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Recent Advances in Industrial & Manufacturing Technologies

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Proceedings of the 1st International Conference on Industrial and Manufacturing Technologies (INMAT '13)

Vouliagmeni, Athens, Greece, May 14-16, 2013

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Preface

This year the 1st International Conference on Industrial and Manufacturing Technologies (INMAT '13) was held in Vouliagmeni, Athens, Greece, May 14-16, 2013. The conference provided a platform to discuss manufacturing systems engineering, complex systems engineering, industrial systems engineering 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 sent to international indexes. They will be also available in the E-Library of the WSEAS. Extended versions of the best papers will be promoted to many Journals for further evaluation.

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

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Plenary Lecture 1

Industrial Design and Technology of Specialized Science-Based Products - The Case of Biosensors

Professor Christina Siontorou
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Abstract: An industry is called science-based if the time lags between scientific discoveries and their possible industrial implementation are quite short; relevant examples include the pharmaceutical, biotechnology, nanotechnology, semiconductor, and fine chemical industries. Designing presupposes a thorough understanding of the products at deep (molecular and atomic) knowledge levels, necessitating design engineers and product developers to maintain specialized knowledge on both, science and technology, at advanced levels. This requirement stems primarily from product concepts based on complex phenomena that are hard to accurately reproduce, yet it is powered by the diversified and upgraded preferences of end users. Integrating this specialized knowledge on a large scale is not an easy task either: science-based products relate to interdisciplinary development approach, usually fed directly from the academic output, in contrast to engineering-based products, that their transition from bench to market proceeds via classical scaling-up. Clearly, science-based products require high R&D expenses and exhibit high investment risk, owing to an inevitable series of knowledge transformation and/or translation from end-users' preferences to product description, to product specifications to product concept to design requirements, possibly to be associated with basic science, hypotheses testing and extensive experimentation. Using biosensor devices as an exemplar, this lecture will present these transformation paths, using various case examples from works performed in our Laboratory of Simulation of Industrial Processes. Design requirements and production platforms are be also discussed.

Brief Biography of the Speaker: Dr C. Siontorou holds a BSc (Hons) in Biomedical Sciences from the University of Sunderland (UK) and a PhD in Analytical Chemistry (2000) from the University of Athens. She worked as a pharmaceutical enterprise consultant on drug development/validation and regulatory affairs (1998-2004) Since 2003, she serves at the Department successively as adjunct lecturer, Lecturer, and now underway for the position of Assistant Professor, specializing in the "Design/Development of Chemical Technology Products". Her research interests include: biosensors; nanosensors; multi-arrays; environmental metrology; environmental management; product design; design of field detectors; industrial process biosensoring; expert systems; fault diagnosis; knowledge management; technology management; knowledge transfer systems; ontology design. She has 32 publications in highly rated ISI journals and 35 in conference proceedings (of IEEE, CHISA, European Biosensor Society, European Biomass Conferences, etc.) 221 ISI citations and an h-index of 14 (source: ISI Web of Science, Thompson Scientific; self-citations have been excluded). She has recently received the 5th-place award in the 1st i-Bank Innovation & Technology Competition (National Bank of Greece) on the significance of her work on environmental monitoring for the Greek regional development.

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Plenary Lecture 2

Method for Control of the Make-To-Order Manufacturing System on the Base of Earning Power Assessment – Theoretical Approach

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Abstract: Method for control of the make-to-order manufacturing system on the base of earning power assessment is a new method to control the entire production process, starting with customer enquiry up to product deliver. In practice, decisions on acceptance of order and production planning are often considered separately. Sales Department is responsible for accepting orders, while the production department in charge of production planning for implementation of orders accepted. Acceptance decisions are often made without involving the control of the production department or incomplete information on the basis of available production capacity. Method for integrated control of the job shop type manufacturing system proposed in this presentation aims to facilitate the connection between the two departments and to achieve integrated control of job shop type manufacturing system on the basis of Earning Power (EP) evaluation. It gives a more accurate picture of a firm's profitability than gross income.
It is presented the proposed method flowchart, three modeling techniques for time and cost: analytic, neural network and k-Nearest Neighbour. Using the achieved models, EP is evaluated at operation level, job level and order level of make-to-order manufacturing system.

