

Sixth International Conference on Changeable, Agile, Reconfigurable and Virtual Production (CARV 2016)

Procedia CIRP Volume 52

Bath, United Kingdom
4 - 6 September 2016

Editors:

**Aydin Nassehi
Stephen Newman**

ISBN: 978-1-5108-2925-1

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© by Elsevier B.V.
All rights reserved.

Printed by Curran Associates, Inc. (2016)

For permission requests, please contact Elsevier B.V.
at the address below.

Elsevier B.V.
Radarweg 29
Amsterdam 1043 NX
The Netherlands

Phone: +31 20 485 3911
Fax: +31 20 485 2457

<http://www.elsevierpublishingsolutions.com/contact.asp>

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

HYPERCONNECTED MANUFACTURING ENTERPRISES

DETERMINANTS OF AN APPROPRIATE DEGREE OF AUTONOMY IN A CYBER-PHYSICAL PRODUCTION SYSTEM	1
<i>Norbert Gronau</i>	
DEVELOPMENT OF A NOVEL SOLUTION TO ENABLE INTEGRATION AND INTEROPERABILITY FOR CLOUD MANUFACTURING	6
<i>Jalal Delaram, Omid Fatahi Valilai</i>	
SOFTWARE-DEFINED CLOUD MANUFACTURING FOR INDUSTRY 4.0	12
<i>Lane Thames, Dirk Schaefer</i>	
A HYPERCONNECTED MANUFACTURING COLLABORATION SYSTEM USING THE SEMANTIC WEB AND HADOOP ECOSYSTEM SYSTEM	18
<i>Hsiao-Kang Lin, Jennifer A. Harding, Chun-I Chen</i>	
STANDARDIZED CLASSIFICATION AND INTERFACES OF COMPLEX BEHAVIOUR MODELS IN VIRTUAL COMMISSIONING	24
<i>Sebastian Süß, Dominik Hauf, Anton Strahilov, Christian Diedrich</i>	
INTEROPERABILITY AS A KEY ENABLER FOR MANUFACTURING IN THE CLOUD	30
<i>M. Mourad, A. Nassehi, D. Schaefer</i>	
PLANNING AND DEVELOPING CYBER-PHYSICAL ASSEMBLY SYSTEMS BY CONNECTING VIRTUAL AND REAL WORLDS	35
<i>Rainer Müller, Leenhard Hörauf, Matthias Vette, Christoph Speicher</i>	
MASTERING COMPLEXITY WITH AUTONOMOUS PRODUCTION PROCESSES	41
<i>Hanna Theuer, Sander Lass</i>	
ON SERVICITIZATION OF THE MANUFACTURING INDUSTRY IN THE UK	46
<i>James Huxtable, Dirk Schaefer</i>	

PRODUCT & PRODUCTION CO-DEVELOPMENT

ENGINEERED HOURS PER PRODUCT FOR SIMULTANEOUS ENGINEERING	52
<i>Jan-Fabian Meis, Anna Theresa Tüshaus, Gunther Reinhart</i>	
BALANCING GLOBAL CUSTOMER NEEDS AND PROFITABILITY USING A NOVEL BUSINESS MODEL FOR NEW MODEL PROGRAMMES IN THE AUTOMOTIVE INDUSTRY	56
<i>R. Mills, L. B. Newnes, A. Nassehi</i>	
TRADITIONAL AND AGILE PRODUCT DEVELOPMENT IN A HYPERCONNECTED WORLD: TURNING WEAKNESSES INTO STRENGTHS	62
<i>Fausto Guaragni, Tobias Schmidt, Kristin Paetzold</i>	
TOWARDS AGILE ENGINEERING OF MECHATRONIC SYSTEMS IN MACHINERY AND PLANT CONSTRUCTION	68
<i>Thorsten P. Klein, Gunther Reinhart</i>	
IMPACT OF PRODUCT PLATFORM AND MARKET DEMAND ON MANUFACTURING SYSTEM PERFORMANCE AND PRODUCTION COST	74
<i>Sufian K. Aljorephani, Hoda A. Elmaraghy</i>	
REALISING DIGITAL CONNECTIVITY BY USING INTERDEPENDENCIES WITHIN A PRODUCTION PROCESS	80
<i>Georg Kasakow, Jan C. Aurich</i>	
EFFICIENCY AND SECURITY OF PROCESS TRANSPARENCY IN PRODUCTION NETWORKS—A VIEW OF EXPECTATIONS, OBSTACLES AND POTENTIALS	84
<i>Elisabeth Ilie-Zudor, Zsolt Kemény, Davy Preuveneers</i>	
SYNCHRONIZATION EMERGENCE AND ITS EFFECT ON PERFORMANCE IN QUEUEING SYSTEMS	90
<i>Manuel A. Schipper, Stanislav M. Chankov, Julia Bendul</i>	
AN APPROACH FOR OPTIMIZING THE PREPARATION AND PRODUCTION PLANNING PROCESS IN SINGLE ITEM PRODUCTION	96
<i>Farhang Akhaveri, Friedrich Bleicher, Arameh Khallaghi</i>	

