V. Chalova, A. Davydova, N. Kaliberda

OPTIMIZATION OF MANUFACTURING PROCESSES AND STRATEGIES FOR INCREASING THE FREQUENCY OF LAUNCHING ROCKETS

The space industry is one of the leading sectors of the world economy and is characterized by high-tech and science-intensive activities. It is necessary to note its significant impact on modern life, for example, providing satellite communication and navigation, enabling environmental monitoring using satellites. Currently, the production of launch vehicles, which deliver the payload into space, is quite lengthy and can take up to several years. Of course, the time spent on production varies depending on the type of rocket, its complexity, and the technology used. Today, there are strategies to accelerate this process and, as a result, increase the number of launches.

1. Large series of production will allow to optimize the logistics of supply of materials and components, to reduce costs per unit of production, and also enabling the advantageous implementation of automated systems that can perform routine assembly operations more efficiently.

2. Preservation and reuse of stages will save time, materials, and costs on manufacturing new stages. It will also reduce the cost of space missions, making space more accessible for scientific and commercial projects.

3. Manufacturing conditions that reduce the time required to transport rocket components between locations. For example, SpaceX designs and builds reusable rockets and spacecraft at its headquarters, where fully assembled rockets can be seen under one roof [1].

4. Using the concept of integrated working groups, where specialists from different fields work together on a common task, allows for identifying and resolving issues quickly [2].

5. Utilizing 3D printing allows for simplifying designs, reducing weight, and manufacturing elements with complex shapes, such as engines, structural element housings, control system parts, and fairing components.

Using SpaceX as an example, one can see how effective these strategies are: in 2020, there were 26 launches of the Falcon 9 launch vehicle, while in 2023 there were 96 launches, with 87 utilizing reused stages.

REFERENCES
1. Build Facility. SpaceX – Mission. [Electronic resource]. – Access mode: https://www.spacex.com/mission/
2. Falcon 9 Launch Vehicle. Payload User's Guide. 2021. [Electronic resource]. – Access mode: https://www.spacex.com/media/falcon-users-guide-2021-09.pdf
3. SpaceX Falcon Data Sheet: Space Launch Report. 2007. [Electronic resource]. – Access mode: https://web.archive.org/web/20071207012921 http://www.geocities.com/launchreport/falcon.html#config

B. Cherniavskyi, D. Chernetchenko, O. Hurko

COMMUNICATION USING MULTI-FACTOR ENCRYPTION WITH SECOND FACTOR VARIATIONS

The growing number of web service and radio receiver integrations necessitates the encryption of confidential data at all levels. Standard security methods, such as Basic Authentication and Digest Access Authentication, do not cover the advanced content encoding methods of transmitted messages that require a secure communication channel. Using a second factor in such systems will eliminate third-party interference with the channel and nullify the chances of obtaining the original content of requests [2, p.5-6].

Known 2FA application protection methods [1, p. 8-12]:

1. One Time Password (OTP) – a password that is engengered once, randomly, and can be sent via SMS or generated using a dedicated application.

2. Biometric Authentication – uses the user's physical characteristics, such as a fingerprint or iris scan.

3. Hardware Key – a physical device for generating random codes.

Main advantages of using 2FA encryption [1, p. 8-12]:

1. Increased security: This is an additional layer of security that makes it difficult for attackers to access data.

2. Adaptability: Code generation can take place without access to the Internet and the ability to combine several authentication methods. The variability of their use intervals ranges from seconds to weeks or months.

3. Convenience: Does not require any technical knowledge or special user skills.

Main disadvantages of using 2FA encryption:

1. Cost: Hardware and biometric keys are very expensive to use.