Forty-Sixth CIRP Conference on Manufacturing Systems (CIRP CMS 2013)

Economic Development and Wealth through Globally Competitive Manufacturing Systems

Setubal, Portugal
29-30 May 2013

Editors:

Pedro F. Cunha

# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Editorial</td>
<td>1</td>
</tr>
<tr>
<td>Evolving Paradigms of Manufacturing: From Mass Production to Mass Customization and Personalization</td>
<td>3</td>
</tr>
<tr>
<td>What Tracks for Sustainable Production Systems in Europe?</td>
<td>9</td>
</tr>
<tr>
<td>Manufacturing Systems: Skills &amp; Competencies for the Future</td>
<td>17</td>
</tr>
<tr>
<td>Virtual Factory: An Integrated Framework for Manufacturing Systems Design and Analysis</td>
<td>25</td>
</tr>
<tr>
<td>Measuring Global Production Effectiveness</td>
<td>31</td>
</tr>
<tr>
<td>Manufacturing Network Design for Mass Customisation using a Genetic Algorithm and an Intelligent Search Method</td>
<td>37</td>
</tr>
<tr>
<td>Structural Complexity of Assembly Supply Chains: A Theoretical Framework</td>
<td>43</td>
</tr>
<tr>
<td>Towards Socio-Cyber-Physical Systems in Production Networks</td>
<td>49</td>
</tr>
<tr>
<td>An Organizational Concept for Collaborative Enterprise Networks</td>
<td>55</td>
</tr>
<tr>
<td>Conceptual Framework for Non-hierarchical Business Networks for Complex Products Design and Manufacturing</td>
<td>61</td>
</tr>
<tr>
<td>Methodology for the Assessment of Structural Complexity in Global Production Networks</td>
<td>67</td>
</tr>
<tr>
<td>Opportunities in the Wake of Crisis</td>
<td>73</td>
</tr>
<tr>
<td>Managing Complexity in Supply Chains: A Discussion of Current Approaches on the Example of the Semiconductor Industry</td>
<td>79</td>
</tr>
<tr>
<td>Coalition Formation Based Multi-item Multi-attribute Negotiation of Supply Chain Networks</td>
<td>85</td>
</tr>
<tr>
<td>Concurrent Product – Supply Chain Design: A Conceptual Framework &amp; Literature Review</td>
<td>91</td>
</tr>
<tr>
<td>Control-theoretic Analysis of the Lead Time Syndrome and Its Impact on the Logistic Target Achievement</td>
<td>97</td>
</tr>
<tr>
<td>Risk-Value-Cost-based Optimization of Global Value-Adding Structures</td>
<td>103</td>
</tr>
<tr>
<td>A Generic Approach for the Graph-based Integrated Production and Intermodal Transport</td>
<td>109</td>
</tr>
<tr>
<td>Scheduling with Capacity Restrictions</td>
<td>115</td>
</tr>
<tr>
<td>A Game Theoretic Model to Manufacturing Planning with Single Manufacturer and Multiple Suppliers with Asymmetric Quality Information</td>
<td>121</td>
</tr>
<tr>
<td>Ad-hoc Rescheduling and Innovative Business Models for Shock-Robust Production Systems</td>
<td>127</td>
</tr>
<tr>
<td>Milkrun Vehicle Routing Approach for Shop-Floor Logistics</td>
<td>133</td>
</tr>
<tr>
<td>Virtual Reality as a Collaboration Tool for Factory Planning based on Scenario Technique</td>
<td>139</td>
</tr>
<tr>
<td>Multidimensional Evaluation of the Changeability of Interlinked Production Processes with Material Flow Simulation</td>
<td>145</td>
</tr>
</tbody>
</table>
Compensation of Errors in Robot Machining with a Parallel 3D-Piezo Compensation Mechanism
Ulrich Schneider, Manuel Drast, Arnold Puzik, Alexander Vert

Development and Research of Environmentally Friendly Dry Technological Machining System with
Compensation of Physical Function of Cutting Fluids

