

ANALYSIS OF THE CAPABILITIES OF UAV'S AND THE LEADING TRENDS IN THEIR APPLICATION IN THE EUROPEAN COOPERATION PROJECTS

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Abstract: *The European defense agency (EDA) is the key institution in the European Union in implementing resource security measures for the Common Security and Defense Policy (CSDP). The Agency has set objectives in the field of military resource development, defense research and development, pan-European armaments cooperation projects, strengthening the industrial and technological resources and as a key focus the creation of a common competitive market for military and dual-use products. Significant progress has also been made in the area of unmanned aerial vehicles (Remotely Piloted Aircraft Systems, RPAS). The goal of the project is to introduce unmanned aerial vehicles (UAVs) into the internal airspace. The Agency coordinates the interaction between UAV national operators the European Commission, represented by the Directorate-General for Mobility and Transport and the European UAV Group.*

Keywords: European defense agency, military integration, unmanned aerial vehicles, pan-European cooperation projects

1. Introduction

The EDA is the key institution of the European Union in the implementation of CSDP resource provision measures. The Agency has set objectives in the field of military resource development, defense research and development, pan-European armaments cooperation projects, strengthening the industrial and technological base, and as a key focus, the creation of a common competitive market for military and dual-use products. In order to achieve the goals set by the EDA, strategic initiatives have been approved, which have become the conceptual basis for this body's activities. However, over the last ten years, the Agency has failed to achieve serious results and it is only making a partial progress in this direction.

2. Analysis of UAV capabilities and leading trends in their application

One of the current and promising ways to improve the combat potential of the Armed Forces is to create and deploy a new type of equipment (UAVs) in the processes of military training and military operations. UAVs have been developed and are being developed particularly for intelligence purposes (including surveillance and target identification). Furthermore increasing efforts are made for UAVs to accomplish a number of other tasks such as gathering information that guarantees political decision-making in crisis situations; radio and radio-technical intelligence; radiation, chemical and biological intelligence. In addition, detection of mine and mine fields; creating interference in the enemy's radio and radio equipment fire control and targeting of ground and naval artillery

ground strikes (in the future and in the fight against air targets); jamming of enemy air defense; evaluation of the results of the enemy's blows; missile defense. Including the detection and destruction of targets; messages and data transmission; collecting meteorological information, etc.

Unmanned aerial vehicles made in the US and Western Europe have been used in combat operations in the Persian Gulf, the Balkans, Afghanistan, Iraq, and the military conflict with Georgia in South Ossetia. To coordinate the conducted in various NATO member states operations, the development of a number of documents is planned, which include the standards for a ground station, used for flight control of UAVs and the required tactical and technical characteristics of UAVs. To develop a tactical unmanned Navy intelligence system, NATO plans envisage the use of several countries. According to one of the possibilities for such use, Germany will provide intelligence UAVs for this system, the United States - a tactical control system and the United Kingdom - data transmission equipment. Since the mid-1990s, there has been a growing interest in the creation of unmanned aerial vehicles.

The analysis of local conflicts from the second half of the XX and the beginning of the XXI century set new requirements for military operations in which high-tech weapons and military equipment are increasingly involved. The increasing implementation and development of UAVs, which, at some stage of development of science and technology evolves high-tech radio-controlled equipment. Unmanned aerial vehicles, as the means of modern warfare, "made their debut" in 1982 over the Beck Valley during the war between Syria and Israel. Syria had a strong air defense system (EIA) built by Soviet military experts. Even for the Israeli Aviation, which at that time was equipped with modern American equipment and had a solid combat experience in previous wars thus, proving to be a serious challenge.

However, Israel, using UAVs, was able to find out the location of the Syrian air defense systems. Using the data obtained from the UAV, Israeli aircraft struck a powerful blow to the Syrian air defense in the Beck Valley. As a result, 18 Syrian rocket batteries were destroyed [2].

Since then, interest in UAVs in the world has been growing. This is manifested particularly in the increasing number of publications on the creation and use of UAV complexes, the involvement of more and more countries in their development, the continuous growth of the tactical and technical characteristics of the developed complexes, and the finding of new and different applications.

Since the mid-1990s in the United States and Western Europe, significant role has been given to UAV research as one of the priority directions for the development of aviation technology. As a result of US military operations in Kosovo in 1999, there was a growing awareness of the objective inevitability of creating UAVs for both the US and leading European countries, including US allies in NATO. The analysis of the military operation in Yugoslavia has made it clear that the further increase of efforts within the current understanding of the military might of the United States is no longer achieving the desired results. There is a need to replace manned combat aircraft with reusable drone systems to deliver ammunition to the target. However, according to foreign experts, there are at least three reasons for the less clear and insufficiently prioritized approach of Western European countries to the issue of creating a UAV with a military payload:

- the overall lag of European countries compared to the United States in the development of UAV technology;
- the difficulty of ensuring the safe use of UAVs on the European continent in an air traffic management system loaded to the limit with civilian aircraft;
- the lack of sufficient desert or vast spaces suitable for use as testing grounds

for established UAVs.

