

PROCEEDINGS OF THE ELEVENTH INTERNATIONAL SYMPOSIUM ON TOOLS AND METHODS OF  
COMPETITIVE ENGINEERING – TMCE 2016, MAY 09-13, AIX-EN-PROVENCE, FRANCE

# Tools and Methods of Competitive Engineering

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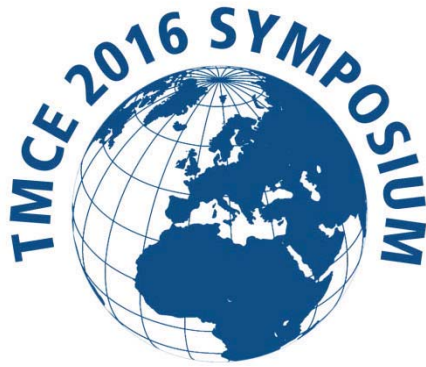
*Arts et Métiers ParisTech, France*

ZOLTÁN RUSÁK

*Delft University of Technology, the Netherlands*

DELFT UNIVERSITY OF TECHNOLOGY

2016



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Published by the Faculty of Industrial Design Engineering, Delft University of Technology  
Landbergstraat 15, 2628 CE Delft, the Netherlands

Cover design: Mr. Shahab Pourtalebi, Delft University of Technology, Netherlands

ISBN/EAN (Printed Proceedings): 978-94-6186-634-9  
ISBN/EAN (Digital Proceedings): 978-94-6186-635-6

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Printed in the Netherlands

# Tools and Methods of Competitive Engineering

## Proceedings

Preface

Advancements in systems engineering

Product and service engineering

Design and production enablers

Author index

# Preface

# Table of contents

Foreword	XII
Members of the Organizing Committee	XIV
Members of the International Paper Review Panel	XV
<b>1 ADVANCEMENTS IN SYSTEMS ENGINEERING</b>	<b>1</b>
<b>Multi-physics-based smart systems</b>	
A design optimization framework for multidisciplinary mechatronic systems <i>Michael Friedl (AT), Rudolf Scheidl (AT), Peter Hehenberger (AT), Andreas Kellner (AT), Lukas Weingartner (AT), Matthias Hörl (AT)</i>	3
Leveraging 3D data in product life cycle of multi-physics-based intelligent systems <i>Alain Pfouga (DE), Josip Stjepandić (DE)</i>	13
Prototyping a cyber-physical affordance exploration system for smart materials: Implementation and integration of hardware, software and cyberware ingredients <i>Azrol Kassim (NL), Imre Horváth (NL), Wilhelm Frederik van der Vegte (NL)</i>	25
<b>Information exploitation in engineering</b>	
A hybrid self-sufficient immune-inspired multi agent critical information infrastructure protection system <i>Jan Hendrik van Niekerk (ZA), Elizabeth Marie Ehlers (ZA)</i>	41
Conceptualization of a real-time information processing platform for context-aware informing cyber-physical systems <i>Yongzhe Li (NL), Imre Horváth (NL), Zoltán Rusák (NL), Wilhelm Frederik van der Vegte (NL), Guangjun Zhang (CN)</i>	53
Model integration for managing dependencies between heterogeneous engineering data <i>Robert Woll (DE), Haygazun Hayka (DE), Rainer Stark (DE)</i>	67
<b>Modeling methodologies and tools</b>	
Property model methodology: A case study with Modelica <i>Romain Piquié (FR), Patrice Micouin (FR), Philippe Véron (FR), Frédéric Segonds (FR)</i>	79
Model-based development and virtual commissioning in practice: A novel approach to establish innovative development methods in industrial environments	93

