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SMART MANUFACTURING

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Nowadays, you can more and more often hear or read somewhere on the Internet about such a concept as “Smart Manufacturing”. Smart manufacturing represents the most intensive use of network and information technologies, as well as cyber-physical systems at any stage of the production of a particular product.

Smart manufacturing is an enterprise production system that is capable of taking into account the context, and is also capable of assisting humans and robots in solving certain problems, through the widespread introduction of information technology into production and management systems.

Any enterprise can organize the work of “smart production”. To do this, it is necessary to analyze the work of production and identify what tasks a machine can cope with no worse than a person. For example, a robot can cope with such a task as regulating the power of devices during the production process, etc. Afterwards, the enterprise needs to purchase the necessary equipment and configure it for the needs of the production process.

The main goal of introducing “smart manufacturing” to enterprises is to improve all competitive advantages of enterprises through the use of the latest technologies. In the modern world, along with smart production, the concept of “Lean Manufacturing” is increasingly gaining popularity.

The practical organization of production is of particular importance in the development of the economy of the Republic of Belarus. At the moment, there are several approaches and tools for practically increasing the use of certain organizational and economic resources of an enterprise. One of the most common practices is the concept of “Lean Manufacturing”. By introducing the tools of this concept into the enterprise, it becomes possible to make practical changes and implement a new ap-

proach to organizing the production process and identifying hidden resources to improve the efficiency of production and economic activities.

Lean manufacturing is an industrial management system aimed at identifying losses during the production process and eliminating them through special measures. The lean manufacturing concept considers tools such as the 5C system, the Kanban system and post planning [1].

The 5C system implies the organization of the employee's workplace and implies the sequential implementation of certain stages: "Sorting"; "Maintaining order"; "Keeping it clean"; "Standardization'; "Improvement".

The Kanban system includes the organization of production and supply and aims to supply a certain number of resources at a certain time. Post planning is a type of production planning based on the production and delivery of a certain number of components and materials to a production line post.

An example of the application of the Lean Manufacturing concept is the Management Company of the Belkommunmash Holding [1].

An integral part of smart manufacturing is artificial intelligence (AI). One of the main areas where artificial intelligence is showing its strength is in pre-production. It is in the process of pre-production that artificial intelligence is most effective, since most stages are very labor-intensive and involve the use of a large amount of time and financial costs.

Organization of production preparation includes the following stages: research, design, technological and organizational.

During the pre-production process, artificial intelligence can be introduced into most of the listed stages

In the economic sphere, smart manufacturing provides some advantages, among which are: an in-depth division of labor with an increase in the length and flexibility of global and industry production chains, which leads to lower costs and product values.

There are also some problems and risks of introducing smart manufacturing and industrial Internet technologies. The main risk is the high costs of implementing and updating system equipment. As a rule, this leads to material problems for the company, in particular for small and medium-sized enterprises.

The second is the threat of cybersecurity. Due to the use of multiple devices connected to the Internet, it can become a target for cyber-

attacks and confidential security leaks. This contributes to economic losses and loss of company reputation.

The introduction of smart production leads to a reduction in personnel, and this leads to the replacement of labor-intensive processes, therefore, to a reduction in jobs in the enterprise. From the above, it follows that a smart enterprise can become a source of social problems and increased unemployment.

There are several ways to reduce risks and ensure the efficiency of a smart enterprise:

a) an attempt to develop and implement cybersecurity protocols, thereby trying to protect the enterprise production from cyber-attacks and information leaks;
b) use machine learning and artificial intelligence algorithms to detect problems and prevent cyber-attacks;
c) collection of information from smart manufacturing systems, as well as data analysis, which can help the company identify problem areas in production processes. After which it is fashionable to take measures to solve them;
d) process modeling to improve and optimize processes, which will allow companies to evaluate their impact on product quality.

When comparing the pros and cons of the topic raised, it is advisable to refer to numbers from real statistics. In 2020, the study "The Global IoT in Manufacturing Market Size, Share & Trends Analysis Report by Component, by Application, by Region, and Segment Forecasts, 2020-2027" showed that the IoT in Manufacturing market was valued at US$27.77 billion in 2019 and was expected to grow to US$83.21 billion by 2027 [2].

Although smart manufacturing has its downsides, its implementation in manufacturing will only improve the economy.

References

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