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SMART FACTORY – SMART FOUNDRY

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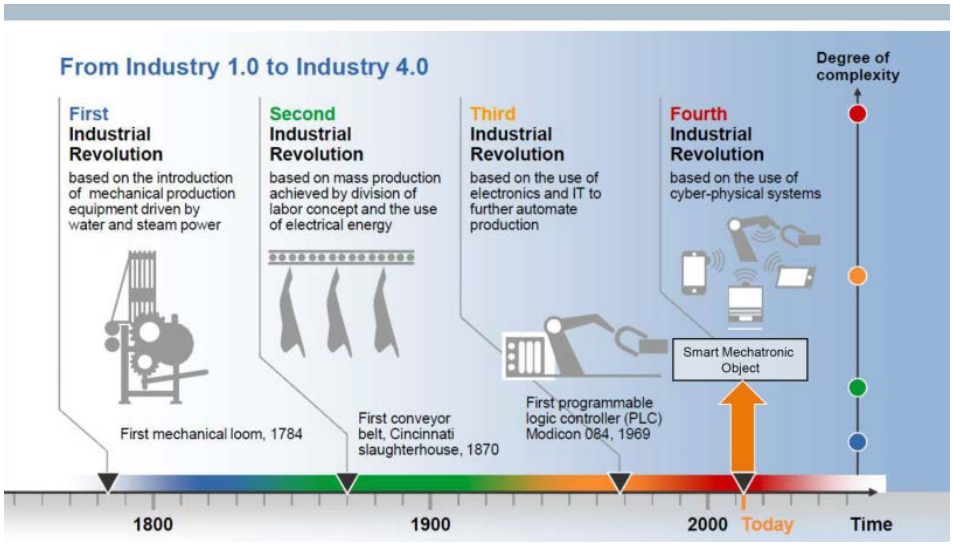
1. Introduction

Quality, efficiency and hence competitiveness are the factors that determine the company's position in a particular industry. The use of full automation, intelligent production line control and knowledge base founded on historical data increases the efficiency of production, allows for monitoring the quality of products, and shortens production time, ultimately making the plant more competitive. A modern factory based on the concept of the Industry 4.0 platform is the future of every manufacturing industry.

2. Concept of Platform Industry 4.0

The basic principle of industry 4.0 is that by connecting machines, work pieces, and systems, we are creating intelligent networks along the entire value chain that can control each other autonomously.



Western civilization has already witnessed three industrial revolutions. The first improved efficiency through the use of hydropower, the increasing use of steam power and the devel-

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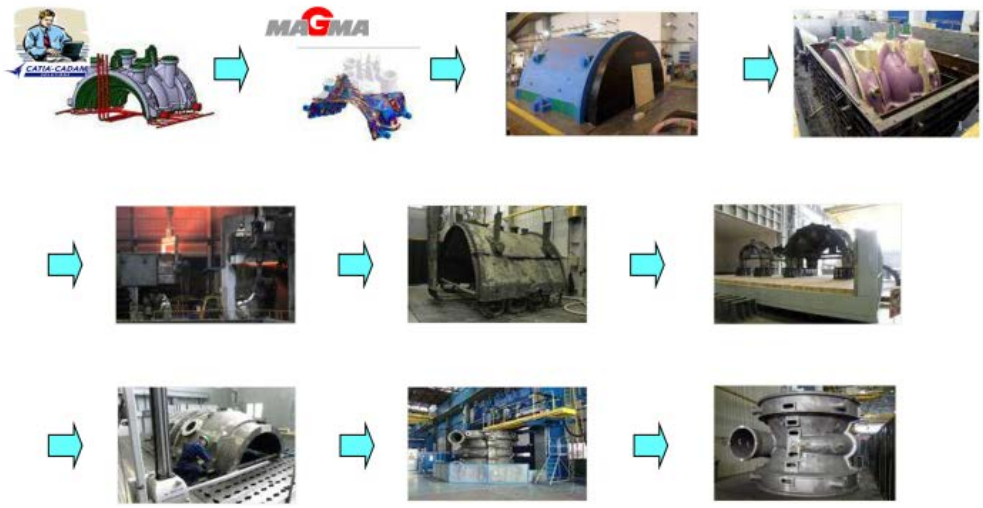
opment of machine tools. The second brought electricity and mass production and the third and most recent further accelerated automation using electronics and IT.
This time, physical objects are being seamlessly integrated into the information network. The Internet is combining with intelligent machines, systems production and processes to form a sophisticated network.
Let's take a look at the key characteristics of the new industrial landscape:

