

ONE ASPECT OF THE USE OF ROBOTIZED FIGHTING SYSTEMS IN MILITARY OPERATIONS

Miroslav Terzić¹, Danilo Đekić², Zoran Jekić³

Abstract: Robotic combat systems became a reality at the beginning of the 21st century. Their use in combat operations has been practically demonstrated during military operations in Syria during the conflict between the Syrian Army and Islamic State terrorists in Latakia province. It is a signal to the scientific and expert public that a paradigm shift in warfare is necessarily occurring, and it is therefore necessary to advance tactics, techniques and procedures, and thereby shape the doctrines of military operations. Accordingly, the authors described robotic combat systems and explained the use of robotic combat systems in military operations at the tactical level based on a case study - Syrian Army attack on Islamic State terrorist forces in Latakia province to capture a telecommunication tower (a strategically important object).

Keywords: military operations, robot, combat system.

1. INTRODUCTION

Robotic combat systems are unmanned armed combat platforms operated from a distance (remotely controlled combat systems) that can be used to carry out combat operations and other activities in military operations. It can be argued with certainty that the use of robotic combat systems represents a turning point in the history of warfare. The emergence of new technological solutions for certain combat systems raises the urge to reconsider existing warfare paradigms (eg conventional warfare, asymmetric, hybrid, etc.) as well as the development of certain (new) combat action models. The armed conflict between Syria and the so-called Islamic State in the second decade of the 21st century is a kind of testing ground for new combat systems. Thus, at the end of December 2015, in the province of Latakia, 6 robotic combat systems of Russian production "Platform M" and 4 "Argo" systems for combat operations in urban areas were used. Unmanned aerial vehicles were also used there to capture the area of combat and to record enemy movements (battlefield visualization). The infantry units that were behind them at a distance of 150 to 200 m, cooperated with the aforementioned systems with the task of "clearing" the terrain. The artillery fires operations were more accurate thanks to the efficient and effective use of drones (battlefield visualization).

The "great powers" armed forces are developing robotic combat systems for use in combat operations on land, sea and in the air. Accordingly, at the armaments fairs, the world's leading forces display: armed drones, unmanned tanks, unmanned howitzers, drones with infantry weapons, unmanned submarines and boats and announcing unmanned fighting aircrafts.

Robotic combat systems are therefore increasingly the subject of scientific and expert discussions that challenge the existing paradigms of warfare and develop new paradigms that, considering their specificity, offer, in addition to tactics for the use of robotic combat systems and certain tactics to counter these systems (countermeasures) in combat operations. In particular literature and in the public, there is often mention counter drone, anti-drone fighting, etc. It's about fighting classic "drones" (mini and micro drones that aren't armed) and fighting robotic combat systems.

¹ PhD, University of Defense, School of National Defense, terzicmiroslav@yahoo.com

² University of Defense, School of National Defense, danilo_djekic@yahoo.com

³ University of Defense, School of National Defense, jekiczoran@gmail.com

2. ROBOTIZED FIGHTING SYSTEMS

One cannot talk about robotic combat systems without mentioning basic theoretical provisions about robots. The term Robot (from Czech and Slovak language - slave, robot meaning literally work, in Serbian means a man who without any resistance submits to someone's unlimited power,⁴ work - active action, activity) is an electromechanical unit capable of autonomously, by a program or control of a person performs certain tasks. The word robot is first mentioned in a theater play by Czech writer Karel Chapek's "R.U.R".⁵

American science-fiction writer and biochemist of Russian origin Isak Asimov first introduced the laws of robotics:

Act 1: The robot must not injure the human being or allow him to be injured by refraining from acting.

Law 2: The robot must obey the orders it receives from human beings except when they are contrary to Act 1.

Law 3: The robot must protect its own existence unless that protection contravenes Laws 1 and 2.

In order for a machine to be called a robot, it must meet the following conditions: receive and interpret information from the environment, move itself, its parts and manipulate objects.

Robot components allow the robot to function and fulfill the purpose of the robot's existence and include:

- sensors that collect information from the environment of the robot (robot senses),
- a processor or logic (logic circuit) that processes information gathered from a sensor (robot brain),
- parts performing an action (moving parts, robot limbs) according to the instructions of the processor,
- a power source (power supply) enlivening the robot and
- the body of the robot (multiple moving parts and sensors combined into one unit).

