# DIGITIZATION OF BUSINESS PROCESSES AND TECNOMATIX AS A COMPREHENSIVE PACKAGE INSTRUMENT FOR THE CREATION OF THE DIGITAL FACTORY

**Marek Kliment**
TU of Košice, Faculty SjF, Institute of Technologies and Management, Department of Industrial Engineering and Management, Němcovej 32, 042 00 Kosice, e-mail: marek.kliment@tuke.sk
**Peter Trebuňa**
TU of Košice, Faculty SjF, Institute of Technologies and Management, Department of Industrial Engineering and Management, Němcovej 32, 042 00 Kosice, e-mail: peter.trebuna@tuke.sk
**Jaromír Markovič**
Slovak legal metrology, Hviezdoslavova 31, 97401 Banská Bystrica, e-mail: slm@slm.sk

***Keywords:*** digitization, digital factory, simulation, planning, production
***Abstract:*** Current trends in the development of a dynamic and turbulent world economy are largely digitization. Once upon the implementation and application of new production, made the setting and testing of variants directly to the production lines for their full operation. First production tested, set its standards and then began the production program. These procedures were but very costly and lengthy and on-going businesses big money and precious time. Gradual deployment of various software techniques, these processes are transferred into digital form. Technology has come to the point that all business and production processes nowadays we can make this into a digital form. In this way we manufacture everything in detail and test plan prior to the launch date line. Such technology is called Digital Factory.

## 1 Introduction

Digital factory is a virtual reflection of the real company that shows business processes in a virtual environment. Digital factory mainly supports planning, simulation, optimization and performance prediction manufacturing complex products. Basically, the digital firm serving the thorough preparation of production before it begins physical production. Digital enterprise systems represent an innovative step in the gradual creation of methods and tools to support business processes in the total life cycle of the product.

## 2 What Is Digital Factory?

Digital factory is mainly corporate strategy. It is an integrated and coherent set of software tools, processes and methods aimed at reducing the times swell up new production, accelerating the change to increase its efficiency. Works with digital models of real production, in which the forward in the digital environment verify and optimize the products themselves, all processes, activities, material flows and tools. To be well analyzed, processed, optimized set, and then put into physical production. Digital Factory concept begins with the formation of the product, its proposal. The product should be constructed from the start so that it is the easiest and most efficient to manufacture. Nowadays designers to work using CAD systems, it is very rare that the models or drawings on paper physically draws on the drawing board as it was in the past. Creating digital data are put emphases on design methodology taking into account the needs of production and assembly. It is important that the data that are essential to running your business flowed in the right direction and be available whenever and wherever they are needed. Important part in the development of digital businesses are technological preparation of production and design, in which the design and simulate all and set for further processing. The effect of all the above mentioned processes and tools take effect their integration into a single cooperating whole. Currently on the market a large number of software products that provide these options and their expansion are comparable with the period when they began to introduce CAD systems, which are now a common tool in many enterprises.

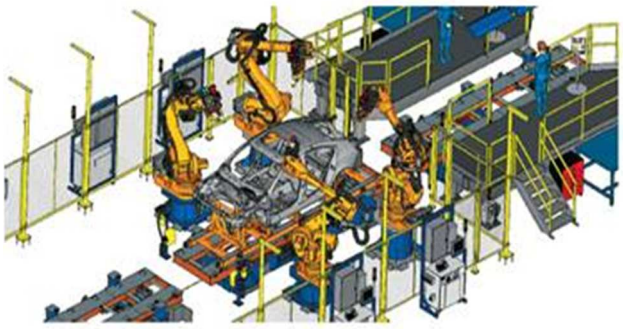

*Figure 1 Simulation as part of the Digital Factory*

## 3 What Is Digital Factory?

Digital Factory concept is promoted mainly due to large manufacturers, especially automakers. Advocates out there that have high batch manufacturing. Successfully, however, also used on routes where there is little serializability where you need to change quite often and converting lines. It is commonly used in the production of larger piece products. Gradually covers a wider range of types of production. It is very well applicable and wherever it is planned to hand made, or where a person enters into production, whether occupational activity, or simply as a supervisory body. It is intended wherever it is necessary to increase the production of production, reduce costs and increase efficiency.

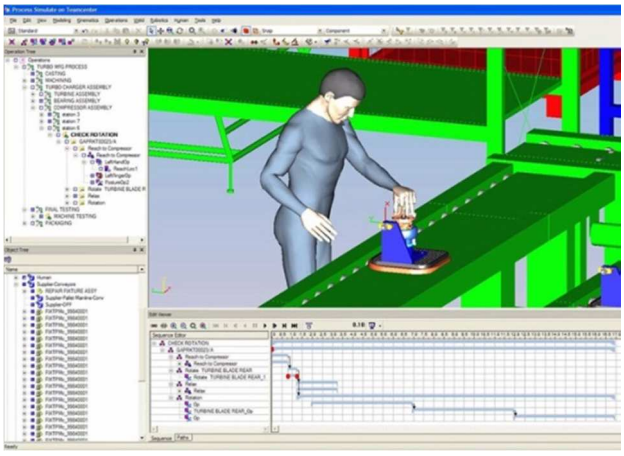

*Figure 2 Simulation of people in the digital factory*

Advantages introduction of digital enterprise:

- cost savings through better use of resources of 30%,
- cost savings achieved by optimizing material flows 35%,
- reduction in the number of machines, tools and workplaces by 40%,
- the total output growth in manufacturing by 15%,
- reduce time to market for new products by 30%.

As already mentioned, currently on the market and the number of providers of products are falling within the digital enterprise. One of these providers is also Siemens PLM Software and its products.

