



THE ROLE AND IMPORTANCE OF ROBOTIZED TECHNICAL MEANS IN COMBAT ACTIONS

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This article analyzes the importance and widespread use of robotic equipment (RTV) in the context of the ongoing military conflict between Ukraine and Russia and their impact on combat operations. In this regard, the strategies, tactical tasks, and directions for implementing robotic platforms of the NATO, Ukrainian, and Russian armies will be considered.

Keywords: robotics, platform, robotics.

Cases of resolving existing contradictions in economic, political, military, and other spheres between various subjects of modern international relations through military force are becoming increasingly frequent. This, in turn, is manifested in the development of the Armed Forces through the use of robotic equipment (RTV) in combat operations.

The nature and composition of modern wars in the 21st century (Syria, Nagorno-Karabakh, Ukraine) largely depend on the fundamentally updated material and technical base of the armies of the world's developed countries. The destructive power, accuracy, and range of strikes of conventional means of destruction have significantly increased, and weapons based on new physical principles are being created and supplied to the troops.

Taking into account the experience of military conflicts, it is aimed at the gradual development of engineering weaponry with modern robotic equipment in the troops of NATO countries, as well as in all countries, and thereby reducing the number of losses among personnel.

The emergence of new technological means of armed confrontation has led to the use of artificial intelligence, automated systems, and small but multifunctional robotic equipment, especially in Russia's large-scale special operations against Ukraine, which began in 2022. With the use of robotic systems in combat, the large-scale development of tactical methods required special attention to issues of effective unit management, reducing human casualties, and troop supply.

The robotization of weapons, military, and special equipment of the ground forces to perform engineering support tasks in NATO countries is reflected in the following main areas:

creation of integrated remote control complexes (modules) for the purpose of unmanned control of weapons, military, and special equipment (WAMT);

development and application of specialized robotic complexes.

To gain economic and time indicators, the use of the chassis of existing combat wheeled and tracked platforms is considered more profitable in terms of technical and economic indicators compared to robot complexes developed from scratch.

An example of the first direction is US remote control equipment. Specifically, the "Pantera" minelaying vessel, based on the M-60AZ tank, and the "Abrams Pantera" minelaying vessel based on the M1A2 tank, are equipped with a full-track roller trawl (Fig. 1).

These engineering vehicles are used to cross minefields and conduct engineering work under enemy fire.

The second direction is robotic complexes of micro, mini, light and medium categories. They are used for engineering reconnaissance at facilities, transportation (manipulation), and the neutralization of explosives. Depending on the category, light and medium-sized robotic mine trawlers differ in safety and specialized equipment. Modern engineering means are widely used in modern combat operations:

mini-sapper robot (for detecting and localizing explosive objects in difficult terrain) "iRobot 110 FirstLook" (Fig. 2a);
"MARM-CSM160" mini-trawl (Fig. 2b);
lightweight sapper robot "iRobot EOD 510 RASKVOT" (Fig. 2c).



Fig. 2a. Mini, light, and medium-class robotic complexes:

a) mini-sapper robot (for detecting and localizing explosive objects in difficult terrain) "iRobot 110 FirstLook"; b) mini-trall "MARM-CSM160"; c) lightweight sapper robot "iRobot EOD 510 RASKVOT."

Based on the experience of the armies of Russia, China, Israel, and NATO countries, the need to improve robotic engineering and technical complexes is characterized by the following:

development of autonomous tactical wheeled and tracked vehicles capable of selecting movement parameters and optimal routes, as well as independent observation and assessment of the nature and type of obstacles;

creation of AML/CFT models capable of recognizing and executing voice commands, as well as independent movement within the unit.

The development of autonomous and semi-autonomous humanoid systems with the "Avatar" control system has been established.

In the ongoing special military operation between Ukraine and Russia, the implementation of strategic and tactical tasks through the use of RTV continues. At the same time, during combat operations, the tactical actions of the units, their combat capabilities, and the effectiveness of inflicting damage on the enemy increased.



Figure 1. The Abrams Pantera, a full-track roller coaster based on the US M1A2 tank

The article provides partial information on the procedure for utilizing robotic equipment and high-precision technologies in modern combat operations. In turn, the tasks and types of robotic equipment on the battlefields of Ukraine are reflected in the following.

Robotic equipment performs the following tasks on the battlefield:

conducting reconnaissance - monitoring dangerous zones and collecting information about enemy activities;

in combat actions (operations) - as a platform for automated firearms;

logistics and transportation - during the evacuation of weapons, spare parts, and the wounded;

mine neutralization - used by the RTV for clearing hazardous areas (Figure 3)



Figure 3. a) Reconnaissance. b) On a machine gun platform. c) Evacuation equipment.

a

b

c

It should be noted that the RTVs used by the Ukrainian Armed Forces in combat are divided into the following main groups:

Unmanned aerial vehicles (UAVs) perform tasks of reconnaissance, observation, and striking targets.

Land-based robots are used in mine neutralization, reconnaissance, and logistics.

Marine and underwater robots are used in underwater reconnaissance and mine combat.

Autonomous combat systems are capable of making independent decisions to a certain extent.

The significance of robotic equipment in combat operations is manifested in the following: reduction of manpower losses (human factor);

increasing the effectiveness of military operations;

reducing the impact of psychological and physical factors;

ensuring accuracy and speed in military decision-making, as well as the digital transformation of robotics in the military sphere.

The troops of the Russian Armed Forces are widely using robotic equipment in special operations. At the same time, they are further developing their military production by testing technological means in UAVs, air defense weapons, engineering equipment, and control systems. The Russian Armed Forces are fully utilizing RTV in all areas (spectrum), implementing production involving defense industry organizations, non-military production organizations, and partner institutions in the following areas:

Automated means - technical means of tracking and self-propelled (products "Courier" and "Omich"). Robotic platforms equipped with surveillance cameras are being effectively used in the field of combat operations for logistics, reconnaissance, and the use of firearms.

The engineer uses robotic platforms to construct underground structures, clear

minefields, and mine sites over long distances.

Logistics - robots perform cargo transportation and communication restoration tasks in selected directions, where robots often act as a means of observation and control.

In conclusion, it can be noted that the use of RTV by the troops of the Armed Forces of both sides in the performance of strategic and tactical tasks is of great importance. Today, trends in robotization based on innovative developments and their application across all sectors are gaining momentum. The Ukrainian side is increasing its strategic power on the battlefield through the use of innovative autonomous robots, while the Russian side is focusing on supporting the offensive actions of units and expanding automated systems.

Fields of application

Ukraine	Russia
Strategic directions	Tactical directions
Practice and Efficiency	Network Development
Innovation and systemic development	Strategic direction

At the same time, both sides are developing the use of new technologies, AI, and tactical concepts for the effective application of Robotics. Robotic equipment provides opportunities to ensure human safety in combat operations, increase operational efficiency, and accelerate technical progress.

Based on the analysis and experience, it is proposed to take measures to combat RTV based on modern requirements in conducting modern combat operations and to develop modern technological means in all sectors of the state.

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