



Editors: Nikos Mastorakis, Valeri Mladenov, Badea Lepadatescu,  
Hamid Reza Karimi, Costas G. Helmis

# Recent Advances *in* Manufacturing Engineering



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Proceedings of the 4<sup>th</sup> International Conference on  
Manufacturing Engineering, Quality and Production Systems  
(MEQAPS '11)



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**Preface**

This year the 4th International Conference on MANUFACTURING ENGINEERING, QUALITY and PRODUCTION SYSTEMS (MEQAPS '11) was held in Barcelona, Spain, September 15-17, 2011. The conference provided a platform to discuss machining processes, productivity and efficiency improvement, total productive maintenance, flexible/integrated manufacturing systems, surface integrity and geometrical precision, complex systems engineering, integrated systems architecture, systems engineering education, technology assessment, large-scale systems, industrial systems engineering, decision analysis and methods, intelligent systems, operations research, project management, systems modeling and simulation etc. with participants from all over the world, both from academia and from industry.

Its success is reflected in the papers received, with participants coming from several countries, allowing a real multinational multicultural exchange of experiences and ideas.

The accepted papers of this conference are published in this Book that will be indexed by ISI. Please, check it: [www.worldses.org/indexes](http://www.worldses.org/indexes) as well as in the CD-ROM Proceedings. They will be also available in the E-Library of the WSEAS. The best papers will be also promoted in many Journals for further evaluation.

A conference such as this can only succeed as a team effort, so the Editors want to thank the International Scientific Committee and the Reviewers for their excellent work in reviewing the papers as well as their invaluable input and advice.

The Editors





## Table of Contents

|  |    |
|--|----|
| <b>Plenary Lecture 1: Researches Regarding the Improvement of Workpieces Surface Finish by Machining through Superfinishing Process</b>                            | 13 |
| <i>Badea Lepadatescu</i>   |    |
| <b>Plenary Lecture 2: Modeling, Stability Analysis and Synthesis of Semiactive Control Strategies for Vibration Mitigation in Structures</b>                       | 14 |
| <i>Hamid Reza Karimi</i>   |    |
| <b>HMLV Manufacturing Systems Simulation Analysis Using the Database Interface</b>   | 15 |
| <i>Juraj Svancara</i>  |    |
| <b>The Importance of Preventive Maintenance in terms of Reliability in Aviation Sector</b>   | 20 |
| <i>Emre Kiyak</i>  |    |
| <b>Prevent of Wrinkling and Rupturing Using a New Method Based on Punch Force in Hydro-Mechanical Deep Drawing Process</b>   | 25 |
| <i>Hamed Ziaeiipoor</i>  |    |
| <b>Productivity Enhancement in a Wood Furniture Manufacturing Factory by Improving Work Procedures and Plant Layout</b>  | 30 |
| <i>Korrakot Yaibuathet Tippayawong, Thitima Prapasirisulee</i>   |    |
| <b>Prediction the Limiting Drawing Ratio in Deep Drawing Process by Artificial Neural Network</b>  | 35 |
| <i>H. Mohammadi Majd, M. Jalali Azizpour</i>   |    |
| <b>Surface Roughness Prediction for Turning Operations by Neural Network</b>   | 41 |
| <i>H. Mohammadi Majd, M. Jalali Azizpour, G. Davoudi, M. Goodarzi</i>  |    |
| <b>Towards Manufacturing Concepts Unity</b>  | 46 |
| <i>Ionel Botef</i>   |    |
| <b>Prioritizing 5S Activities by Kano Model For a Semiconductor Wafer Fabrication</b>  | 52 |
| <i>Chuan-Yung Chen, Yung-Chia Chang</i>  |    |
| <b>Effect of Interactive Normal and Lateral Stiffness, Damping and Tip Dimensions on the Flexural and Torsional Vibration Modes of Rectangular AFM Cantilevers</b> | 57 |
| <i>Mehdi Shekarzadeh, Abbas Rahi</i>   |    |
| <b>Managing Manufacturing Enterprise System and CAPP System Complexity: An Investigatory Perspective</b>   | 63 |
| <i>Ionel Botef</i>   |    |
| <b>The Impact of Ionizing Radiation on the Mechanism of Current Transition in TlInSe<sub>2</sub> Monocrystals</b>  | 69 |
| <i>R. S. Madatov, A. I. Najafov, T. B. Taghiyev, M. A. Mehrabova, M. R. Gazanfarov</i>   |    |
| <b>Prediction of Inventory Levels and Capacity Utilization with Artificial Neural Networks</b>   | 73 |
| <i>Bernd Scholz-Reiter, Florian Harjes, Amir Kaviani Mehr</i>  |    |