Sensors represent the part of a robot that serves to interact with the environment. The robot collects the necessary information from the environment through the sensor. Installation of the sensor depends on the purpose for which the robot was designed and depending on the need and the program for which it is designed.

A processor (logic, logic circuits, and programmer) or robot brain is used to command and control the actions of the robot. Depending on the complex activity of the robot, various types of processors and computers are used.

The moving parts of the robot allow it to move (eg legs, wheels, propeller, wings, and caterpillars) and perform some work or function (hands, rifle, grenade launcher, periscope, camera or some specific tool).

The power source is the part of the robot that gives it the energy to work. They can be connected to the robot, such as battery power, solar panels, internal combustion engines, nuclear generators, etc.

⁴ Dictionary of Serbian language, Матица Српска, Нови Сад, 2017, стр. 1168.

⁵ R.U.R. – Rosum's Universal Robots.

It can be safely claimed that the originator of robotics is Nikola Tesla, who, by Patent No. 613 809, "Method of Control and Apparatus for the Mechanism for Controlling Movable Vessels or Vehicles," filed Nov. 8, 1898, introduced the first robotic remote-controlled system. The remote control of the ship is realized with two transmitters of different frequencies and two paired receivers with each transmitter individually. Navigation of the ship (in the form of propulsion and rudder control functions) was only possible when both signals on both frequencies from the individual transmitters on board were simultaneously recorded on the ship's receivers. This is the result of the logic operation "I", which was then used for the first time and realized by relays, where the propeller or rudder movements appears as an output, so it can be said that the first time electrical logic appeared. The patent application stated: "What distinguishes this patent from all systems up to then is that no wires are needed, the only thing that is needed is the natural media in the space. This is much more practical and similar results are obtained (as when the mechanism is connected to a wire) as long as the body is within range of the waves, electricity and impulses being emitted. The invention enables the application of any propulsion means, permits the moving body or ship, the highest possible speed, to control the operation of its machinery and to direct its movement either from a stationary point or from a moving body and changing its direction at any speed, and that control is maintained at long distances without any physical connection between the ship and the apparatus controlling its movement, and thus without restriction".⁶

Based on the purpose, or use of the robot, there are two groups of robots: autonomous general purpose robots and dedicated, specialized (which perform one or a set of similar functions).

Autonomous general purpose robots can perform different functions independently. They can usually move independently on familiar premises, do some of their own needs (eg charging ...), use electronic doors, elevators and perform other basic tasks.

A special type of autonomous robots are robots that have been used in space exploration, which had to deal with real-time interaction with the environment, embedded with very complex and accurate sensors, autonomous and automatic operation and artificial intelligence. The problem with these robots was the transmission of control signals as well as information from sensors over long distances. These robots are the forerunner of robotic combat systems that have almost all the developed functions as well as space exploration robots but are armed and adapted for military combat use.

Analyzing the purpose of robotic combat systems, it is possible to conclude that this particular autonomous type of robot is "dehumanized" because it does not respect Asim's basic laws of robotics because it likes to inflict as much loss in manpower and destruction of war equipment and infrastructure. However, some theorists say that robotic combat systems will be dehumanized when they are left with the ability to make their own decisions about combat performance on objectives. As long as the human factor makes the decision on the combat action of the robot, a certain level of humanity remains.

One of the earliest applications of robots in military operations is the use of the Fau-2 rocket (Vergeltungswaffe 2) by which Germany bombed London in World War II. Figure 1 shows the layout and composition of the Fau 2 rocket. These rockets and this program were developed in Germany during World War II under the leadership of Oto Fon Brown. The rocket was partially "programmed" with fuel consumption, clockwise, stabilized gyroscopically and had a radio channel. For the first time, perhaps, in the field of technology,

⁶ www.teslauniverse.com/nikola-tesla/patents/us-patent-613809-method-and-apparatus-controlling-mechanism-movig-vehicle-or

electric servo motors were used. This rocket represents one of the first robotic combat systems.