R. L. G. Monaro, A. L. Hellessen, K. Schützer

Genetic Algorithm-based Optimization of Cutting Parameters in Turning Processes
Doriana M. D’Addona, Roberto Tett

A Real-time Collision Prevention System for Machine Tools
Marco Schumann, Marco Witz, Philipp Klimant

Study of the Environmental and Technical Performance of a Diesel Engine with the Alternative Use
of Biofuel Obtained from the Reutilization of Vegetable Oil
Adeliton Fernandes, Alexandre Tadeu Simon, Carlos Roberto Camello Lima

Influence of Process Parameters in the Friction Surfacing of AA 6082-T6 over AA 2024-T3
J. Gandra, D. Pereira, R. M. Miranda, P. Vilač

Learning Defect Classifiers for Textured Surfaces Using Neural Networks and Statistical Feature
Representations
D. Weimer, H. Thamer, B. Scholz-Reiter

Predicting Dimensional Deviations of Structural Vehicle Body Parts Deep Drawn from Aluminum
Blanks
Julius F. Klinger, Martin Bohn

Advances in NDT and Materials Characterization by Eddy Currents
G. Almeida, J. Gonzalez, L. Rosado, P. Vilaça, Telmo G. Santos

#Architecture and Conceptual Design for IPS2-Execution Systems
Horst Meier, Thomas Dorka, Friedrich Morlock

A Methodology for Product-service Systems Development
Pedro Marques, Pedro F. Cunha, Fernando Valente, Ana Leitão

A Framework for Developing Portfolios of Improvements Projects in Manufacturing
Bernard J. Kornfeld, Sami Kara

Roadmap for Business Models Definition in Manufacturing Companies
A. Leitão, P. Cunha, F. Valente, P. Marques

Five Models of Platform-type Product Service Systems in Manufacturing
Nariaki Nishino, Sihui Wang, Nobuyuki Tsuji, Kazuro Kageyama, Kanji Ueda

A PSS Model for Diamond Gemstone Processing: Economic Feasibility Analysis
Joris Van Ostaeyen, Yves Kerremans, Guy Van Goethem, Joost R. Duyfou

Statistical Process Control as a Service: An Industrial Case Study
Gašper Škulja, Rok Vrabic, Peter Butula, Aljoša Sluga

Integrated Control System Simulation for Supporting Changes of Routing Strategy in an Automated
Material Flow System
Aezel Azaawi, Abdul Rahman, Günther Seliger

Method for Situation-based Modeling and Simulation of Assembly Systems
Michael Neumann, Engelbert Westkämper

Visualization Support for Virtual Redesign of Manufacturing Systems
Erik Lindskog, Jonatan Berglund, Johan Vallhagen, Björn Johansson

Integrated Virtual Platform for Manufacturing Systems Design
Marcello Colledani, Giulia Pedrielli, Walter Terkaj, Marcello Urgo

3D Design Support for Rapid Virtual Prototyping of Manufacturing Systems
István Németh, János Pispóki, Csaba Haraszkó, Gyula Mátayási, Tibor Nagy, Christopher Freeman, Robin W.
Scott, James S. Baldwin

Agent based Manufacturing Simulation for Efficient Assembly Operations
Yasuhiro Sudo, Michiko Matsuda

Object-oriented Modeling of Manufacturing Resources Using Work Study Inputs
R. Hedman, R. Sundkvist, P. Almström, A. Kinnander

Analyzing the Influence of Capacity Adjustments on Performance Robustness in Dynamic Job-Shop
Environments
Mirja Meyer, Marius-Vasile Apostu, Katja Windt

Methodology and Data-structure for a Uniform System’s Specification in Simulation Projects
Csaba Kardos, Gergely Popovics, Botond Kádár, László Monostori

