

Table of Contents

Preface

Chapter 1: Innovative Solutions in Surface Engineering

Composite ZrO₂-Based Cermet Material Modified with Mo

A. Wrona, K. Czechowska, M. Osadnik, M. Kamińska, M. Lis, K. Bilewska, M. Czepelak, G. Więclaw and G. Moskal 3

The Study on Erosive and Abrasive Wear Resistance of Different Multilayer Coatings Obtained on Titanium Alloy Ti6Al4V

A. Mazurkiewicz, J. Smolik, D. Paćko, J. Kacprzyńska-Gołacka, H. Garbacz and P. Wieciński 9

Nanomultilayer Coatings Based on Vanadium Nitride

J. Smolik, A. Mazurkiewicz, Z. Słomka, J. Bujak, J. Kacprzyńska-Gołacka, H. Garbacz and P. Wieciński 15

Universal Research Instrumentation for Erosion Tests

A. Mazurkiewicz, J. Smolik, W. Mizak, J. Mężyk and D. Paćko 21

The Influence of Microstructure of Nanomultilayer AlN-CrN-TiN Coatings on their Tribological Properties at Elevated Temperature

J. Kacprzyńska-Gołacka, J. Smolik, A. Mazurkiewicz, J. Bujak, H. Garbacz and P. Wieciński 27

Composite Layers TiAl_{Intermetallic}/PVD Coating Obtained by Hybrid Surface Treatment Technology on Aluminium Alloys

J. Smolik, A. Mazurkiewicz, J. Kacprzyńska-Gołacka and M. Rydzewski 34

Optimization of CrN/CrCN Gradient Coatings

Ł. Szparaga, P. Bartosik, A. Gilewicz and J. Ratajski 41

Thermal Stability and Corrosion Resistance of Cr/CrN Multilayer Coatings on Ti6Al4V Alloy

P. Wieciński, J. Smolik, H. Garbacz and K.J. Kurzydłowski 47

Mechanisms for the Transfer of Innovative Surface Engineering Solutions to Industrial Practice on the Example of Hybrid Layers

A. Mazurkiewicz, J. Smolik and B. Poteralska 54

Cylindrical Magnetron with Dynamic Magnetic Field

M. Betiuk 61

Chapter 2: Technologies and Mechatronic Devices for Quality Inspection and Measurements in Industry

Inspection of the Proprieties of Joints for Pipes with Couplers Using the Hybrid Vision Method

P. Czajka, J. Mężyk and W. Mizak 71

The Use of 2D/3D Sensors for Robotic Manipulation for Quality Inspection Tasks

B. Burski, P. Garbacz, J. Mężyk, P. Czajka and W. Mizak 77

Unique Optomechatronic Systems for Fatigue Monitoring

T. Giesko and D. Boroński 83

Simulation Model of Surface Heterogeneity, Using Gielis' Superformula for Adaptive Methods of Image Analysis

T. Wójcicki 89

The Use of Texture Analysis in Optical Inspection of Manufacturing Processes

T. Marciniak, M. Maszewski, B. Marciniak and Z. Lutowski 95

A Method for Optical Liquid Flow Analysis

Z. Lutowski, T. Marciniak, S. Bujnowski and B. Marciniak 101

Reliability in Low Emission Wireless Measurement Networks

Ł. Zabłudowski, B. Marciniak, D. Ledziński and M. Maszewski 107

Assessment of an Influence of Real Values of V-Block Method Parameters on the Method Accuracy of V-Block Waviness Measurement of Rotary Machine Parts S. Adamczak, P. Zmarzły and K. Stępień	112
New Generation Devices for Lubricant Consistency Testing J. Molenda	118
Analysis Method for Finding the Sources of Failures in Circuits with a Frequency Converter P. Mroczkowski and M. Neska	124
Inspecting the Quality of Fly Ash and the Identification of Areas of their Economic Utilisation J. Molenda	130
Influence of Geometrical Features of Material Defects on the Identification Level by the Eddy Current Method W. Jóźwik and T. Samborski	136
Truck Driving Parameters - A Comparative Study S. Koziół	142
Methodology of Comparative Studies on Air-Handling Units with Heat Recuperation S. Koziół and S. Zacharski	148
A Method and Device for Testing Impact Resistance of Glassware S. Zacharski and W. Jóźwik	154
Initial Research of Impact Strength in Adhesive Joints A. Komorek and P. Przybyłek	160