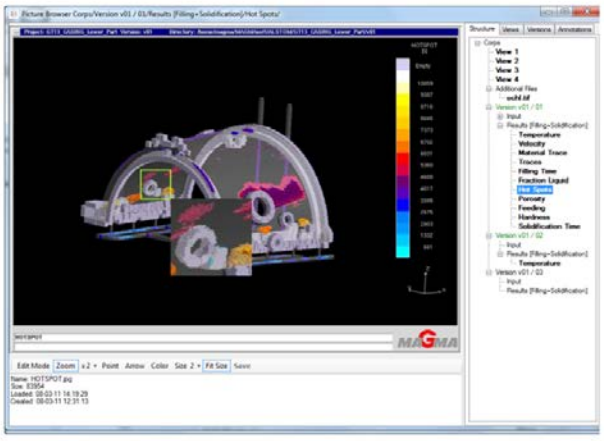
- Cyber-physical systems and marketplace. IT systems today are already at the heart of the production system. In Industry 4.0, those systems will be far more connected to all sub-systems, processes, internal and external objects, the supplier and customer networks.
- Smart robots and machines. Robots already replaced human workers in the last revolution. In the future they will become intelligent, which means able to adapt, communicate and interact.
- Big data. Data is often referred to as the raw material of the 21st century. Indeed, the amount of data available to businesses is expected to double every 1.2 years. A plant of the future will be producing a huge amount of data that needs to be saved, processed and analyzed. Innovative methods to handle big data and to tap the potential of cloud computing will create new ways to leverage information.
- New quality of connectivity. While at the beginning of the 21st century connectivity was a feature of only the digital world, in Industry 4.0 the digital and real worlds are connected. Machines, workpieces, systems and human beings will constantly exchange digital information via Internet protocol.

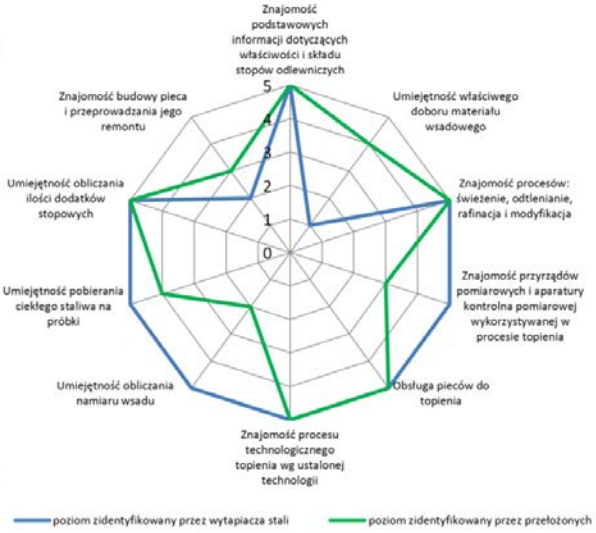
3. Application of Smart Foundry system in the foundry industry



In the casting sector, the concept of Industry 4.0 is at a very preliminary (initial) stage. The best potential IoT (Internet of Things) applications are still being sought. However, systems combining data from various subsystems (databases, sensors, technology, etc.) are already being implemented. In addition to merging data, the system also integrates people working in different positions, allowing individual persons to have access to selected information. The entire production process – from receiving an order, through developing the technology, making a model, preparing a casting mold and alloy (metal), performing the casting, and carrying out quality tests – everything is combined into a single system, Smart Foundry. Then, the quality control results are returned as the feedback to the technology development module. Such a large amount of data, multiplied by the number of manufactured units and the number

of new projects, creates significant opportunities for data exploration systems. Screenshots from selected modules of the system, along with short description of their functionality, are presented below.
Each workstation is operated by specialists with relevant competence. The competence star presents the range of skills, knowledge and abilities to perform a given position.
Additionally, repetitive processes can be controlled by systems utilizing artificial intelligence methods.
The Smart Foundry system integrates data from various systems, and connects persons working in various positions, facilitating the execution of the production process. Smart Foundry fits well with the SMART FACTORY concept.





4. Summary

Smart Factory is a rapidly evolving concept. Numerous production plants representing various industries want to use the abundance of digital resources to turn them into tangible economic benefits

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