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Process approach to the creation of a domestic unmanned aerial vehicle tactical management

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ABSTRACT

This article describes one of the approaches to the development of unmanned aerial vehicles by consistently performing intellectual, creative, scientific, development and other processes. The results of previous processes are input data for subsequent processes.

Key words : Process approach, Unmanned aerial vehicle (UAV), Unmanned aircraft systems, Unmanned aircraft systems.

1. INTRODUCTION

The development of the first unmanned aerial vehicles began at the beginning of the XX century. During the first world war, aeroplanes with radio control systems were used. In the 1930s, remotely piloted aerial targets appeared, and in the 1950s, unmanned scouts appeared. The 1970s marked the beginning of research and development in the field of combat (strike) UAVs, as well as unmanned aircraft with high altitude and flight duration, designed for long-term surveillance and use as reconnaissance and strike systems. A significant leap in the field of unmanned aerial vehicles occurred at the turn of the century, when the world-famous American RQ-2 pioneer, MQ-1 predator, RQ-4 global hawk, Boeing x-45, Boeing x-48, MQ-9 Reaper,Israeli Hermes 450, etc. appeared [1].

UAVs were first used EN masse during the Vietnam war.

In 1973, during military operations in the middle East, Israel began to use UAVs EN masse [2].

During operation Allied force in 1999, American Predator and Hunter UAVs were widely used in Yugoslavia. In 2003, during operations in Afghanistan and Iraq – Global Hawk and Predator UAVs [3]

Modern armed conflicts in Syria and Ukraine confirm the increasing role of the use of unmanned vehicles and technologies for their creation [4,5].

UAVs are a reliable source of information used both for the efficiency of decision-making on the battle (operation), and to confirm the legality of the actions of law enforcement agencies in front of the world community.

The advantages of unmanned vehicles are [3,6]:

- excluding personnel losses
- the ability to achieve the goals of combat tasks at a lower cost;
- presence of lower unmasking features;
- high maneuverability and high survivability.
- increased reliability;
- lower cost and weight;
- the best performance of reconnaissance due to the long time spent in the area of exploration, detection of targets from a safe range and altitude
- no need to allocate forces and funds for search and rescue of the crew;
- low cost and time for maintenance and preparation of the calculation;
- ability to perform maneuvers with high overloads;
- small size and effective reflective surface;
- ability to use weapons from short distances;
- possibility of remote piloting by several operators in shifts.

An unmanned aerial vehicle is a part of an unmanned aviation system, which, in turn, is part of an unmanned aviation complex.

The acquisition of foreign components of unmanned aircraft systems compensates for the lag of the aviation industry in

Kazakhstan from world leaders such as the United States, Israel, China and Russia.
At the same time, it is necessary to develop the domestic industry of unmanned aviation by developing, creating, testing and adopting UAVs of national production.
One of the approaches to creating a tactical control UAV is a process approach.
The process approach is one of the management concepts, according to which all the activities of an organization are considered as a set of processes.
ISO 9001 defines a process as a set of interrelated and interacting activities that transform inputs into outputs.
At the input of the UAV creation process, there can be:

- terms of reference, including the purpose, requirements for it, and terms of development;
- limit of financing;
- analytical materials of the experience of creating UAVs abroad;
- legal and technical documentation;
- production and technological base.
- The output is-the expected result, that is, the UAV itself.

In addition, the implementation of the process requires the availability of certain resources: human-specialists, technical-equipment, laboratories, manufacturing materials, etc., financial.
The process approach also implies the owner of the process-the Manager who has the necessary amount of resources and is responsible for the final result.
Each process must have customers and suppliers. Suppliers provide the input elements of the process, and customers are interested in getting the output result.
If the process does not have any suppliers, the process will not be executed. If there are no customers, the process is not in demand.
Process indicators are quantitative and qualitative parameters that characterize the process itself and its result.

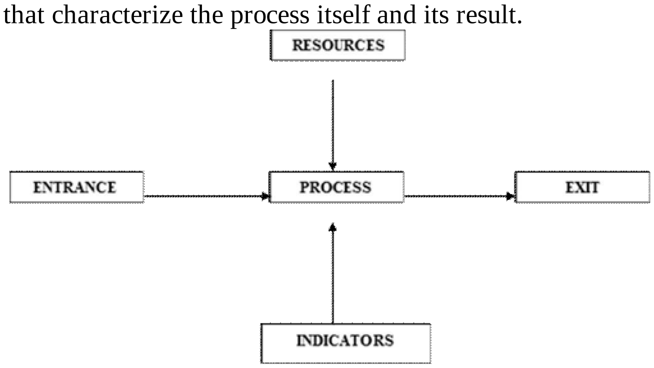

Figure 1: Description of the process approach

Many foreign authors of scientific articles concerning unmanned aircraft offer a different classification of UAVs. For example, Korchenko A. G. and ilyash O.C in their article presented an expanded classification of UAVs [7].

Within the subject of the article, it is proposed to consider the classification of:

- By type of control system
- By type of aircraft
- In the direction of takeoff and landing
- By type of takeoff and landing
- The type of engine
- By number of uses
- By range
- The flying height
- By functional purpose

The analysis of modern armed conflicts in Syria, Afghanistan and Ukraine shows promising directions for the development of tactics and operational art, innovations in management systems, and tactical and technical characteristics of weapons and military equipment.
For example, an unmanned aircraft complex can be used as part of a reconnaissance-strike (reconnaissance-fire) complex in a single information space of network-centric interaction.
Therefore, an unmanned aircraft system can include various UAVs for their intended purpose: one device can conduct reconnaissance, the second-jamming, the third-to deliver high-precision air strikes, the fourth-correcting the fire of artillery and aviation, monitoring the situation on the battlefield in the tactical zone.
Consider a UAV that performs reconnaissance tasks.
The design of the scout should use radio-absorbing materials that reduce its radar visibility and infrared radiation.
Undoubtedly, the probability of performing the task of a reconnaissance UAV depends more on its instrumentation.
On Board the device, you must have a full automatic control system, a panoramic aerial camera with high resolution and bandwidth on a gyrostabilizing platform.
To quickly restore damaged structures, the airframe must be made according to a modular scheme.
Since the depth of the detailed and survey reconnaissance zones of the battalion is 5 and 10 km, respectively, the tactical control UAV must be of the type of reusable copter with a range of at least the depth of the survey reconnaissance. For the copter, vertical takeoff and landing from these points are inherent, while reducing the time for deployment and folding of the complex in a combat situation. The flight altitude is 200-300 m for high-quality image acquisition.
The engine type is electric, providing a low noise level and no heat trace, which eliminates the guidance of infrared homing heads.
Here are the main characteristics of a promising UAV tactical management.
The resources for creating such a UAV can be laboratories of national Universities, 3D printers and design documentation.

5. CONCLUSION

Thus, to create a domestic UAV tactical management level, it is necessary to organize close cooperation with state authorities in the field of aviation industry, national Universities, private enterprises and intellectual reserves of the scientific sphere of Kazakhstan.

In the future, the development of operational and operational-strategic level UAVs will allow creating a local navigation system without the use of navigation satellites, which will require lower costs for its deployment and operation.
In addition, a relatively cheap national navigation system built using UAVs and under the full control of users will not depend on the foreign policy environment.

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