|  |     |
|--|-----|
| <b>A Comparison of the Distortion of Machined Parts Resulting From Residual Stresses within Workpieces</b>   | 79  |
| <i>J.-F. Chatelain, J.-F. Lalonde, A. S. Tahan</i>   |     |
| <b>Effect of Tool Geometry Special Features on Cutting Forces of Multilayered CFRP Laminates</b>   | 85  |
| <i>J.-F. Chatelain, I. Zaghbani</i>  |     |
| <b>Investigating the Influence of TQM Elements on the Overall Performance of Jordanian Municipalities Case Study: Greater Irbid Municipality GIM</b> | 91  |
| <i>Mohammad D. Al-Tahat, Tayseer A. Daradkeh</i>   |     |
| <b>Research on Friction Stir Welding and Tungsten Inert Gas assisted Friction Stir Welding of Copper</b>   | 97  |
| <i>Elena Scutelnicu, Dan Birsan, Radu Cojocar</i>  |     |
| <b>Behaviour Simulation of Aluminium Alloy 6082-T6 during Friction Stir Welding and Tungsten Inert Gas Welding</b>                                   | 103 |
| <i>Dan Birsan, Elena Scutelnicu, Daniel Visan</i>  |     |
| <b>An Immersive Virtual Reality Training System for Mechanical Assembly</b>  | 109 |
| <i>Amaury Peniche, Christian Diaz, Helmuth Trefftz, Gabriel Paramo</i>   |     |
| <b>Effects of Temperature in Relation to Sheet Metal Stamping</b>  | 114 |
| <i>Paul C. Okonkwo, Michael P. Pereira, Georgina Kelly, Bernard F. Rolfe</i>   |     |
| <b>Investigation of the Effect of Changing Operating Temperature on the Creep Life and Natural Frequencies of Gas Turbine Blade</b>                  | 119 |
| <i>Abbas Rahi, Mohsen Papari</i>   |     |
| <b>Mechanical Properties Analysis of Two Nanowires with Different Cross Section</b>  | 125 |
| <i>Abbas Rahi, Mohammad Ali Arjomandi, Reza Abedi</i>  |     |
| <b>Effect of Slip Factor in Hydrodynamic Behaviors of Basic Micro-Flows Problems</b>   | 131 |
| <i>K. Bataineh, A. F. Khadrawi, M. A. Al-Nimr</i>  |     |
| <b>Researches on the Influence of Gas Content from the Steel on its Quality</b>  | 139 |
| <i>Florin Dragoi, Ana Socalici, Teodor Heput, Erika Ardelean</i>   |     |
| <b>Research on Desulphurization of Steel with Calcium Aluminate Synthetic Slag with Addition of Titanium Oxide</b>                                   | 141 |
| <i>Adriana Putan, Teodor Heput, Lucia Vilceanu, Vasile Putan</i>   |     |
| <b>Performance Analysis of Re-Entrant Manufacturing Networks under Surplus-Based Production Control</b>  | 152 |
| <i>K. K. Starkov, A. Y. Pogromsky, I. J. B. F. Adan, J. E. Rooda</i>   |     |
| <b>Contributions on the Study of Internal Flaws in Continuous Cast Semi-Finished Products</b>  | 161 |
| <i>Erika Popa, Teodor Heput, Erika Ardelean, Ana Socalici</i>  |     |
| <b>Research on the Influence of Binders with Basic Data Base on Compressive Strength of Pellets</b>  | 165 |
| <i>Eugen Crisan, Marius Ardelean, Lucia Vilceanu, Teodor Heput</i>   |     |