<i>Christoph Richter (DE), Martin Ahrens (AT), Peter Hehenberger (AT), Stefan Krottil (DE), Peter Stich (DE), Gunther Reinhart (DE), Alois Wiesinger (AT), Andreas Wimmer (AT)</i>	
A comparative view to model-based systems engineering technique in space and automotive development	105
<i>Carolin Eckl (DE), Markus Brandstätter (DE), Alain Pfouga (DE), Josip Stjepandić (DE)</i>	
<b>New modeling approaches</b>	
Point-based models for compensation of thermal effects in dimensional metrology	117
<i>David Ross-Pinnock (UK), Bingru Yang (UK), Glen Mullineux (UK)</i>	
Procedures for creating system manifestation features: An information processing perspective	129
<i>Shahab Pourtalebi (NL), Imre Horváth (NL)</i>	
Nonlinear model predictive control design using AMESIM models	143
<i>Johan Vanhuysse (BE), Stijn De Bruyne (BE), Mike Nicolai (BE), Daisuke Atarashi (BE), Herman van der Auweraer (BE), Wim Desmet (BE)</i>	
<b>Agent technologies in engineering</b>	
Towards knowledge-based adaptive autonomous agents	153
<i>Stefano Borgo (IT), Amedeo Cesta (IT), Andrea Orlandini (IT), Alessandro Umbrico (IT)</i>	
A multi-agent model for heterogeneous nanobot swarms	167
<i>Mark Heydenrych (ZA), Elizabeth Maria Ehlers (ZA)</i>	
<b>Research in agent-based systems</b>	
Multi-agent system simulation of cellular network subscriber behaviour: Implemented using the JADE framework	177
<i>Trevor Nel (ZA), Elizabeth Marie Ehlers (ZA), Duncan Anthony Coulter (ZA)</i>	
Agents-based discovering dynamic of interaction in CAD models	191
<i>Alain-Jérôme Fougères (FR), Egon Ostrosi (FR)</i>	
Agent-based crowd simulation using GPU computing	203
<i>Sean O'Reilly (ZA), Elizabeth Marie Ehlers (ZA), Duncan Anthony Coulter (ZA)</i>	
<b>Dependability of engineering systems</b>	
Empirical study on sensor and actuator systems of validation setups: Descriptive models, application and analysis	213
<i>Tobias Pinner (DE), Simon Klingler (DE), Albert Albers (DE)</i>	
Testbed for validating failure diagnosis and preventive maintenance methods by a low-end cyber-physical system	225
<i>Santiago Ruiz-Arenas (NL), Zoltán Rusák (NL), Sebastián R-Colina (CO), Ricardo Mejía-Gutierrez (CO), Imre Horváth (NL)</i>	
Integrating renewable energy forecasting with home energy management system and developing it with bottom-up approach	237
<i>Punit Gandhi (NL), Han C. Brezet (NL), Tim Gorter (NL), Uchechi Obinna (NL)</i>	
<b>Application of generative models</b>	

Development of generative models of plastic parts: Use case of plastic channel parts <i>Andrzej Jałowiecki (PL), Paweł Kłusek (PL), Wojciech Skarka (PL)</i>	247
An architecture model for communication of safety in public transportation <i>Mohammad Rajabalinejad (NL)</i>	257
Matching designers and 3D printing service providers using Gale-Shapley algorithm <i>Naman Mandhan (US), Joseph Thekinen (US), Alan Lo (US), Jitesh H. Panchal (US)</i>	265
<b>2 PRODUCT AND SERVICE ENGINEERING</b>	
<b>Product service systems</b>	
Using modular abstract prototyping for complex product service systems <i>Els Du Bois (BE), Chana Custermans (BE), Yalenka Mariën (BE)</i>	279
Context-aware control and service-sharing generic smart environment <i>Hendrik Johannes Carl van der Westhuizen (ZA), Elizabeth Ehlers (ZA)</i>	291
Concept for a 3D engineering dashboard based on RESTful web services <i>Alexander Christ (DE), Christian Steinmetz (DE), Reiner Anderl (DE)</i>	303
<b>Multi-materialization methods and techniques</b>	
A framework for automated additive-subtractive manufacturing of multi-material composites <i>Wout De Backer (US), Ramy Harik (US), Michel van Tooren (US), Joshua A. Tarbutton (US), Zafer Gürdal (US)</i>	317
Comparison of optimization techniques for the design of multi-material structures under multi objective functions <i>Liliane G. Ngahane Nana (DE), Zhuzhell Montano (DE), Jonathan Schmidt (DE), Jörg Feldhusen (DE)</i>	329
Parts internal structure definition using lattice patterns optimization for mass reduction in additive manufacturing <i>Laurent Chougrani (FR), Philippe Véron (FR), Jean-Philippe Pernot (FR), Stéphane Abed (FR)</i>	341
<b>Methodological issues of engineering</b>	
Target disassembly methodology for product maintainability and dismantling: Validation on a washing machine case study <i>Claudio Favi (IT), Michele Germani (IT), Marco Mandolini (IT), Marco Marconi (IT)</i>	353
Development CATIA_2_GEANT interface for simulation of high energy physics experiments <i>Alexander Sharmazanashvili (CH), Niko Tsutskiridze (CH)</i>	363
Assessment framework for a methodology under development - Application to the PDA methodology <i>Damien Motte (SE), Martin Eriksson (SE)</i>	373
<b>Business aspects in engineering</b>	
A user-business-oriented approach to design product-service systems <i>Eugenia Marilungo (IT), Michele Germani (IT), Margherita Peruzzini (IT)</i>	389