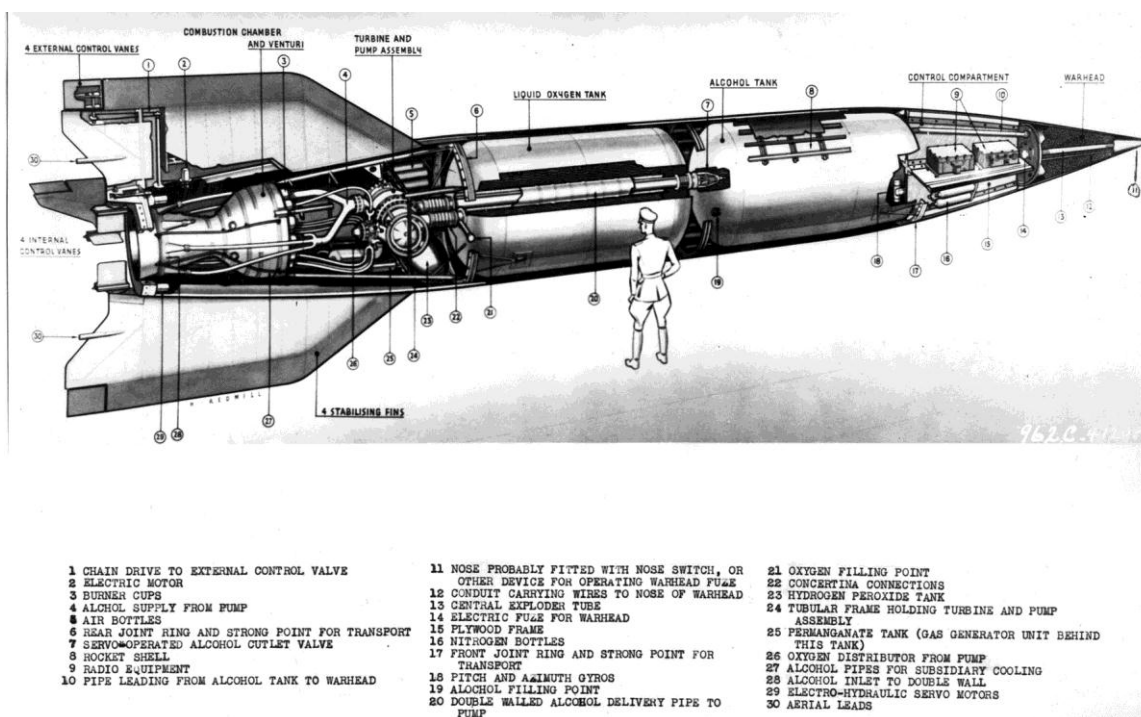


Figure 1 – The first ballistic missile *Fau-2*, *Vergeltungswaffe 2*⁷

The use of the *Fau-2* rocket had more of a psychological effect because the guidance system was primitive, not precise enough, the high cost of producing it, but its speed was greater than the speed of sound. An additional influence on the psychological effect was realized by the fact that there was no possibility at that time to defend against attack by that missile.

⁷ <http://www.zamandayolculuk.com/v2rocket.htm>

3. USE OF ROBOTIZED FIGHTING SYSTEMS IN MILITARY OPERATIONS AT THE TACTICAL LEVEL

The modernization and technological development of weapons and military equipment have significantly contributed to the development of a special type of robot for performing high-risk (dangerous) tasks, and the application of modern technological advances in the information and communication sphere has influenced the development of remote control of these robots.

The area as a field of military activity or an area of interest in military science in which robotic combat systems can be deployed (used) is very wide. Robotic combat systems are used in peace, emergency and warfare by all military branches to perform various tasks on land, sea, airspace and space.

The practice of combat operations under different conditions often provides numerous solutions in the application of different technologies, which prove to be optimal for some of the problems. Recent History has noted a novelty that deserves to be analyzed and considered for facts that could have an impact on the concept of further development of robotic combat systems and their use in modern combat operations, as well as on the advancement of tactics for the use of robotic combat systems. This is primarily related to the use of unmanned aerial vehicles for the preparation and execution of military operations. The phenomenon has been reported in recent decades, from the Israeli-Lebanese war, through NATO aggression in the FRY to the war in Syria.