Viable System Model for Manufacturing Execution Systems
Christian Breecher, Simon Müller, Thomas Breitbach, Wolfram Lohse
Enhanced Production Control for Prepreg Manufacturing
Tohias R. Philipp, Thomas Winkler, Gunther Reinhart
467
Modelling Complex Production Processes in Aerospace Industry based on Dimensional Analysis
S. N. Grigoriev, A. A. Kutin, M. V. Turkin
473
Four Types of Manufacturing Process Innovation and Their Managerial Concerns
Yaji Yamamoto, Monica Bellgran
479
Proposal for a Generic Model Dedicated to Reconfigurable and Agile Manufacturing Systems (RAMS)
Imad Chaffoun, Khalid Kousis, Anne-Lise Hayet, Nicolas Bouton, Pascal Roy
485
Changeability by a Modular Design of Production Systems – Consideration of Technology, Organization and Staff
Horst Meier, Stefan Schröder, Niklas Kreggenfeld
491
A Dispatching Algorithm and Software Tool for Managing the Part Flow of Reconfigurable Transportation System
Anna Valente, Andrea Cataldo, Emanuele Carpanzano
497
Multi-agent Systems vs IEC 61499 for Holonic Resource Control in Reconfigurable Systems
K. Kruger, A. H. Basson
503
Passive Haptic Feedback for Manual Assembly Simulation
Nestor Andrs Arteaga Martin, Victor Mittelstädt, Michael Prieur, Rainer Stark, Thomas Bär
509
Developing Concepts for Improved Efficiency of Robot Work Preparation
M. S. Essers, T. H. J. Vaneke
515
Disassembly Liaison Graphs Inspired by Word Clouds
Robert J. Riggs, S. Jack Hu
521
Virtual Fort Knox Federative, Secure and Cloud-based Platform for Manufacturing
Philipp Holbewert, Rolf Watze, Joachim Seidelmann, Thomas Bauerhansl
527
H. Shidpour, A. Bernard, M. Shahrokhi
533
Modelling of Flexibility Costs in a Decision Support System for Mid-term Capacity Planning
Lukas Lingitz, Christian Morawetz, Dariusch Tavaghof Gigloo, Stefan Minner, Wilfried Sihn
539
Contact-less and Programming-less Human-Robot Collaboration
Bernard Schmidt, Lihai Wang
545
Maintenance Database
José Caldeira Duarte, Pedro F. Cuahoa, João T. Craveiro
551
Impact of Machine Reliability Data Uncertainty on the Design and Operation of Manufacturing Systems
M. Colledani, A. Yemane
557
Spare Parts Planning for Offshore Wind Turbines Subject to Restrictive Maintenance Conditions
Kirsten Tracht, Jan Westerholt, Peter Schub
563
Lean Leadership – Fundamental Principles and their Application
U. Dombrowski, T. Mielke
569
Continuous Improvement Beyond the Lean Understanding
Halvor Holtskog
575
A Systematic Approach on Developing Action-oriented, Competency-based Learning Factories
580
An Approach for Integrated Design of Flexible Production Systems
Alexandra F. Marques, António C. Alves, Jorge P. Sousa
586
Efficiency and Economic Evaluation of Cellular Manufacturing to Enable Lean Machining
Joachim Metternich, Sven Bechtloff, Stefan Seifermann
592
Improving Changeover Time: A Tailored SMED Approach for Welding Cells
Pablo Guzmán Ferradás, Konstantinos Salonitis
598
Lean and Proactive Liquidity Management for SMEs
Frank Zwijller, Eftal Okhan, Engelbert Westkämper
604
Beyond Lean and Six Sigma; Cross-collaborative Improvement of Tolerances and Process Variations-A Case Study
Lars Krogstie, Kristian Martinsen
610
Casting Defect Analysis using Design of Experiments (DoE) and Computer Aided Casting Simulation Technique
Uday A. Dabade, Rahul C. Bhedaghaonkar
616
Enabling Energy Management for Planning Energy-Efficient Factories
Egon Müller, Romina Poller, Hendrik Hopf, Manuela Krones
622