FUNCTIONAL SYNTHESIS OF MANUFACTURING SYSTEMS USING CO-PLATFORMING	102
<i>Mohamed Abbas, Hoda Elmaraghy</i>	

ENABLERS OF CHANGE AND SUCCESS IN PRODUCTION

ROADMAP FOR DEPLOYING SEMANTIC GD&T IN MANUFACTURING	108
<i>Martin Hardwick</i>	
ADAPTATION OF RECONFIGURABLE MANUFACTURING SYSTEMS FOR INDUSTRIAL ASSEMBLY – REVIEW OF FLEXIBILITY PARADIGMS, CONCEPTS, AND OUTLOOK.....	112
<i>Guido Huettemann, Christian Gaffry, Robert H. Schmitt</i>	
MODELLABILITY OF SYSTEM CHARACTERISTICS - USING FORMAL MARK-UP LANGUAGES FOR CHANGE CAPABILITY BY DESIGN.....	118
<i>Norbert Gronau, Birgit Vogel-Heuser, Edzard Weber, André Ullrich, Daniel Schütz</i>	
WHAT IS REALLY “ON-TIME”? A COMPARISON OF DUE DATE PERFORMANCE INDICATORS IN PRODUCTION	124
<i>Ricarda Schäfer, Stanislav Chankov, Julia Bendul</i>	
RECOMMENDER SYSTEM FOR ACYCLIC GRAPH GENERATION IN MULTI-AGENT ASSEMBLY LINE PLANNING	130
<i>Daniel Neumann</i>	
APPLICATION OF MODULE DRIVERS CREATING MODULAR MANUFACTURING EQUIPMENT ENABLING CHANGEABILITY	134
<i>Mads Bejlegaard, Thomas Ditlev Bruno, Kjeld Nielsen</i>	
RECONFIGURABLE MANUFACTURING – AN ENABLER FOR A PRODUCTION SYSTEM PORTFOLIO APPROACH.....	139
<i>Ann-Louise Andersen, Carin Rösiö, Jessica Bruch, Mats Jackson</i>	
PREDICTING FUTURE INBOUND LOGISTICS PROCESSES USING MACHINE LEARNING.....	145
<i>Dino Knoll, Marco Prügmeier, Gunther Reinhart</i>	
ANALYZING INTERDEPENDENCIES BETWEEN FACTORY CHANGE ENABLERS APPLYING FUZZY COGNITIVE MAPS.....	151
<i>Sven Hawer, Nino Braun, Gunther Reinhart</i>	
USE OF MAINTENANCE PERFORMANCE INDICATORS BY COMPANIES OF THE INDUSTRIAL HUB OF MANAUS.....	157
<i>Marcelo Oliveira, Isabel Lopes, Cristina Rodrigues</i>	
A MATURITY MODEL FOR ASSESSING INDUSTRY 4.0 READINESS AND MATURITY OF MANUFACTURING ENTERPRISES	161
<i>Andreas Schumacher, Selim Erol, Wilfried Sihn</i>	
TECHNICAL DOCUMENTATION AS A SERVICE – AN APPROACH FOR INTEGRATING EDITORIAL AND ENGINEERING PROCESSES OF MACHINERY AND PLANT ENGINEERS	167
<i>André Barthelmey, Kay Lenkenhof, Julian Schallow, Kai Lemmerz, Jochen Deuse, Bernd Kuhlenkötter</i>	
A CATEGORICAL FRAMEWORK OF MANUFACTURING FOR INDUSTRY 4.0 AND BEYOND.....	173
<i>Jian Qin, Ying Liu, Roger Grosvenor</i>	

ENTERPRISE DESIGN & KNOWLEDGE MANAGEMENT

E-COMMERCE LOGISTICS IN SUPPLY CHAIN MANAGEMENT: PRACTICE PERSPECTIVE.....	179
<i>Ying Yu, Xin Wang, Ray Y. Zhong, George Q. Huang</i>	
INTERCONNECTING PRODUCT AND PROCESS INFORMATION TO ENABLE PERSONALIZED PRODUCTION.....	186
<i>Hendrik Walz, Nadine Keddiss</i>	
A LIFECYCLE-ENHANCED GLOBAL MANUFACTURING PLATFORM FOR ENTERPRISES.....	192
<i>Marco Mengarelli, Marco Marconi, Michele Germani</i>	
PROACTIVE MANAGEMENT OF PRODUCTION TECHNOLOGIES: A CONCEPTUAL FRAMEWORK	198
<i>Alexander Schönmann, Josef Greitemann, Gunther Reinhart</i>	
IMPROVING ERROR MODELS OF MACHINE TOOLS WITH METROLOGY DATA	204
<i>J. M. Flynn, J. E. Muelaner, V. Dhokia, S. T. Newman</i>	
INCREASING THE TRACEABILITY THROUGH TARGETED DATA ACQUISITION FOR GIVEN PRODUCT PROCESS COMBINATIONS	210
<i>Christina Reuter, Felix Brambring, Thomas Hempel</i>	

