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## **1 Introduction**

This special issue of the Journal of Industrial Engineering and Management is focused on new trends in Management of Technology as a Step to Sustainable Production.

Creation of durable solutions to the global financial and economic crisis is obviously a multidisciplinary issue that should be addressed by a team of macroeconomists, skilled managers, politicians, advanced technology experts, sociologists, psychologists, financial experts, futurists, etc.

Possible solutions in a particular country will be considered depending on the position and characteristics of the country's economy: gross domestic product (GDP)/per capita, resources (natural, energy, human resources, level of education of the population, age of the population, water resources, energy sources, type of industry), the share of hi-tech technologies, the number of patents, innovations/per 1000 inhabitants, local and global environmental concerns, financial power of the state structure, the level of democracy, the level of organization of state administration, distribution of power between political and intellectual elite, the influence of experts in decision making process regarding public affairs, civic sector in public and political life, etc.

That was also one of the ideas for starting the international scientific conference MOTSP (Management of Technology – Steps to Sustainable Production) which is

trying to integrate the ideas of *sustainable production*, relationship to the environment, environmental legislation, socially responsible behaviour of companies, civic sector, and impact of new technologies, materials (composites, metal foams), nano-technology, mechatronics, *production and organization improvement methods* (5S, Kaizen, Lean, SMED, 6 Sigma, Supply Chain Management, Green Logistics, LCA/LCM), management of technology, total cost estimation, cutting of costs, risk management, change management, reengineering.

How to adopt the procedures for the selection of technology transfer that is part of the concept of BAT (Best Available Techniques) or Clean Technology, its technological and economic sustainability in a longer period represents a problem that requires joint approach of environmental protection experts, legal experts, technology experts, economists, state and local government experts, experts in EU projects, participation of civil sector and development of secondary and higher education.

The development should not move along the lines of capital investment, assignment of technology and know-how, ownership of foreign capital, with the required labour force being semi-skilled or lower level. Why? Because in the long run, the production plant, despite the state incentive measures, will be moved to another country, as soon as better conditions regarding business investment, lower taxes and less demanding work and environmental legislation are obtained.

Idealized goal of our conference is to encourage team and stratified research work, as a result of joint projects that would connect specific technologies, innovation, selection procedures and transfer of best technologies, adhering to the principles of sustainable production (LCA/LCM, Clean Production, Green Logistics, BAT, etc.). However, for the time being these are only fragments of the envisaged complex goal.

## **2 Overview of the papers**

We know that the papers presented this year are of higher quality compared to the last year. This year we introduced a better software system for pondering different criteria during reviewing process.

The first paper by Peter Štrukelj and Slavko Dolinšek presents how transnational corporations (TNCs) internationalize their R&D and how they allocate foreign R&D units in high-tech clusters, where competitors of these TNCs, research and academic institutions, and suppliers of these TNCs are also located. Based on a modern innovation theory, they derive a cluster approach as a specific method of analyzing modern R&D internationalization. They then present an analysis of two high-tech clusters (Cambridge, Bangalore) and we are shown that some TNCs allocate their foreign R&D units into those clusters, in order to make use of available external knowledge from academic institutions through intensive R&D collaborations.

The second paper by Aleksander Janeš and Slavko Dolinšek shows logistics system in Luka Koper (the port of Koper), Slovenia. From being a small local port, Luka Koper developed into a significant port and logistic system - European Logistics and Distribution Centre Luka Koper, d.d., in the Adriatic and European maritime market. The main purpose of this paper is to present the development of the management system. Luka Koper, d.d. was recognized for Excellence (R4E) in 2005 and was finalist in the 2006 Excellence Award (EEA) process. Within the presented research the authors stress the importance of the influence of process key performance indicators (KPIs') on the business results of the company through the EFQM model harmonization. From the literature review they found no similar case study research in Slovenia. Qualitative and quantitative analysis indicates the general benefits of the KPIs' influence on the business results. In this context, diagnosis and consecutive deeper understanding of the process KPIs' influence on the business results should be the basis for further improvements of the company's performance.