Successful preparation of military operations required timely, accurate and reliable information on the combat zone. Certain information about the combat zone was obtained through the use of certain optoelectronic and visual means, which was sufficient to scout the "front" of the enemy. New methods of reconnaissance - reconnaissance from satellites, have been developed for scouting the depth of the operation area, which, due to the frequent change and unpredictability of the combat situation and the time of arrival of satellite images, was not optimal. The aforementioned conditions have influenced the development of unmanned aerial vehicles with specific sensors intended for various methods of data collection.






In parallel with the development of drones for data collection, types of drones were developed that were equipped with various equipment, from electronic warfare sensors to weapons and ammunition. Robotic combat systems, apart from use in the Air Force, are also being developed for use in the Army and Navy as an unmanned platform that accommodates a variety of sensors, tools and weapons for use in combat operations. The war in Syria is, among other things, a proving ground for the practical application of robotic combat systems developed so far, that analyze their use in real-world situations.

Table 1 shows representative examples of robotic combat systems for the Army, Air Force and Navy.

Table 1 –/Combined show (illustration) robotized combat systems

Type of military force	Representative examples	
	Robotized system	Mission
Ground forces	Uran-9 	Combat support for infantry units and reconnaissance in combat missions.
	Platform M 	Antiarmor combat mission and support for units in urban areas
	„Милица“ 	Closed antiarmor combat support for infantry units on tactical level.
	МРК-27 ⁸ 	Discovering and neutralizing EOD under chemical contamination area.
Air Force	UAV MQ-9 Reaper 	Discovering and tracking submarines, also for attack on designated targets

⁸ Мобильный робототехнический комплекс гранатометного взвода мотострелкового батальона, Информационное агентство Оружие России 19.05.14, <http://www.arms-expo.ru/analytics/perspektivnye-razrabotki/mobilnyy-robototekhnicheskyykompleks-granatometnogo-vzvoda-motostrelkovogo-batalona/>

	<p>UAV Global Hawk RQ 4E</p> 	<p>Gathering information for unit support in military operations worldwide.</p>
	<p>Shark A-175</p> 	<p>Multipurpose UAV for reconnaissance and identification activities on the ground.</p>
Navy	<p>Unmand submarine Hydra</p> 	<p>Reconnaissance enemy territory near maritime ports.</p>
	<p>Unmand submarine Echo Voyager</p> 	<p>Discovering, mapping and tracking ships.</p>
	<p>Unmand ship Sterenn Du</p> 	<p>Discovering, identifying and destroying different types of mines.</p>

Attack of the Syrian Armed Forces in Latakia Province in December 2015, present the typical an example of the use of robotic combat systems in military operations at the tactical-level. At that time, in the province of Latakia, during the attack on the telecommunication tower, 6 posts of robotic combat systems «Platform M» and 4 «Argo» systems were used for fighting in the urban environment. Unmanned aerial vehicles were also used to capture the area of deployment of terrorist forces in the area of operations (in facilities and surroundings of the telecommunication tower), as well as to record movements of those forces (battlefield visualization).

The aforementioned robotic combat systems were assisted by infantry units 150 to 200 m behind them. The task of the infantry units was to "clear" the terrain. The movement data of Islamic State terrorists were collected using an unmanned aerial vehicle and transmitted, through the command center, to artillery units. Thanks to this information, the artillery

weapons (the Acacia howitzer) were accurate and carried the fire in a timely manner through the depth of the operation area.

Figure 2 shows an illustration of a possible deployment of robotic combat systems and units during the execution of an operation, at the tactical-level to destroy terrorist forces and capture a telecommunications tower in the Syrian province of Latakia.