Chapter 3: Advanced Methods for Control Systems and Robotics

Event Driven Networked Control System for Impact Load Monitoring A. Majcher	169
Analysis of a Machine Safety System for a Modular PVD Test Stand J. Przybylski	175
Multi-Agent Control System for the Movement of Uniaxial Objects M. Mrozek	183
Task Scheduling Algorithms for Multi-Carrying Robots D. Ledziński, S. Smigiel, Ł. Zabłudowski and J. Zdrojewski	189
Hydropneumatic Suspension Efficiency in Terms of Teleoperated UGV Research A. Bartnicki, T. Muszyński and A. Rubiec	195

Chapter 4: Researching and Designing of Technologies, Machines and Apparatus for Technological Systems in Mechanical Engineering

Pneumatic System in a Device for Erosive Wear Tests W. Mizak	203
Innovative Metal Forming Techniques Developed at the Lublin University of Technology Z. Pater, J. Tomczak and T. Bulzak	209
The Analysis of Prototype Cast Constructions and the Assessment of their Technological and Exploitation Properties S. Pysz and R. Żuczek	215
A Prototype of a 3D Bioprinter J. Mielczarek, G. Gazdowicz, J. Kramarz, P. Łątka, M. Krzykowski, A. Miroszewski, P. Pieczarko, R. Szczelina, P. Warchoń and S. Wróbel	221
Evaluation of Durability of Haulage System Based on Low Fatigue Cycle Test and FEM Analysis J. Piekło, M. Maj, R. Żuczek and A. Zachura	227
High-Energy Impact Certification of Aero Structures: Experiments and Numerical Simulations G. Socha, S. Szalkowski and A. Zbrowski	233
Device for Low-Cost Assembly of Chips in RFID Inlays T. Samborski, J. Wiejak and E. Matras	239

Specialised Power Supply for Magnetron Plasma Sources A. Gospodarczyk	245
Transmission Proprieties of Overhead and Cable LV Power Lines – The Comparison in the Frequency Spectrum from 3 kHz to 150 kHz P. Kiedrowski	251
Test System for Electromechanical Drives Used in Changeable Ambient Conditions T. Samborski	257
Raman Studies of Amorphous Carbon Phase in Diamond Films Grown by Hot-Filament CVD A. Banaszak-Piechowska and P. Malinowski	263

Chapter 5: Industrial Technologies of Waste Recycling and Environmental Engineering

Regeneration Method of Aqueous, Technological Liquids Using a Dedicated Microfiltration System P. Łobodzin, W. Piątkiewicz and M. Grądkowski	271
A Method for the Production of Glycol Recyclates by Physicochemical Processing of Antifreeze Waste Fluids J. Molenda	278
Lubricant Purification Device and a Method for Lubricant Recycling E. Rogoś	283
Lubricating Effectiveness of Secondary Metabolites from Microalgae in Different Material Systems K. Dziosa, M. Makowska and M. Grądkowski	289
Phosphorus Removal in Anaerobic Fluidized Bed Reactor with Active Microporous Filling Produced by Extrusion Technology M. Krzemieniewski, M. Zieliński, M. Dębowski, A. Tor-Świątek, M. Makowska and M. Grądkowski	295
Innovative Method for the Combustion of Glycerol Fraction in Solid Fuel Grate Boiler M. Swat	301
A Pro-Ecological System for Using Industrial Oils and Cutting Fluids E. Rogoś	307