|   |     |
|---|-----|
| <b>Research on Quality of Steel for Production of Rolling Cylinders</b><br><i>Adina Pauca, Teodor Heput, Virginia Socalici, Ana Josan</i>   | 170 |
| <b>Theoretical Research on the Failure Mode and Effects Analysis (FMEA) Method and Structure</b><br><i>Florina-Cristina Filip</i>   | 176 |
| <b>Experimental Investigation for the Elimination of Heat Treatment Related Distortion for the Production of 'Grizzly Bar' Casting Made of (12-14) % Manganese Steel</b><br><i>Mohammad Hayajneh, Mohammad Al-Tahat, Walid Khraisat, Salman Alshobaki</i> | 182 |
| <b>Researches Regarding the Improvement of Workpieces Surface Finish by Machining through Superfinishing Process</b><br><i>Badea Lepadatescu, Adela-Eliza Dumitrascu, Ioan Enescu, Anisor Nedelcu</i>   | 190 |
| <b>Kinematics of a Variable Compression Ratio Engine</b><br><i>Adrian Gabor, Paul Grigore, Eugenia Secara, Leonte Petric, Ioan-Serban Radu</i>  | 196 |
| <b>Mathematical Model used for the Vibration Insulation within a Car</b><br><i>Ionatan Popa, Eugenia Secara, Leonte Petric, Violeta Guiman, Carol Ambrus, Vlase Sorin</i>   | 200 |
| <b>Research on the Recovery of Oil in the Iron and Steel Mill Scale</b><br><i>Maria Laura Strugariu, Sorina Serban, Erika Ardelean, Ana Socalici, Teodor Heput</i>  | 204 |
| <b>Design and Control of an Automatized Stacker Crane for Warehouses</b><br><i>Jozef Dorner, Michal Blaho</i>   | 208 |
| <b>Interconnecting Matlab with TwinCAT</b><br><i>Ludovit Farkas, Luboslav Janicek, Jan Murgas, Juraj Hnat</i>   | 214 |
| <b>Networked Control Systems with PROFINET and IWLAN</b><br><i>Michal Blaho, Leo Mrafko, Martin Urban, Jan Murgas</i>   | 219 |
| <b>Robust Quality Analysis Using Coarsely Discretized Measurements</b><br><i>Maxime Deregnaucourt, Martin Kozek</i>   | 224 |
| <b>Intelligent Manufacturing and Computer Integration Manufacturing Systems</b><br><i>Simona Sofia Duicu, Luminita Popa</i>   | 230 |
| <b>Risk Assessment of Radiological and Non-radiological Hazard for Accident Prevention in Decommissioning Activities</b><br><i>Hyeon-Kyo Lim, Kwan-Seong Jeong, Kune-Woo Lee</i>  | 237 |
| <b>Evaluation of using Advanced Manufacturing Technologies and Clusters of Advanced Technologies</b><br><i>Jan Hribik</i>   | 241 |
| <b>The Profitability of Companies Operating in the Czech Stone Cluster and its Impacts</b><br><i>Jan Hribik</i>   | 247 |
| <b>Finite Elements Method (FEM) Investigation Seamless Pipes Production Hot Pilger Rolling Process</b><br><i>Abbas Rahi, S. Javad Jandaghi, A. Hossein Jalali, Reza Abedi</i>   | 252 |

