

УДК 338.45:629.735

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GLOBAL TRENDS IN THE USE OF INDUSTRY 4.0 TECHNOLOGIES IN THE AIRCRAFT INDUSTRY

The term ‘Industry 4.0’ (hereinafter I.4.0) was first presented at the Hannover Exhibition in Germany in 2011 to describe a strategic approach to production, which is based on computerization and digitalization of production.

At the present, the aviation industry sector has undergone a powerful influence both from the side of globalization trends, which have led to increased competition and standards in the industry, the introduction of changes in the product life cycle and the digitalization of production processes, and the COVID-19 pandemic and tensions in the Taiwan region, which influenced not only the situation of demand for aviation products, but also changed the usual approach to the introduction of new technologies.

In view of the new challenges, I.4.0 is an important direction for the development of the aviation industry and includes the use of the latest technologies that can improve the efficiency and quality of production, reduce costs and increase competitiveness.

However, in the aircraft industry, the costs associated with the development and implementation of new technologies are extremely high compared to other sub-industries of I.4.0 which makes the introduction of such technologies unprofitable in the short term. This situation necessitates a balanced approach to the selection of new technologies for implementation in the production process.

The result is that, for further use in production, only I.4.0 technologies with significant level of maturity are used, which can significantly reduce the cost of implementation and reduce the time of return on investment.

Global trends indicate a fairly wide range of possibilities for using I.4.0 technologies in the industry. Technologies for automation of production processes, which are used to reduce the human factor in production, improve accuracy and reduce the time of production. Artificial intelligence and data analytics, which are used to analyze large amounts of production data, collect and process information about products that are in operation.

The Internet of Things (IoT) and sensor network are being implemented in industries to ensure a continuous production cycle and prevent the occurrence of defects. In the aviation industry, there is a tendency to introduce IoT to collect and analyze data on the state of aircraft and their operation in real time. However, today the greatest use of I.4.0 technologies is observed in the design work of aircraft manufacturers, namely the use of VR and AR and the use of additive technologies. It should be noted that AR technology was introduced in 1997 and is the most mature I.4.0 technology.

VR and AR can significantly reduce time and costs when creating new prototypes, provide an opportunity to analyze design features and identify significant shortcomings at the design stage. In addition, VR and AR allows you to increase the efficiency of communication between the design bureau, production and the customer. Additive technologies allow you to quickly create and test new prototypes compared to making prototypes in a classical way, which in turn can significantly reduce the final cost of the product.

Thus, at present, the degree of involvement of I.4.0 technologies in the aircraft industry is low, but the introduction of such technologies has a great potential to increase production efficiency and competitiveness of the final product, to ensure even higher standards of quality and safety in the industry.

The introduction of I.4.0 technologies requires significant efforts and investments at all stages without exception, as well as the development and implementation of new standards and protocols for the exchange of data between different systems and devices.