Brief Biography of the Speaker: Luiza Daschievici got a Master's degree in Mechanical Engineering in 1994.
In 2000 Luiza Daschievici got a PhD in Mechanical Engineering ("Dunarea de Jos" University of Galati).
Since 1994, she has been an assistant, then lecturer and associate professor at "Dunarea de Jos" University of Galati.
Her research fields are the following: technology of the manufacturing process; cutting process modeling; tribology of parts machines; techniques of complex modeling of the manufacturing systems; the reliability of the mechanics systems.
Dr. Daschievici Luiza has participated in many research projects organized by Romanian Ministry of Education and Science.
She published, as author or co-author, over 80 articles in journals and proceedings of the international conference (Hungary, Italy, Hong Kong, Spain, Portugal, Poland, South Africa, Japan, UK, USA). Daschievici Luiza wrote 5 books in her research field.
She is a member of the following professional and scientific associations: IFAC – International Federation of Automatic Control, SAAM - South African for Theoretical and Applied Mechanics, IAENG – International Association of Engineers, ARoTMM - Romanian Association for Theory of Machines and Mechanisms, ACM-V - Multidisciplinary Research Association of the West Zone.
Dr. Daschievici Luiza is an expert of Romanian National University Research Council – CNCSIS.

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Plenary Lecture 3

Method for Control of the Make-To-Order Manufacturing System on the Base of Earning Power Assessment - Experimental Approach

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Abstract: A key requirement for make-to-order manufacturing (MTO) companies to remain competitive is the ability to assess incoming orders in terms of their technical-economic efficiency and determine the best orders that they should accept.
It is presented numerical simulations of the method proposed in "Method for control of the make-to-order manufacturing system on the base of earning power assessment - Theoretical approach". It is demonstrated the ability of the proposed method on a real case and illustrated the applicability of mathematical models that were proposed. The main problems for a MTO company manager, problems related to order acceptance and machine control are solved by the new integrated control method, which is included in this presentation.

Brief Biography of the Speaker: Daniela Ghelase graduated from the "Politehnica" University of Bucharest in 1985 (the Faculty of Machine Manufacturing). In 2002, she got her PhD in Industrial Engineering at "Dunarea de Jos" University of Galati.
Her research fields include: flexible systems manufacturing, numerical simulation of manufacturing processes and surfaces generation, optimal computer-aided design of gear-sets, quality assurance and management.
Dr. Ghelase is Associate Professor at the Faculty of Engineering Braila, "Dunarea de Jos" University of Galati. She published, as author or co-author, over 80 articles in journals and in proceedings of international conferences (Hungary, Italy, Hong Kong, Spain, Portugal, Poland, South Africa, Japan, UK, USA). Daniela Ghelase wrote 5 books in her research field. In 2005 she was visiting professor at The City University of Hong Kong.
She is a member of the following professional and scientific associations: IFAC – International Federation of Automatic Control, SAAM - South African for Theoretical and Applied Mechanics, IAENG – International Association of Engineers ARoTMM - Romanian Association for Theory of Machines and Mechanisms, ACM-V - Multidisciplinary Research Association of the West Zone.
Dr. Daniela Ghelase is an Expert of Romanian National University Research Council – CNCSIS.

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Plenary Lecture 4

The Strategic Development of Advanced TPS Based on the New Manufacturing Theory

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Abstract: The Toyota Production System (TPS) exemplifies Japanese manufacturing though it has been further developed and spread in the form of internationally shared global production systems, including Just-in-Time (JIT). TPS is no longer a proprietary technology of Japan. This studyfocuses on the strategic development of Advanced TPS based on the new manufacturing theorythrough New JIT, a new management technology principlethat surpasses conventional JIT practices. Specifically, the authors have developed the New Japan Global Production Model “NJ-GPM”, a system designedto achieve worldwide uniform quality and production at optimal locations – the keys to successful global production. The effectiveness of NJ-GPM is demonstrated at Toyota, a leading international corporation.