KNOWLEDGE CAPTURE IN CMM INSPECTION PLANNING: BARRIERS AND CHALLENGES	216
<i>D. Anagnostakis, J. Ritchie, T. Lim, A. Sivanathan, R. Dewar, R. Sung, F. Bosché, L. Carozza</i>	
DEVELOPMENT OF A WEB BASED MONITORING SYSTEM FOR A DISTRIBUTED AND MODERN PRODUCTION	222
<i>Michael Stangl, Julia Pielmeier, Christoph Berger, Stefan Braunreuther, Gunther Reinhart</i>	

COMPETITIVENESS & SUSTAINABILITY IN THE HYPERCONNECTED WORLD

APPLICATIONS FOR FRUGAL PRODUCT CUSTOMIZATION AND DESIGN OF MANUFACTURING NETWORKS	228
<i>D. Mourtzis, E. Vlachou, C. Giannoulis, E. Siganakis, V. Zogopoulos</i>	
REMANUFACTURING PROCESS ASSESSMENT – A HOLISTIC APPROACH	234
<i>Stefen Butzer, Sebastian Schötz, Rolf Steinhilper</i>	
RECONFIGURABLE STANDARDIZED WORK IN A LEAN COMPANY – A CASE STUDY	239
<i>Ana Pereira, M. Florentina Abreu, David Silva, Anabela C. Alves, José A. Oliveira, Isabel Lopes, Manuel C. Figueiredo</i>	
LOGISTICAL CONTROL OF FLEXIBLE PROCESSES IN HIGH-THROUGHPUT SYSTEMS BY ORDER RELEASE AND SEQUENCE PLANNING	245
<i>Ann-Kathrin Onken, Alexander Bader, Kirsten Tracht</i>	
A MULTI-OBJECTIVE DESIGN APPROACH TO INCLUDE MATERIAL, MANUFACTURING AND ASSEMBLY COSTS IN THE EARLY DESIGN PHASE	251
<i>Claudio Favi, Michele Germani, Marco Mandolini</i>	
AN APPROACH TO DETERMINE SIMULATION MODEL COMPLEXITY	257
<i>Gergely Popovics, László Monostori</i>	
PROCEDURE FOR DEFINING THE SYSTEM OF OBJECTIVES IN THE INITIAL PHASE OF AN INDUSTRY 4.0 PROJECT FOCUSING ON INTELLIGENT QUALITY CONTROL SYSTEMS	262
<i>Albert Albers, Bartosz Gladysz, Tobias Pinner, Viktoriia Butenko, Tobias Stürmlinger</i>	
REQUIREMENTS SPECIFICATION OF A COMPUTERIZED MAINTENANCE MANAGEMENT SYSTEM – A CASE STUDY	268
<i>Isabel Lopes, Patrícia Senra, Sandrina Vilarinho, Vera Sá, Catarina Teixeira, João Lopes, Anabela Alves, José A. Oliveira, Manuel Figueiredo</i>	
DIGITAL MANUFACTURING AND FLEXIBLE ASSEMBLY TECHNOLOGIES FOR RECONFIGURABLE AEROSPACE PRODUCTION SYSTEMS	274
<i>Keith Jackson, Konstantinos Efthymiou, John Borton</i>	
AN APPROACH FOR THE SENSORY INTEGRATION INTO THE AUTOMATED PRODUCTION OF CARBON FIBER REINFORCED PLASTICS	280
<i>Johannes Graf, Kristina Gruber, Yi Shen, Gunther Reinhart</i>	
PRESENTING A NOVEL MOTION CAPTURE-BASED APPROACH FOR WALK PATH SEGMENTATION AND DRIFT ANALYSIS IN MANUAL ASSEMBLY	286
<i>Philipp Agethen, Michael Otto, Felix Gaisbauer, Enrico Rukzio</i>	
USE OF CLASSIFICATION TECHNIQUES TO DESIGN LASER CUTTING PROCESSES	292
<i>Hasan Tercan, Toufik Al Khawli, Urs Eppelt, Christian Büscher, Tobias Meisen, Sabina Jeschke</i>	
Author Index	