 IMPROVE PRODUCTIVITY THROUGH DIGITAL MANUFACTURING

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Abstract: In the future the digitalization and "Industry 4.0" will be in every step of the product lifecycle from design to the manufacture, service, and maintenance. Through digitalization, the companies will be able to operate and program the complex CNC machine tools that will be ready to respond more flexibly to the market demands and at the same time to boost their productivity. Work preparation and production can be breaking down further into additional process steps, ranging from tendering to quality assurance. The demand for digitalization solution can be illustrated thru the following targets and questions what every production company must define and establish: 1. How long time will be the part on the machine to be manufactured; 2. Is that CNC machine tools (what is able and have the technical characteristics) available; 3. Are necessary new cutting tools for this new job; 4. The CNC operator is familiar with the CNC control equipment; 5. Does the workpiece tolerance correspond with the customer specifications. Is not so easy to link up all this requests and to find the best solutions in time and to have high productivity. Digital manufacturing will give us the preliminary units costs and delivery deadline that must be determined to be able to tender for a job correctly. Today, the amount of time a workpiece will require for machining can be calculated quickly reliably and very important, without trial runs, using CNC simulation solutions. This recommendations from our paper can be an answer at the production companies and the advantage of this implementations is that can be made step by step. The solution of this implementation should be in concordance with the company’s requirements and resources.

Key words: digitalisation, Industry 4.0, cnc.


Ključne reči: digitalizacija, Industrija 4.0, cnc.

1. INTRODUCTION

Digitalization -about used terminology Industrial Internet,[1, 2] is a term and refers to the integration of complex physical machinery with networked sensors and software.

The industrial Internet draws together fields such as machine learning, big data, the Internet of things and machine-to-machine communication to ingest data from machines, analyze it (often in real-time), and use it to adjust operations.

Industry 4.0 [2] is a project in the high-tech strategy, which promotes the computerization of traditional industries such as manufacturing. The goal is the intelligent factory (Smart Factory), which is characterized by adaptability, resource efficiency and ergonomics as well as the integration of customers and business partners in business and value processes.

Technological basis are cyber-physical systems and the internet of things. Experts believe that Industry 4.0 or the fourth industrial revolution, could be a reality in about 10 to 20 years. Meanwhile, in the United States, an initiative known as the Smart Manufacturing Leadership Coalition is also working on the future of manufacturing.

Industry 4.0 as part of networked world business networks smart products supporting actively manufacturing process network of human beings, machines and resources factory interfaces with smart mobility, smart logistics and smart grid.
It is about collaboration productivity!

Industrial internet in the future next natural development step is to expand from virtualization of manufacturing to virtualize the whole company and its ecosystem. Snapshot from current company performance can be basis for simulation. Through simulations can be tested different future scenarios: raw material price, energy price, production machinery capacity and productivity, transportation cost, etc. As a result, best fit can be played in production.

2. EXPLANATIONS AND HOW TO WORK

Digitalization is fundamentally changing our working environment and society (Fig. 1). Billions of intelligent devices and machines generate massive amounts of data, creating a bridge between real and virtual worlds. Turning these vast amounts of data into value is a real source of competitive advantage for both businesses and economies. However, the level of preparedness for this change varies widely from country to country.

Fig. 1. Digitalization changing our working environment.

Upswing for Romania through digitalization:
1. Can't build a house without foundation. Foundation would be great education. Industry professionals are needed. The ones who can play the virtual factory simulations (Smart Factory Game).
2. Part of foundation is virtual factory builders. Could there even be synergies with game industry? Finally, it’s only a question of building a strategy game linked to parameters from real business.
3. Romania is fertile soil for implementation, pioneers can be found in industry.

Industry 4.0 in products workshop products, parts, assemblies, and end user products will benefit from in all its varieties and applications. New engines carry a lot of digital information as well monitoring of the machine condition is one of the approaches where information technology is widely used. Collecting this data from several engines gives valuable information for further development of the engine itself and above all new value adding services.

New technologies - like Industry 4.0- enable new products and new services interaction.

New world order generates new needs for products and to create new business opportunities.

Today, Digitalization drives the evolution of demand:
1. Artificial Intelligence- Purpose, 2. Digital-Agility, 3. Industry -Efficiency, 4. Trade- Scale, 5. Agriculture-Survival. Fig. 2.

3. THE TARGETS

Technologies that shape the digital age. The breadth and depth of these changes herald the transformation of entire systems of production, management, and governance. The targets are:

I. VELOCITY Mobile Internet, cloud Technology, Processing power, Big Data, New energy supplies and technology. 3 Internet of things 4. Sharing economy, crowd sourcing.

II. SCOPE: Robotics, autonomous transport, artificial intelligence, advance manufacturing, 3D printing, advance materials, biotechnology,


Fig. 2 Digitalization drives the evolution of demand.

SCOPE Metals & Mining Waste management Wellness industry 1. SYSTEMS IMPACT Market size potential [3].

The two important data's who must take in consideration in production are: the unit costs and the delivery deadline.

Digitalization is very competitive in this area. Now the time of manufacturing can be calculated reliably and very fast. For this is not necessary to have any trial run, only to use the CNC simulation capabilities of the CAM software. Together with the time of preparation (who at every workshop is different but know by every CNC operator particular) we can establish the time for delivery.

To gain an overview of machine performance and utilization, operators can consult the overall equipment efficiency indicators, which are read out from the CNC. Machine utilization can be displayed on a PC or a mobile data device using the software from the modern CNC equipment.

Production managers can use these data to assess the availability of the relevant machine.

It allows to find out the exact status of an order online during a shift.
Collaboration has never been easy, and companies have long struggled to solve collaboration challenges. However, as products and development ecosystems continue to get more complex, collaboration needs have increased. Unfortunately, poor collaboration comes at a high price. It results in delays, errors, and increased costs, all of which have an impact on profitability. The good news is that digitalization technologies, such as the cloud and innovation platforms, can help to significantly overcome barriers and improve design collaboration across the enterprise.

Recommendations and the steps based on industry experience are:

- Understand the true cost of poor collaboration on both engineers and the entire company.
- Invest in digitalization improvements to increase engineering efficiency.
- Recognize the significance of collaboration requirements on engineers from the number of people involved, different departments, and processes impacted.
- Ensure excellent collaboration between engineering and manufacturing to overcome knowledge gaps and support seamless hand-offs.
- Support effective collaboration between design engineers and simulation analysts to empower engineers to catch problems and design more competitive products.
- Considered digitalization technologies, such as cloud and an innovation platform, to support and enable better collaboration processes.

5. REFERENCES


Authors: Ph.D. Eng. Adrian BUT
POLITEHNICA University of Timișoara, Mechanical Faculty, Department of Materials and Manufacturing Engineering, B-dul Mihai Viteazu nr.1, Timișoara 300222, Romania,
E-mails: adrian.but@upt.ro; adi.but@gmail.com

Ph.D. Eng. Radu CANARACHE
INICAD DESIGN, Bucharest, Str. Popa Tatu nr.27, Romania
E-mails: radu_canarache@yahoo.com

Ph.D. Eng. Lucian GAL
AUREL VLAICU” University of Arad, B-dul Revolutiei nr 1, Arad, Romania
E-mails: lucian.gal@gmail.com