Applying an entrepreneurial mindset to Internet of Things: A case study <i>Beshoy W. Morkos (US), Abram L. J. Walton (US), Deep N. Patel (US), Gerid D. Paquette (US)</i>	399
Identifying design requirements for emerging markets: A study on Danish industry <i>Xuemeng Li (DK), Saeema Ahmed-Kristensen (DK), Jaap Daalhuizen (DK)</i>	409
<b>Enhancement of performance indicators</b>	
A competitive design approach for machine cost optimization: An industrial case study <i>Margherita Peruzzini (IT), Marcello Pellicciari (IT)</i>	421
Application of lean methods into design process of large power transformers <i>Mitja Varl (SI), Jože Tavčar (SI), Jožef Duhovnik (SI)</i>	433
Capturing and analyzing how designers use CAD software <i>Samira Sadeghi (FR), Thomas Dargon (FR), Louis Rivest (CA), Jean-Philippe Pernot (FR)</i>	447
<b>Human orientated solutions</b>	
Integration of technology for olfactory and gesture based interaction for VR applications <i>Mario Covarrubias (IT), Monica Bordegoni (IT), Giandomenico Caruso (IT), Umberto Cugini (IT)</i>	459
Roles of perception in engineering design <i>Suo Tan (CA), Thanh An Nguyen (CA), Yong Zeng (CA)</i>	469
3D scanning and design platform for lower limb prosthesis <i>Giorgio Colombo (IT), Claudio Comotti (IT), Daniele Regazzoni (IT), Caterina Rizzi (IT), Andrea Vitali (IT)</i>	479
<b>Novel principles for designing</b>	
Designing using margins <i>Safaa Lebjioui (UK), Christopher Earl (UK), Claudia Eckert (UK), Ola Isaksson (SE)</i>	489
An automatic knowledge based process generation technique for design automation <i>Shiva Shankar Mangalore Babu (UK), Craig Chapman (UK), Pathmeswaran Raju (UK), Ralph Boyce (UK)</i>	501
On the use of design robots <i>Yuemin Hou (CN), Michel van Tooren (US), Ji Linhong (CN)</i>	513
<b>Awareness enhancement approaches</b>	
On the need for a design ontology within additive manufacturing <i>Vasilije Kokotovich (AU), Dušan N. Šormaz (US)</i>	527
A proposed approach to promote idea generation activity in preliminary design <i>Khadija Hmina (MO), Mohammed Sallaou (MO), Larbi Lasri (MO), Abdelaziz Arbaoui (MO)</i>	539
<b>3 DESIGN AND PRODUCTION ENABLERS</b>	
<b>Geometry-related problems of engineering</b>	
Smooth tool motions through precision poses <i>Mat Hunt (UK), Glen Mullineux (UK), Robert J. Cripps (UK), Ben Cross (UK)</i>	551



