determining the Efficiency of Heat Recuperators A. Zbrowski and S. Zacharski	316
Examples of Laser Processing Control with Machine Vision Feedback J. Reiner, W. Cieszyński, M. Sidorowicz, M. Wiercioch and E. Chlebus	325

Teleoperation in Remote Steering System Built in Unmanned Land Vehicles A. Bartnicki	333
Simulators of Industrial Processes K. Dzierżek	340
Materials Diagnostics: Non-Destructive Identification of Degraded Areas of Microstructure J.T. Bonarski	348
Stresses in a Cr-Ni Superficial Steel Layer Based on X-Ray Measurements and Electropolishing B. Kucharska and M. Krzywiecki	355
Determination of Fatigue Limit by Locati Method using S-N Curve Determined by Means of Thermographic Method A. Lipski	362
System for Automatic Web Guiding for Roll-to-Roll Machine Working in a Start-Stop Mode M. Neska and A. Majcher	374