

INFORMATION TECHNOLOGY IN THE AEROSPACE INDUSTRY: SOFTWARE AND WORKFLOW AUTOMATION

The role of Information Sciences and Technology in the practice of Aerospace Engineering is very important. Aerospace systems rely heavily on computers, software, and digital information; for control, sensors, and other onboard systems. The aerospace industry is one of the most complex, challenging and regulated industries, where safety, quality and reliability are of the highest priority. The industry faces many challenges, such as the need for improved and automated technology, more accurate and reliable calculations, and achieving the most efficiency in the least amount of time and at the lowest cost. To solve these problems, the aerospace industry turns to information technology.

The role of software in the practice of aerospace engineering is critical and continues to grow rapidly. The effective design, development, and manufacturing of aerospace systems rely heavily on computers, software, and digital information. Some aircraft cannot fly without their onboard computers, and many future aerospace vehicles will be unmanned, resulting in even greater software challenges. Software can be used to develop, test, and test various components of air and space vehicles, as well as perform various computational tasks.

However, efficient work requires the automation of workflows (e.g. project planning and management process, the quality control process, the production process, and the material supply process).

The use of information technology and software can reduce the time it takes to complete tasks, improve the accuracy and quality of work, and ensure better coordination of workflows across departments and teams.

In addition, information technology helps ensure the efficient and safe operation of air and space vehicles. Special programs can be used to monitor and analyze various flight parameters, such as temperature, pressure, speed, altitude, and the status of various components and systems. Information technology in the aerospace industry is also used to ensure flight safety.

Software tools can be used to analyze various scenarios, develop strategies and action plans in extreme situations, and train pilots and other specialists.

It is worth mentioning how much NASA's moon landing programming has changed since it was first launched.

The agency uses HAL/S (High-order Assembly Language/Shuttle), a language designed for real-time aerospace systems. It has been used in many US space projects since 1973, most famously in the Space Shuttle program (approximately 85% of the Shuttle software is written in HAL/S). Although the language is designed primarily for programming onboard computers, it is general enough to meet almost all the needs of producing, verifying, and maintaining aerospace and other real-time applications. The three key principles in developing the language were reliability, efficiency, and machine independence. HAL/S was designed not to include some constructs that were considered error-prone. For example, there is no support for dynamic memory allocation.

United Space Alliance, one of NASA's main shuttle support contractors, has developed a workflow automation system (WAS) in Python.

Here are some specific examples of the use of IT and software in space missions:

1. Curiosity mission on Mars. To control the rover's actions on the surface of Mars, software is used to remotely control the vehicle's movement and monitor the status of its various systems.

2. Juno mission to Jupiter. To collect and process data received from the Juno spacecraft, special software was developed that allows scientists to analyze data and visualize geometric objects based on this data.

3. Apollo mission to the Moon. To calculate the trajectory and navigation of spacecraft during the Apollo mission, special computer programs were used to ensure the accuracy and safety of the flight.

4. Hubble mission in space. To ensure the high quality of the received photos and data from space, special software tools are used to correct technical deficiencies and ensure optimal shooting parameters.

Thus, the use of information technology and software in the aerospace industry helps to ensure high quality and safety of production, improve productivity and efficiency of work processes, and ensure safe and efficient operation of air and space vehicles. Therefore, the use of these technologies is an important factor in the development of the aerospace industry in Ukraine and globally.