|  |     |
|--|-----|
| <b>Supply Chain Organization and Management in French SMEs: An Exploratory Study</b><br><i>Calin Gurau</i>   | 256 |
| <b>An Overview of Critical Chain applied to Project Management</b><br><i>Francisco Correia, Antonio Abreu</i>  | 261 |
| <b>Architecture of Knowledge Management in the Manufacturing Process</b><br><i>Luiza Daschievici, Daniela Ghelase, Vasile Marinescu</i>                                  | 268 |
| <b>Considerations on Knowledge Management in Cutting Process</b><br><i>Daniela Ghelase, Luiza Daschievici, Vasile Marinescu</i>  | 273 |
| <b>Aspects of the Defect Analysis Methodology</b><br><i>Leonid Kuznetsov, Nikita Dorin</i>   | 279 |
| <b>Hardware-in-the-Loop Simulation of an Active Heave Compensated Drawworks</b><br><i>Sanin Muraspahic, Lawk Farji, Yousef Iskandarani, Hamid Reza Karimi</i>            | 285 |
| <b>Modeling and Simulation of an Active Heave Compensated Draw-Works</b><br><i>Ahmed A. Walid, Peter Gu, Yousef Iskandarani, Hamid Reza Karimi</i>                       | 291 |
| <b>Estimation of a Normal Process Variance from Measurements with Large Round-Off Errors</b><br><i>Diamanta Benson-Karhi, Ellite Dvir, Itai Regev, Edna Schechtman</i>   | 297 |
| <b>A Study for Tool Deflection in using Actual Shape</b><br><i>Hae-Soo Lee, Jin-Ah Kim, Byung-Hun Park, Tae-Hoo Kim, Eon-Chan Jeon, Hyunsu Kim</i>                       | 303 |
| <b>Determination of the Forming Conditions of fitting Pipes Using the Bulging Processes</b><br><i>SeungGul Baek, TaeGul Kim, SeungKyu Kim, TaeHo Kim, YoungChul Park</i> | 306 |
| <b>A Study for FCAW Welding Fabrication Characteristics of Marine Structure</b><br><i>Sung-Hwan Jee, Jung-Do Chun, Min-Sik Han</i>                                       | 311 |
| <b>New Software to Generate the CNC Code for Turning Operations</b><br><i>R. T. Curta, N. Balc, A. Carean</i>  | 315 |
| <b>Authors Index</b>   | 321 |

## Plenary Lecture 1

### Researches Regarding the Improvement of Workpieces Surface Finish by Machining through Superfinishing Process



#### Associate Professor Badea Lepadatescu

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**Abstract:** In the paper is presented a machine for superfinishing external surfaces of cylindrical workpieces with diameters between 5 to 30 mm and length between 10 to 300 mm. The surface finish that is obtained for the workpieces is very high with the roughness values Ra between 0,4 - 0,2  $\mu\text{m}$ . The parts are placed between two cylinders that have a rotational movement and with nonparallel axis. This feature allow for the parts to have a rotation motion and a transverse motion simultaneously while the abrasive stones which have a reciprocation motion make the abrasion action on the workpiece surfaces.

The machine is automatically fed with parts and has a great productivity. An operator can work and control two these machines in the same time.

#### Brief Biography of the Speaker:

Badea Lepadatescu is currently an Associate Professor at the Faculty of Manufacturing Engineering of the Transilvania University of Brasov, Romania. He obtained his doctoral degree in 1998 in the area of machining through superfinishing process. After he graduated he worked five years as design engineer at Roman truck factory in the field of manufacturing processes where designed many devices and special machines especially for superfinishing process. Started on 1982 he worked as research engineer at Transilvania University of Brasov, and after 1997 he is teaching at Faculty of Manufacturing Engineering department. His main academic interests include Tolerance and Dimensional Control, Manufacturing Engineering Processes, Automation Processes, and Renewable Energy Sources. The research accomplishments are reflected through publications in a six books and authored or co-authored over 120 papers published at international conferences. He has extensive experience in both experimental and theoretical research work having more than 50 contracts with factories to design and produce machines for machining processes. Also in the field of Renewable Energy Sources together with a team he made two wind turbines, one with horizontal axis for taking water, and one with vertical axis to produce electric energy. He has been speaker to international conferences, has moderated forums, organized workshops and sessions at major international conferences.