The creation of a UAV characterizes as an organized process of research and design work funded by the military departments of a number of Western countries, including work on the creation of UAVs with high-precision weapons [3,5]. At present, an army that does not have a sufficient number of drones and cannot use them effectively is not considered modern. These factors determine the ability to clarify views on the role and place of UAVs in each country's armed forces system in order to assess the prospects for the development of these weapons and military equipment. The effectiveness of combat methods is determined by the quality of destruction, intelligence, communications and automated control systems. The use of unmanned aerial vehicles for military purposes has become one of the important directions for the development of modern aviation, which allows for the automation of troop control, to reduce the loss of personnel in battle due to the received intelligence on the current situation.

Depending on the level of tasks they have to solve, they are designed to supplement manned aircraft insofar as increasing their capacity is impossible or irrational. The task of creating and expanding a fleet of unmanned aerial vehicles has another equally important reason. It consists in the fact that UAVs in the decision to provide individual combat tasks to the Air Force are an alternative to manned aircraft, which in modern conditions can be preferred according to a number of criteria. Recovering and strengthening the capabilities of the Air Force is possible by developing and manufacturing (or purchasing foreign) UAVs that require less cost than manned aircraft, including the cost of building and maintaining ground infrastructure, preparing and training ground-based personnel. The training of ground personnel could be carried out during the training of the students from the "Georgi Benkovski" Air Force Academy. Thus, the use of UAVs will increase the

capabilities of manned aircraft and reduce the cost of maintaining the fleet.

The correctness of the theoretical concepts developed is evidenced by the pattern of hostilities in the Middle East, where despite some technical delay in the development of UAVs by the leading armies of the world, the armed forces of Russia and Syria have brilliantly applied the theory in practice, using predominantly intelligence UAVs. The Russian group in Syria includes about 80 UAVs, from the lightest to the worst. Their number exceeds the total number of manned aircraft and helicopters. Such an amount of UAVs radically increases the intelligence capabilities of Russian troops. The successful use of the UAV is in its deployment in all types of troops. In the navy, UAVs are used for fleet fire control but also in the interest of the CB [4]. Unmanned aerial vehicles assist in aircraft strikes with aircraft destroyers, target control and reconnaissance. UAV video footage gives an opportunity to evaluate the actions of crews, the position of government forces, the position of the enemy, and coordinate strikes in response to the changing situation. All this contributes greatly to the interaction between the units and the troops. This makes it possible to monitor the situation of hostilities.

UAVs equipped with radar and optical equipment can be used to solve many tasks, the execution of which with piloted aircraft (PA) is inappropriate for a number of economic, technical and other reasons. These tasks include: monitoring of airspace, land and water surfaces, environmental control, air traffic management, maritime control, development of communication systems, such as intelligence and surveillance of tightly guarded sites and areas where combat operations are being carried out as well as areas with large-scale fires, floods and more [1]. The monitoring of the air and ground conditions with the UAV is related to the observation of a section of the ground and taking pictures or films. During flight in an area, a UAV can transmit intelligence information on a radio

channel in real time (or near real) to a modular communication system that manages and processes the information.

Another equally important direction in the use of UAVs is to use them to combat air defense systems (air defense systems), including radio broadcasting ones. Unmanned aerial vehicles have remarkable advantages over „Air - Radar station“ guided missiles due to the duration of their flight operation, the ability to deploy different sensors, and the exchange of information with the operator in real time. Prospects for using UAVs as a strike option is also an effective tool for destroying enemy air defense equipment.

The main efforts in the development and use of UAVs should be directed to the creation of low-cost and multifunctional vehicles with an advanced navigation equipment and control systems. The problem is further actuated due to increased demands for better radar and optical imaging for UAV's, which necessitates the development of new and / or modified methods and algorithms for processing the received images.

Thus, in the context of troop control automation, it is very important to have modern drones that perform a complete range of tasks that are assigned to them. Modern military action are unthinkable without UAVs, and the prospects for their development are enormous.

An analysis on the ways to explore the different paths of UAVs development, shows that the key issues that determine the appearance and combat use of promising aeronautical systems for combat unmanned aerial vehicles are:

- implementation of joint combat use for both manned and unmanned aerial vehicles in the structure of the mixed forces of tactical aviation;
- ensuring the safety of UAV operations in civil airspace, including cases of return landing with unused armaments;
- allocation of control functions between the operator located in the external

control center and the on-board system for automatic control of combat UAVs;

- providing sufficient information on the situation and data required for use of force decision making.

