Making management decisions on after-sales maintenance processes for aircraft based on the Stage-Gate methodology

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Abstract. The article provides a brief description of the methodology for making management decisions for organizing service processes and after-sales maintenance of aircraft based on the Stage-Gate program management methodology and simulation modeling methods. The results of the work show that this approach allows managers to make informed decisions about the possibility of a consistent step-by-step transition through service processes for the effective implementation of an aircraft maintenance program.

1 Introduction

To ensure the competitiveness of aviation technology, one of the most important factors is the provision of after-sales service (AFS) for aircraft. To effectively organize service and software processes, it is necessary to reduce the time for making management decisions at various stages of the implementation of the aviation program. Currently, there are a number of problems associated with the organization of technical training of domestic aviation equipment, including:

1. Lack of synchronization of processes at various stages of project implementation to ensure the operation of aircraft.
2. Long turnaround times for components when providing maintenance and repair (MRO) services.
3. Lack of domestic information systems for data exchange between participants in air transportation and ensuring the operation of aircraft.

To eliminate these shortcomings, a management decision-making methodology is proposed that will allow program managers to make decisions on service and software processes at various stages of program implementation in the Stage-Gate methodology based on the results of simulation modeling.

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2 Materials and methods

2.1 Simulation modeling methods when organizing a service system and software
seven modules: input, operational load, planning and scheduling, supply of materials and spare parts, equipment availability, quality control and, finally, performance indicators.

In [12], an attempt was made to formulate and solve the problem of creating and testing a function for quickly modeling maintenance systems in the field. In a study [13], the authors evaluated asset monitoring levels for maintenance operations using a simulation approach to achieve cost-effectiveness. Generic and simulation modules have been created to study the behavior of a maintenance operation system with respect to different levels of asset monitoring [14].

3 Research and results

As a result of the conducted research, a methodology for making management decisions was developed based on the Stage-Gate project management methodology and simulation modeling methods, which allows at each stage of the program to monitor the situation in the service process and maintenance software of aviation equipment [15-17].

The methodology is a sequence of formalized actions on the basis of which the decision maker (project or program manager) will be able to quickly make decisions about the readiness of work on this process for the transition to the next Gate based on the results of simulation modeling (Fig. 1):

1. Construction of a structural model of the service system and software on Gate N.
2. Formation of a list of source data for various business processes for the service model and software in the Stage-Gate methodology on Gate N.
3. Collection of initial data for simulation of the service process and software on Gate N.
4. Conducting simulation modeling of service and software on Gate N.
5. Analysis of simulation results and decision-making on the launch of work on Gate N.
6. Performing tasks related to the business process of the service and software on Gate N.
7. Making decisions about moving to the next Gate (N+1) or finalizing the project for the service process and software on Gate N.

Fig. 1. Scheme for making management decisions based on the Stage-Gate methodology and simulation methods

Based on the proposed methodology, decision makers will be able to monitor the progress of work and the fulfillment of the criteria for transition to the next Gate in the process of service and after-sales service based on the results of simulation modeling during the implementation of the aviation program [18].

E3S Web of Conferences 458, 03031 (2023) EMMFT-2023
https://doi.org/10.1051/e3sconf/202345803031
Conclusion

The paper presents a brief overview of methods for making management decisions in the process of service and software of aviation equipment, in particular the Stage-Gate project management technology and simulation modelling methods. A brief description is given of the developed methodology for making management decisions, which will allow making decisions in real time.

References

3. D. Yurin, A. Deniskina, B. Boytsov, M. Karpovich, E3S Web of Conferences 244 (2021) https://doi.org/10.1051/e3sconf/202124411010
14. A. Korchagin, E3S Web of Conf. 376, 01093 (2023) https://doi.org/10.1051/e3sconf/202337601093
17. E3S Web of Conferences 458, 03031 (2023) EMMFT-2023 https://doi.org/10.1051/e3sconf/202345803031


E3S Web of Conferences 458, 03031 (2023) https://doi.org/10.1051/e3sconf/202345803031

EMMFT-2023