Patch based registration for deviation assessment <i>Hariharan Krishnamurthy (IN), Dibakar Sen (IN)</i>	563
Robust marker-less object tracking for factory floor augmented reality <i>Rafael Radkowski (US), Timothy Garrett (US), Jarid Ingebrand (US)</i>	575
<b>Capitalizing on cad knowledge</b>	
CAD assembly descriptors for knowledge capitalization and model retrieval <i>Katia Lupinetti (IT), Franca Giannini (IT), Marina Monti (IT), Jean-Philippe Pernot (FR)</i>	587
A negative knowledge enabling framework to support hybrid geometric modelling education for industrial engineering <i>Harald E. Otto (IT), Ferruccio Mandorli (IT)</i>	599
Comparison of the manufactured shape with the designed shape of a crease line on the outer panel of a car <i>Yun Chan Chung (KR), Won Chang Choe (KR), Juho Han (KR)</i>	613
<b>Model-based development methodologies</b>	
Reference models for concurrent engineering implementation assessment in individual, serial and mass production <i>Jože Tavčar (SI), Jožef Duhovnik (SI)</i>	623
Product development management based on hierarchical design models and workspaces methods: An application to mechatronic systems design <i>Matthieu Bricogne (FR), Peter Hehenberger (AT), Julien Le Duigou (FR), Benoit Eynard (FR), Michael Mayrhofer (AT)</i>	637
Design of a simulation tool for steam assisted gravity drainage - Based on the concept of unified feature modelling scheme <i>Yishak Yusuf (CA), Yongsheng Ma (CA)</i>	647
<b>Utilization of analytical tools</b>	
Rule authoring representation comparison of correctness and consistency: An empirical study <i>Keith Phelan (US), Bryan Pearce (US), Joshua Summers (US), Mary Kurz (US)</i>	659
A three-level signature by graph for reverse engineering of mechanical assemblies <i>Marina Bruneau (FR), Alexandre Durupt (FR), Laurent Vallet (FR), Lionel Roucoules (FR), Jean-Philippe Pernot (FR)</i>	669
On the detection of over-constrained subparts of configurations when deforming free-form curves <i>Hao Hu (FR), Mathias Kleiner (FR), Jean-Philippe Pernot (FR)</i>	683
<b>Advancement in empowering fabrication</b>	
Qualifying the performance of human-robot coproduction at a relabing station <i>Argun Cencen (NL), Jouke C. Verlinden (NL), Jo Geraedts (NL)</i>	695
An extended data model for production-orientated integral bifurcated sheet metal products <i>Thiago Weber Martins (DE), Katharina Albrecht (DE), Reiner Anderl (DE)</i>	705
Multi-scale modeling and knowledge capitalization for analysis and development of DFM	719

*Yósbél Galavís-Acosta (FR), Lionel Roucoules (FR), Lionel Martin (FR)*

### **Exploitation of additive manufacturing**

Design for additive (and hybrid) manufacturing – Needs and prospects 733  
*Dušan N. Sormaz (US), Vasilije Kokotovich (AU)*

Towards an approach to additive manufacturing oriented design 745  
*Germain Sossou (FR), Frédéric Demoly (FR), Ghislain Montavon (FR), Samuel Gomes (FR)*

Manufacturing rights management - Knowledge protection for distributed additive manufacturing 755  
*Marco Grimm (DE), Reiner Anderl (DE)*

### **Consideration of sustainability aspects**

Designing an efficient build environment to save energy and water consumptions 767  
*Maura Mengoni (IT), Andrea Capitanelli (IT), Lorenzo Cavalieri (IT), Damiano Raponi (IT), Francesca Pavani (IT)*

An introductory approach to concretize social sustainability for sustainable manufacturing 779  
*Patricia Lagun Mesquita (SE), Sophie I. Hallstedt (SE), Göran I. Broman (SE), Ola Isaksson (SE)*

Determination of sustainability indicators and validation strategies for integrated electro mobility 793  
*Albert Albers (DE), Nicolas Reiß (DE), Katharina Bause (DE), Nicolas Burkardt (DE), Matthias Behrendt (DE)*