## Plenary Lecture 2

### Modeling, Stability Analysis and Synthesis of Semiactive Control Strategies for Vibration Mitigation in Structures



**Professor Hamid Reza Karimi**  
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**Abstract:** For the past three decades, significant research and development have been conducted in the field of structural control to mitigate excessive responses caused by earthquake, wind, etc. Structures such as buildings, bridges and vehicle suspension systems are subject to vibrations that may cause malfunctioning, discomfort or collapse. In order to make structures more resistant against these phenomena, passive and active dampers were initially proposed. Magnetorheological dampers are highly nonlinear semiactive devices that can produce high damping forces with less energy requirements than other devices of their class. Additionally, these systems are characterized by parametric uncertainties, limited measurement availability and unknown disturbances. The presence of these factors makes mandatory the use of complex control techniques in order to get a reliable performance of the control system. This talk will highlight some new control algorithms that incorporate these problems in their formulation, especially, the dynamics of the damper.

#### **Brief Biography of the Speaker:**

Hamid Reza Karimi, born in 1976, is a Professor in Control Systems at the Faculty of Engineering and Science of the University of Agder in Norway. His research interests are in the areas of nonlinear systems, networked control systems, robust control/filter design, time-delay systems, wavelets and vibration control of flexible structures with an emphasis on applications in engineering.

Dr. Karimi is a senior member of IEEE and serves as chairman of the IEEE chapter on control systems at IEEE Norway section. He is also serving as an editorial board member for some international journals, such as *Mechatronics*, *Journal of The Franklin-Institute*, *International Journal of Control, Automation and Systems*, *Journal of Innovative Computing Information and Control-Express Letters*, and *International Journal of Control Theory and Applications*, etc. He is a member of IEEE Technical Committee on Systems with Uncertainty, IFAC Technical Committee on Robust Control and IFAC Technical Committee on Automotive Control. He was the recipient of the Juan de la Cierva Research Award in 2008, Alexander-von-Humboldt-Stiftung Research Fellowship in 2006, German Academic Exchange Service (DAAD) Research Fellowship in 2003, National Presidency Prize for Distinguished PhD student of Electrical Engineering in 2005 and National Students Book Agency's Award for Distinguished Research Thesis in 2007, etc.