Brief Biography of the Speaker: Dr. Amasaka became a professor of the School of Science and Engineering, and the Graduate School of Science and Engineering at Aoyama Gakuin University, Tokyo, Japan in April 2000. His specialties include: production engineering (Just in Time, JIT and Toyota Production System, TPS), multivariate statistical analysis and, reliability engineering.. Recent research conducted includes: “Science SQC, new quality control principle”, "Science TQM, new quality management principle”, "New JIT, new management technology principle”, “Customer Science”, “Kansei Engineering” and numerical simulation (Computer Aided Engineering, CAE).
Positions in academic society and important posts:He is the author of a number of papers on strategic total quality management, as well as the convener of JSQC, JOMSA, and other publications (e.g. POMS in USA and EurOMA in Europe). He has been serving as the vice chairman of JSPM (2003-2007) and JOMSA (2008-2010), the director of JSQC (2001-2003), and the commissioner of the Deming Prize judging committee (2002-present).Now, he is inaugurated as the vice chairman (2009-2010) and the chairman of JOMSA (2011-present).
Patents and prizes: He acquired 72 patents concerned with quality control systems, production systems, and production engineering and measurement technology. He is a recipient of the Aichi Invention Encouragement Prize (1991), Nikkei Quality Control Literature Prizes (1992, 2000, 2001 and 2010), Quality Technological Prizes (JSQC, 1993 and 1999), SQC Prize (JUSE, Union of Japanese Scientists and Engineers, 1976) and Kansei Engineering Society Publishing Prize (2002).

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Plenary Lecture 5

Modeling of Surfaces Machining

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Abstract: The problematic surfaces generation by enveloping method is known, and exists general laws for solving enwrapping problems of first degree or second degree (Olivier, Gohman).
Also, the problems of helical surfaces generation was developed at large using the method of helical movement decomposition.
At "Dunărea de Jos" University of Galați, during more years were developed algorithms designated to solution the surfaces generation by enveloping: the minimum distance method; the substitutive circles family method; the in plane generating trajectories method.
These methods, applied for all the enveloping generation problems (first degree problems, profiles and surfaces associated with rolling centrodes couples as so as contact problems of revolving surfaces with helical surfaces), and also second degree problems (reciprocally enwrapping surfaces with point contact, have solutions based on these new methods, characterized by these that the theorems formulation is much simplified (for the minimum distance method), a intuitive form of enwrapping surfaces, especially for the substitutive circles family method, a simplified enveloping condition for the in plane generating trajectories method.
The methods may be easy used also for a expression in discreetly form of surfaces.
The enveloping surfaces modeling, by presented methods, allow a rigorous expressing of tool's primary peripheral surface which generates surfaces by enwrapping.

Brief Biography of the Speaker: Virgil Teodor graduated a 5 years Mechanical Engineering degree program at "Dunarea de Jos" University of Galati (1994); PhD in Industrial Engineering - at "Dunarea de Jos" University of Galati (2005); Research fields: cutting process modeling on the machine tools; surface generation with cutting tools which work by enwrapping; the surfaces generation methods study algorithmisation. Professional experience: 1994 – 2000 – Engineer at Uzinsider Engineering design institute; 2003 – 2004 – Assistant at "Dunarea de Jos" University of Galati, Manufacturing Science and Engineering Department; 2004 up to present – lecturer, in the same department.
Virgil Teodor participated in 6 research projects supported by Romanian Ministry of Education and Science; author / co-author of over 5 scientific or didactic books; over 60 scientific papers written or co-authored, published to International / National Conferences proceedings (Spain, Italy, USA, Greece, Malta) and Journals. Member of professional and scientific associations: Romanian Association for Non-Conventional Technologies - ARTN.

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