### **Advanced learning approaches**

Implementation of a prototype of a web-based stimulating learning system for construction engineering 803  
*Garrett Keenaghan (IR), Imre Horváth (NL), Wilhelm Frederik van der Vegte (NL)*

A competency model for the topic of standardisation in higher education 813  
*Sandra Drechsler (DE), Albert Albers (DE)*

Materials planning in practical student activity 827  
*Rod Valentine (UK)*

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## Foreword

In the last three decades, many paradigms of digital computing, such as networked personal computing, ubiquitous computing, pervasive computing, cloud computing, Internet of things, cyber-physical computing, and social computing have emerged. Others, such as biological computing and quantum computing, are just around the corner. The intervals between the emergences of the subsequent paradigms are getting shorter and shorter. The rapid space of technology development is accompanied by a lot of developments in the domains of emerging smart materials, sustainable energy provisioning, big data utilization, and organization of production facilities. Alongside with these, influential societal and conceptual changes are taking place. The age of interweaving smart socio-technical systems of systems is forming. Visionary professionals advocate that computers may one day learn how to program themselves and how to mimic biological intelligence. Product and service developers are challenged not only by the experienced pace of technology progression, but also by the perpetuated competitiveness and complicatedness of the global business ecosystem. They should simultaneously be technology-aware, socially conscious, and business driven if they want to strive after true competitiveness. Multidisciplinary knowledge and networked knowing will be even more important assets than ever before.

This Proceedings of the Eleventh International Tools and Methods of Competitive Engineering Symposium (TMCE 2016) offers a limited, but useful contribution to the knowledge of transferring and utilizing the latest digital technologies in the product, systems and service development and implementation practices. TMCE 2016 was jointly organized by the Delft University of Technology, the Netherlands and Arts et Métiers ParisTech, France and held in Aix-en-Provence, France, from 9th to 13th May, 2016. On the one hand, this Proceedings provides an excellent overview of the most important challenges systems and service designers and engineers are facing nowadays. On the other hand, it offers novel scientific knowledge, conceptual frameworks, formal methodologies, empirical know-how, and proposes supporting tools and best practices to address many concrete challenges.

Altogether 70 technical papers were presented at TMCE 2016 in three tracks of podium presentations: (1) Advancements in systems engineering, (2) Product and service engineering, and (3) Design and production enablers. The papers have been arranged in the chapters of this Proceedings according to this structure of sessions. The papers included the *Advancement of systems engineering* chapter addresses topics such as: multi-physics-based smart systems, information exploitation in engineering, modeling methodologies, approaches and tools, and application of generative models, agent technologies in engineering and agent-based systems, and dependability of engineering systems. The reader can find new concepts and research/development results in the *Product and service engineering* chapter about development of product service systems, product multi-materialization methods and techniques, methodological issues and business aspects of engineering, enhancement of performance indicators and novel principles for designing, human orientated solutions and awareness enhancement approaches. Finally, the chapter entitled *Design and production enablers* includes papers on solving some geometry-related problems of engineering and utilization of CAD knowledge, model-based development methodologies and utilization of

analytical tools, exploitation of additive manufacturing and empowering fabrication, consideration of sustainability aspects, and application of advanced learning approaches.

We are convinced that the papers included will be a useful reference for industrial product designers, engineers and managers, as well as for academic researchers, educators and students. As the above concise overview shows they cover a rather wide spectrum of challenges and offer a multitude of knowledge and solutions. We are very grateful to the contributing authors for their high quality work and submissions, and for their constructive attitude and collaboration in the peer review and paper revision processes. We also highly appreciate the work of the 144 members of the international paper review panel. Without their rigorous but helpful support the overall good quality represented by the published papers could not be achieved. Finally, but equally gratefully, we are thanking the members of the Organizing Committee, whose graphical design, lay-outing, and technical arrangements contribution supported not only the realization of the Eleventh International Tools and Methods of Competitive Engineering Symposium, but also this Proceedings.



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