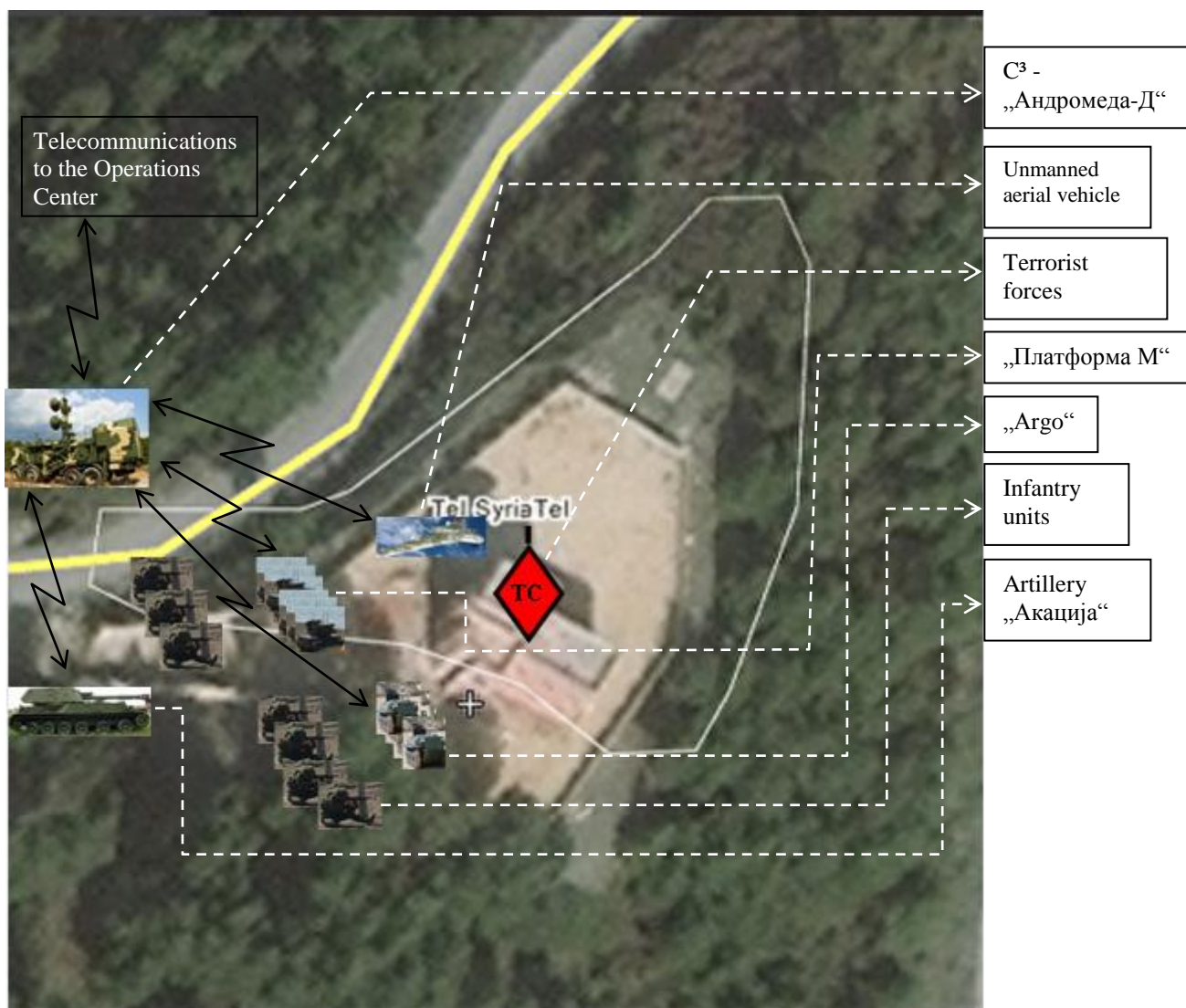


Figure 2 – Illustration of possible deployment for robotic combat systems and other units during combat missions against terrorist forces in Syrian province Latakia.

It is assumed that the robotic combat systems "Platform M" and "Argo", unmanned aerial vehicles and artillery units were connected through the command, control and communication systems at the tactical level "Andromeda-D". The Andromeda-D system obtained data (footage) from unmanned aerial vehicles and data (images) from robotic combat systems (because they are also equipped with optoelectronic devices) and based on that data formed an operational picture of the battlefield and managed artillery fire and robotic combat systems.

The Andromeda-D system was in communication (telecommunications) with the operative center of the superior command, so it was possible to monitor the situation and manage combat operations from the operational center.

4. CONCLUSION

The use of robotic combat systems in the operation of the Syrian Army against Islamic State terrorists in Latakia Province indicates possible tendencies in the development of tactics, techniques and procedures while conducting military operations at the tactical level. They are most likely aimed at fully automating the conduct of military operations at the tactical level. So, in the future, more and more deployable platforms will be developed for use in military operations at the tactical level, which will necessarily influence the automation of these operations.

5. LITERATURE

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