## Authors Index

|                   |               |                  |               |                    |               |
|-------------------|---------------|------------------|---------------|--------------------|---------------|
| Abedi, R.         | 125, 252      | Grigore, P.      | 196           | Okonkwo, P. C.     | 114           |
| Abreu, A.         | 261           | Gu, P.           | 291           | Papari, M.         | 119           |
| Adan, I. J. B. F. | 152           | Guiman, V.       | 200           | Paramo, G.         | 109           |
| Al-Nimr, M. A.    | 131           | Gurau, C.        | 256           | Park, B.-H.        | 303           |
| Alshobaki, S.     | 182           | Han, M.-S.       | 311           | Park, Y. C.        | 306           |
| Al-Tahat, M. D.   | 91, 182       | Harjes, F.       | 73            | Pauca, A.          | 170           |
| Ambrus, C.        | 200           | Hayajneh, M.     | 182           | Peniche, A.        | 109           |
| Ardelean, E.      | 139, 161, 204 | Heput, T.        | 139, 141, 161 | Pereira, M. P.     | 114           |
| Ardelean, M.      | 165           | Heput, T.        | 165, 170, 204 | Petric, L.         | 196, 200      |
| Arjomandi, M. A.  | 125           | Hnat, J.         | 214           | Pogromsky, A. Y.   | 152           |
| Azizpour, M. J.   | 35, 41        | Hribik, J.       | 241, 247      | Popa, E.           | 161           |
| Baek, S. G.       | 306           | Iskandarani, Y.  | 285, 291      | Popa, I.           | 200           |
| Balc, N.          | 315           | Jalali, A. H.    | 252           | Popa, L.           | 230           |
| Bataineh, K.      | 131           | Jandaghi, S. J.  | 252           | Prapasirisulee, T. | 30            |
| Benson-Karhi, D.  | 297           | Janicek, L.      | 214           | Putan, A.          | 141           |
| Birsan, D.        | 97, 103       | Jee, S.-H.       | 311           | Putan, V.          | 141           |
| Blaho, M.         | 208, 219      | Jeon, E.-C.      | 303           | Radu, I.-S.        | 196           |
| Botef, I.         | 46, 63        | Jeong, K.-S.     | 237           | Rahi, A.           | 57, 119, 125  |
| Carean, A.        | 315           | Josan, A.        | 170           | Rahi, A.           | 252           |
| Chang, Y.-C.      | 52            | Karimi, H. R.    | 285, 291      | Regev, I.          | 297           |
| Chatelain, J.-F.  | 79, 85        | Kelly, G.        | 114           | Rolfe, B. F.       | 114           |
| Chen, C.-Y.       | 52            | Khadrawi, A. F.  | 131           | Rooda, J. E.       | 152           |
| Chun, J.-D.       | 311           | Khraisat, W.     | 182           | Schechtman, E.     | 297           |
| Cojocar, R.       | 97            | Kim, H.          | 303           | Scholz-Reiter, B.  | 73            |
| Correia, F.       | 261           | Kim, J.-A.       | 303           | Scutelnicu, E.     | 97, 103       |
| Crisan, E.        | 165           | Kim, S. K.       | 306           | Secara, E.         | 196, 200      |
| Curta, R. T.      | 315           | Kim, T. G.       | 306           | Serban, S.         | 204           |
| Daradkeh, T. A.   | 91            | Kim, T.-H.       | 303, 306      | Shekarzadeh, M.    | 57            |
| Daschievici, L.   | 268, 273      | Kiyak, E.        | 20            | Socalici, A.       | 139, 161, 204 |
| Davoudi, G.       | 41            | Kozek, M.        | 224           | Socalici, V.       | 170           |
| Deregnacourt, M.  | 224           | Kuznetsov, L.    | 279           | Sorin, V.          | 200           |
| Diaz, C.          | 109           | Lalonde, J.-F.   | 79            | Starkov, K. K.     | 152           |
| Dorin, N.         | 279           | Lee, H.-S.       | 303           | Strugariu, M. L.   | 204           |
| Dorner, J.        | 208           | Lee, K.-W.       | 237           | Svancara, J.       | 15            |
| Dragoi, F.        | 139           | Lepadatescu, B.  | 190           | Taghiyev, T. B.    | 69            |
| Duicu, S. S.      | 230           | Lim, H.-K.       | 237           | Tahan, A. S.       | 79            |
| Dumitrascu, A.-E. | 190           | Madatov, R. S.   | 69            | Tippayawong, K. Y. | 30            |
| Dvir, E.          | 297           | Majd, H. M.      | 35, 41        | Trefftz, H.        | 109           |
| Enescu, I.        | 190           | Marinescu, V.    | 268, 273      | Urban, M.          | 219           |
| Farji, L.         | 285           | Mehr, A. K.      | 73            | Vilceanu, L.       | 141, 165      |
| Farkas, L.        | 214           | Mehrabova, M. A. | 69            | Visan, D.          | 103           |
| Filip, F.-C.      | 176           | Mrafko, L.       | 219           | Walid, A. A.       | 291           |
| Gabor, A.         | 196           | Muraspahic, S.   | 285           | Zaghbani, I.       | 85            |
| Gazanfarov, M. R. | 69            | Murgas, J.       | 214, 219      | Ziaeiipoor, H.     | 25            |
| Ghelase, D.       | 268, 273      | Najafov, A. I.   | 69            |                    |               |
| Goodarzi, M.      | 41            | Nedelcu, A.      | 190           |                    |               |