3. Europe-wide cooperation projects

In recent years, the EDA has been able to launch and partially implement a number of pan-European projects aimed at simplifying the harmonization of standards and accessibility in the defense industry markets for European manufacturers. Such database projects include Procurement Gateway and e-Quip, initiated by the EDA as information resources for national defense departments and defense industrial enterprises, including small and medium-sized enterprises involved in the supply and production of military and dual-use products.

The Procurement Gateway system provides access to regulatory and technical documents for all 27 (Denmark does not participate in the EDA) countries participating in the EDA regulating the purchase of military products. The main objective of this project is to facilitate the mutual access of small and medium-sized enterprises in the field of defense industry to the markets of the EU Member States by providing "navigation" through a huge set of regulatory documents in this field. However, the system only provides access to documents in the national language, without providing translation, making it difficult to handle them.

In 2013, the e-Quip system was launched, which allows the exchange of information between potential sellers and buyers of defense industry products. It is an online platform where you can track the online supply of defense products across the EU. EU countries with a surplus of military equipment and weapons, which are usually formed at the end of military and peacekeeping operations, regularly update the information in the system and enter relevant product data [4,6].

Considerable progress has also been made

in the area of unmanned aerial vehicles (Remotely Piloted Aircraft Systems, RPAS). The goal of the project is to introduce unmanned aerial vehicles (UAVs) into internal airspace. The Agency coordinates the interaction of UAV national operators, the European Commission, represented by the Directorate-General for Mobility and Transport, and the European UAV Steering Group. According to the European Roadmap for the Integration of Civilian Pilot Systems into the European Aviation System, their gradual implementation and use in EU airspace should start by 2016. According to Philip Leopold, lead resource development officer at EDA, is working to create a working group of UAV operators in Europe that will include mid-altitude Reaper UAV specialists, developers of mid-altitude collision avoidance systems (Mid-Air Collision avoidance System (MIDCAS) and satellite systems that enable the introduction of UAVs in Europe (DeSIRE). The DeSIRE program is a joint project of the EAO and the European Space Agency, implemented by the Spanish company Indra. It tests UAVs in Spanish airspace using satellite control and surveillance, communications and air traffic management systems and data transmission systems to ground stations. Member States' investments in the project amount to € 50 million. The results of the project implementation should be the development of common standards for the training of UAV users, the harmonization of national laws governing the use of UAVs in airspace, standardization of certification requirements and the development of an effective collision detection and prevention system (sense and avoid) [7].

In addition to those projects that are essentially targeted at the creation of a common market, work is being done to create specific pan-European resources. These include the development of A400M military transport aircraft and the production of refueling airplanes with two

Air-to-Air refueling systems. EU operations show that transport aviation and refueling are one of the most important links in them, while cooperation in this area is least developed: despite the obvious problem, only seven members are involved in the project and they can provide only 30 % of required load. But at the same time, European governments have not abandoned parallel bilateral and multilateral interstate projects. For example, under intergovernmental agreements between France and the United Kingdom, Italy and Germany, cooperation continues in various fields, including the creation of UAVs. In 2009, Finland, Denmark, Iceland, Norway and Sweden signed a Memorandum of Understanding on Defense Cooperation (NORDEFECO project), identifying the competitiveness of their defense industry complex as one of their priorities. And this leads to duplication and misallocation of resources.

During its existence, the European Defense Agency has been able to identify major gaps in the provision of Common Security and Defense Policy resources, to formulate policy priorities in this area that are set out in strategic initiatives, and to launch a number of pan-European projects. In defining problems and priorities, the EDA is based on the goals and objectives of the CSDP and the European Security Strategy, which is its conceptual basis.

The ESS identifies major threats to the security of the European Union and the challenges it will face in the medium term. In order to counteract these threats and challenges for the EU, it is necessary to radically review security approaches, mainly in the area of engagement of Member States' armed forces in joint operations and their resource support. The strategies developed and approved by the Agency are the result of a systematic analysis of the current state of the Member States' military-industrial complexes and related compatibility issues. The aim of the strategy is to harmonize the standards of

products in the defense industry, to enhance the compatibility of weapons and control systems, to maintain the competitiveness of the EU industrial and technological resources and to develop advanced dual-use military technologies.

4. Conclusions

The first real EDA data are the result of integration in this area. This institute has significant potential that can be utilized by deepening the integration and broader transnational security and defense functions of the Agency. Increasing funding for pan-European projects as a result from the implementation of strategic initiatives will be visible only after a few years, although intermediate results are visible today, such

as the implementation of projects such as e-Quip, Gateway Procurement, the integration of civilian UAVs in domestic airspace. Strategic initiatives of the European Defense Agency are consultative in nature, are often referred to as guidance, and therefore differ from national strategies by their non-binding nature. Thus, they are a set of programming documents that must be followed when determining the priorities of national defense and military research and development programs. The lack of a unified strategy in the research field, development of weapons and the involvement of all Member States in the process of building a common market for military and dual-use products.

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