The third paper by Dan Săvescu presents some aspects regarding the scientific research in universities or research institutes oriented to fundamental or practical aspects. It is known that a researcher must publish his work, but the problems are: whether to publish it as single or multi-authors articles, in ISI or domestic journals, in international conference proceedings having ISBN, whether to protect the new information at IP national or international organization. The permanent process of research for business, the role of innovation and business incubators are supporting elements for SME's growth. Besides the facilities offered to SMEs, other benefits come from creating a business incubator, like for instance: developing

innovative products, product design, prototyping, technological transfer and registration and exploitation of intellectual property rights, coming from the obtained products of research.

The fourth paper by Maria Giovanna Trotta shows that PLM process is developing the methodologies to support sustainable production during the whole product lifecycle. The present research makes a focus on the first phase product development (the design phase) that is significant to set future costs and environmental impacts. This research analyzes important tools that could be used by PLM to formalize knowledge for sustainable new products development in a company. It offers an overview and compares different approaches to share knowledge, to carry out innovation and to reduce CO<sub>2</sub> emissions, materials and energy.

The fifth paper by Valentina Gecevska, Paolo Chiabert, Zoran Anisic, Franco Lombardi, Franc Cus shows that Product Lifecycle Management (PLM) is the process of managing the whole life cycle of a product starting from generating an idea, concept description, business analyzes, product design and solution architecture and technical implementation, to the successful entrance to the market, service, maintenance and product improvement. If a company actually wishes to innovate its processes for improving the way to account for project management, it will face relevant difficulties to deal with different guidelines, tools and methods currently addressing the matter from various points of view.

In the sixth paper by Tihomir Opetuk, Ivan Zolo and Goran Dukic the concept of Green Supply Chain Management is aimed at the reduction of several elements: energy, materials, the pollution and the waste in production and logistics processes. Power networks are a part of the supply chain of production and distribution of electrical energy, and similar principles of greening could be applied. Currently, the losses within the distribution networks in the whole world are between 3.7 to 26.7 % and they primarily occur due to the losses in the conductors and the losses within distribution transformers. After an overview of the losses in the power networks and related CO<sub>2</sub> emission, some solutions of how to reduce the above mentioned losses are given.

This seventh paper by Reibenschuh Marko, Cus Franc and Zuperl Urosi includes a comparison of different optimization methods, used for optimizing the cutting conditions during milling. It includes also a part of using soft computer techniques in process control procedures. PSO and GA algorithm are applied to the CNC milling program to improve cutting conditions, improve end finishing, reduce tool wear and reduce the stress on the tool, the machine and the machined part.

The eighth paper by Davor Donevski, Diana Milcic, Dubravko Banic shows that devices in print production can be characterized by different characterization methods. One commonly used method of color device characterization is least squares fitting. In essence, the least squares fitting is used to determine the coefficients of a predetermined polynomial, such that the sum of squared differences between the values predicted by the model and the empirical data is minimal. This paper is a part of a larger study which investigates the criteria in the measurement data which can be used for optimal model selection.

The ninth paper by Yung-Cheng Wang, Jui-Chang Lin, Shih-Fong Chiu shows that the demand for measuring equipments of automatic optical inspection has grown rapidly, because of its benefits of promoted efficiency and higher precision. Instead of manual projection measurements, measurement performance and efficiency can be obviously enhanced by the image measurement system. In this investigation, digital image processing and geometrical measurement principles have been integrated to develop a dynamic measurement system for the dimensional measurements of a saw blade milling cutter. Comparing the results of the developed system and reference standard system, a deviation of 25 $\mu$ m in dimensional measurement and 0.26° in angular measurement has been found. That measuring performance can meet the industrial requirement and a higher measurement efficiency can be achieved.

The tenth paper by Filip Górski, Wiesław Kuczko, Radosław Wichniarek, Adam Dudziak, Maciej Kowalski, Przemysław Zawadzki explains that process of choosing right Rapid Prototyping technology is not easy, especially for companies inexperienced with that group of manufacturing techniques. Paper summarizes research focused on creating an algorithm for expert system, helping to choose optimal process and determine its parameters for thin-walled products rapid manufacturing. Research was based upon trial manufacturing of different thin-

walled items using various RP technologies. Based on the research outcome, the main algorithm was created. The next step was developing detailed algorithms for optimizing particular methods.

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