

**Technical University of Košice**  
**Faculty of Mechanical Engineering**

# **DIGITAL FACTORY**

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## **PRODUCTION PROCESSES AND SYSTEMS DIGITALIZATION**

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## Introduction

The driving force behind the development of the industry is the rapidly growing digitization and development of digital technologies. They are an accelerator of innovation with a great influence on the behavior of companies and an impetus for starting changes in customary business models. Short innovation cycles and product adaptation to customer requirements are significantly changing the industry and service sectors. An innovation is only successful if it reaches the market quickly. The cooperation of individual partners is very important not only during product development, but also within the entire product life cycle. In accordance with the above, national production development strategies were developed, such as Industry 4.0, Smart Industrie, l'industrie du futur, Made in China 2025. Rapid development of new technologies based on the Industry 4.0 concept, such as cloud computing, the Internet of Things, the Internet services, big data, artificial intelligence, exponential technologies (nanotechnologies, biotechnology, advanced robotics, 3D/4D printing, etc.), PLM systems, digital production, digital twins are a prerequisite for achieving the digital factory concept.

Connecting technologies with production processes through communication technologies and the introduction of so-called Self-X features (self-regulation, self-configuration, self-diagnosis, self-optimization, self-protection) enable autonomous or partially autonomous activities of machines and equipment, or logistics elements, which increases flexibility and efficiency. It opens up the possibility to process a large amount of data in real time, to create a virtual environment without interfering with real systems and processes, to create a digital environment by using digital technology and implementing digital models, which creates a new environment for the development of Industry 4.0. Communication and cooperation of people, intelligent machines, devices, logistics elements and products is the main meaning of Industry 4.0. One of the impacts of Industry 4.0 will be the elimination of monotonous work as well as physically demanding jobs. The need for people with expert knowledge and skills in specific areas will increase in combination with the so-called soft skills, thanks to which they will be able to provide managerial functions such as planning, management, coordination, etc. To ensure the continuity of this process, it will be necessary to create platforms that will be built on the concept of continuous education. The goal is to advance and

## *Introduction*

improve the interaction between humans and machines through the concept of Industry 5.0, which combines human creativity and craftsmanship with the speed, productivity and consistency of robots based on Industry 4.0.

The scientific monograph Digital Factory provides a comprehensive and systematic analysis of the issue of digitization of the corporate sphere in industry. It is processed into 15 consecutive chapters, in which, in addition to the latest knowledge from the subject area, the own outputs from the scientific and research activities of the author's collective are processed. The author's collective focused on processing the issue of the digital factory with the aim of communicating their own conclusions from scientific activity in the circle of professionals and specialists in the subject area.