## 4 Tecnomatix and other products from Siemens PLM software

NX improves productivity through product development, delivering faster, more flexible modeling of individual components and assemblies, higher performance of several CAD applications used at the same time, more efficient digital simulation and more efficient manufacturing PLM Software Teamcenter connects people throughout the lifecycle with a single source of knowledge about products and processes Velocity Series is a comprehensive family of modular , yet integrated solutions across the product lifecycle management (PLM) in the midmarket . Medium allows manufacturers to compete effectively with larger companies with more funds available. Add to portfolio Velocity Series, Siemens falls Solid Edge with synchronous technology - is a complete 2D/3D CAD software based on the properties with excellent modeling of parts and assemblies, drafting, transparent data management , and inclusion of finite element analysis (FEA). 3DSync - is a tool designed to edit 3D CAD data, which, thanks to the synchronous technology facilitates designers to work with imported data engineering components and assemblies. It is intended for use in conjunction with existing CAD system helps engineers to reuse the data , thus reducing the cost and time needed for processing Tecnomatix ™ is a broad portfolio of digital manufacturing solutions that offer an innovative approach by linking various manufacturing engineering disciplines with the product , from the layout and design , process simulation and validation after implementation registration Siemens PLM Software includes several software tools for different areas of production , which can be interconnected. Tecnomatix suite of

tools allow industrial companies to use in practice, the concept of the digital enterprise, thus producing plans and projects, design, verify and optimize manufacturing processes and resources in the digital environment. Precise digital modeling, simulation and spatial (3D) visualization allow professionals working in development visualize, analyze future production process, thus limiting the possibility of errors that could occur during the start-up of production. Tecnomatix product portfolio is very extensive. It is composed of interconnected, but also separately usable software products (Fig. 3).

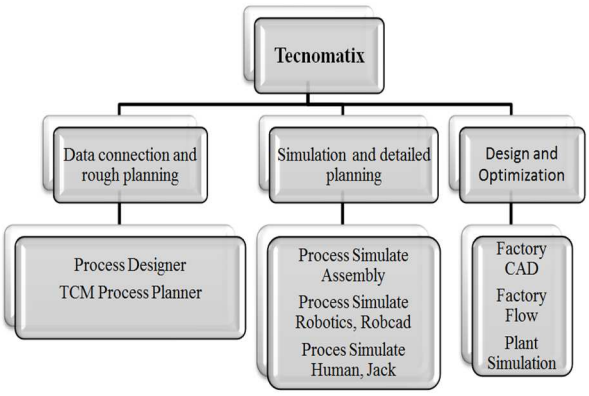


*Figure 3 Tecnomatix distribution of modules according to the type of use*

Key areas using Tecnomatix solutions are:

1. New product development - balanced production planning in accordance with product management ensures competitive advantages.

2. Synchronization value chain - the exchange of innovative ideas and synchronization requirements with the supply chain worldwide.

3. Enterprise data management - to benefit from the knowledge that the enterprise using Tecnomatix operates under the same rules of life- cycle portfolio.

4. Knowledge / intellectual property management – increasing the flow of information to ensure the success of the development process and give new insights for future development.

5. Match - automate data collection at the manufacturing to reduce risks and ensure compliance.

6. Efficiency of production - planning, creation and optimization of production processes to increase productivity, increase profitability and guaranteeing excellent quality.

7. Systems Engineering and Mechatronics - use system view and check electro - mechanical processes for the most efficient production facility.

## Conclusion

Currently, the market for products of any kind is a huge competition as companies increasingly want to be one step ahead of their competitors, they must produce fast, high quality and also provide additional services at a good level. As the product life cycle shortens, it is often necessary to innovate products and production processes change. With these changes of production methods and processes is an essential tool for digital enterprise that helps all activities optimally set up and tested everything and plan before starting the physical production lines. It is important to choose the right tools for the realization of this goal. One of the right tools is the use of Tecnomatix product portfolio of products, which cover much of the modules in digital factory.

**Acknowledgement**
This article was created by implementation of the grant project KEGA 004TUKE-4/2013 *"Intensification of modelling in teaching II. and III. degree in the field of study 5.2.52 Industrial Engineering"*.

## References

[1] STARK, J.: Product Lifecycle Management, 21 st Century Paradigm for Product Realisation, ISBN 978-0-85729-546-0
[2] Software, Siemens PLM., Tecnomatix overview brochure. [pdf.] Siemens PLM Software, 2007.
[3] www.itscz.net/pdf/tx_brozura_cz.pdf.
[4] http://www.sova.sk/poradenstvo/digitalny-podnik-je-zasadna-konkurencna-vyhoda
[5] FIĽO, M., PEKARČÍKOVÁ, M.: Contribution to the creation of the model warehouse management in the company, Manažment podnikov. Vol. 3, issue 2, p. 62-64, 2013.
[6] IVANKA, J.: Automation systems and safety in intelligent buildings. In: Sborník příspěvků, ICMT´09, Brno, IDET, International Conference on Military Technologies, p. 225 – 234, 2009.
[7] SOBOTOVÁ, L., BADIDA, M., KARKOVÁ, M.: Water quality in water jet technology, SGEM 2013, 13th International Multidisciplinary Scientific Geoconference : Water resources, forest, marine and ocean ecosystems : conference proceedings: 16-22

June, 2013, Albena, Bulgaria. - Sofia : STEF92 Technology Ltd., p. 463-470, 2013.

[8] MILLER, A., KLEINOVÁ, J., ŠIMON, M.: Proposal for evaluating variants of inter-company transport in business networks. In Innovation and Sustainable Economic Competitive Advantage, Istanbul: International Business Information Management Association (IBIMA), p. 2785-2792, 2012.

**Review process**
Single-blind peer reviewed process by two reviewers.