THEORETICAL CONSIDERATIONS CONCERNING THE SETTING OF THE CAPABILITY REQUIREMENTS SPECIFIC TO COMBAT ENGINEERS STRUCTURES SUPPORTING MANAGEMENT ACTIVITIES FROM AN AIRFIELD

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***Abstract**: Combat engineers structures are responsible for support missions in battlefields, which determines their involvement in the four specific domains: mobility, countermobility, survivability and general support. Inevitably, all these missions lead to ensuring the viability of the roads for land vehicles and the runway for aircraft. Air Force combat engineers must ensure the maintenance of the necessary infrastructure for take-off, landing or even parking of aircraft by carrying out the asphalting missions. The Air Force combat engineers capabilities are highlighted by the multitude of missions carried out which are constantly being diversified. Based on the idea that the combat engineers intervention in an emergency situation regarding the infrastructure of a runway or a platform must be efficient, this paper aim to highligh this fact through a study of the equipment used and their characteristics.*

***Keywords:** combat engineers structures, capabilities, aerodrom, support missions*

1. ANALYSIS CONTEXT

It is unanimously accepted by specialists the assertion that the current battle framework is based on continuous modernization, the classic laws and principles of the war having other valences related to the way the military actions unfold. The North Atlantic Treaty Organization is the main coordinator of military activities, and the Member States contribute to the collective effort, one of the main problems to be solved within this framework is the achievement of interoperability. Currently, different types of military structures carry out stability and support operations, but also intermediate operations in the affected areas.

Risks, threats and vulnerabilities in the security spectrum are increasingly diverse, and subsequently, the emergency management and civil emergency planning becomes extremely important. A classic but topical threat is blocking or destroying

communication routes (like roads or runway). Starting from the idea that currently blocked traffic manages to create cascade deficiencies in different areas of activity, it may be a hypothesis that the scenario according to which the aerodrome runways, landing or take-off routes would be blocked.

This work brings to our attention presentation of some benchmarks for combat engineers capabilities involved in solving a situation in the context mentioned in the title. The initial scenario concerns the impossibility of using an aerodrome runway or a platform. Thus, a realistic framework for highlighting the support provided by the combat engineers structures in solving this situation is constructed, by asphalting such a track or platform.

The combat engineers structures missions became more and more important with the reorganization of the specific combat missions and a narrower specialization of the units and subunits of the combat engineer brench, which included: the support of the forces directly engaged in the battle and the combat engineer general support (Vladu, 2006). Given that one of the main missions of the combat engineers is to ensure viability and the maintenance of roads, it is easy to notice that they can intervene when an aerodrome is facing an emergency.

Asphalting is a relatively new mission assigned to the combat engineers and has appeared as a necessity for the maintenance of military aerodromes, for which there is a specialized structure that executes these missions, within the air forces.

2. THE COMBAT ENGINEERS STRUCTURES FROM AIR FORCES AND THEIR CAPABILITIES

According to the Law no. 346/2006, generically, at national level, the air forces have a special role in defending the national airspace with air-air and ground-air means, the support of the other categories of forces and of the local authorities in emergencies.

In the air forces there are several structures, including combat engineers structures, responsible for executing combat engineer support missions for all other structures subordinate to the Air Force.

The judicious use of the combat engineers capabilities in the actions of prevention, limitation and elimination the effects of the disasters is most often determinant for avoiding the loss of human lives or the material damages (Vladu, 2006). In the national context, the air forces combat engineers structures were noted by the arrangement of some aerodromes but also by the execution

of mining works - demining, bomb neutralization, the restoration of the hit runways and the release of the aviation technique destroyed on the ground, the arrangement of the command points, ammunition, fuel and aviation warehouses. Currently, these structures are continuously participating in the combat engineers support missions in all air bases by arranging the necessary fortifications, maintaining and repairing the landing-take-off runways.

As previously stated, within NATO, the national commitment to achieve a certain level of interoperability with the member countries armies is vital. Subsequent objectives also concern the development of military capabilities that are essential at national level, as well as of missions aimed at collective defense and multinational exercises. The constitution and development of these capabilities is based on a rational policy of allocating resources on objectives, programs and projects developed in accordance with the provisions of the normative acts specific to the planning, programming, budgeting and evaluation (Vladu, 2006).

The capabilities of the combat engineers structures are noted for their important role in supporting the battlefield by providing mobility, countermobility, survivability and general support, which is why it is necessary to equip them with modern equipment that helps to carry out specific missions (Vladu, 2006).

Specific to the combat engineers structures subordinated to the air forces, their general capacity as a result can be appreciated by providing the necessary infrastructure. We use the term capability by explaining the ability to plan, design, execute a necessary process to achieve an objective, using the necessary technologies (Atanasiu, 2014). Of course, we have in mind also newer approaches to the concept, such an example being the one provided by Correia J. (2019, p.45) : *Finally, after an understanding on "how were we planning (?)" and "what will we need to plan for (?)", we were in the condition to answer the question "were we in a new normal (?)". Despite the identified gap between what we have and what we need, one concludes that there is no other paradigm regarding the strategic planning. Capabilities will continue to be the core element and output of that process* (Correia, 2019).

Returning to its own framework of analysis, in relation to a key element of defining the capability, we emphasize that, in order to ensure the specific missions within the air bases, the combat engineers structures use the appropriate technologies and the military technique. Also, to create a military capability a force structure is required, a level of performance correlated with the equipment

used, promptness in execution and maintenance of operational capacity. Air forces combat engineers structures manage to achieve a high level of performance in each mission, whether they involve fortification, route clearance, maintenance and repair of runways and platforms. These performances are determined by the capability when a structure is endowed with efficient technique and personnel, being able to fulfill any mission requested by the upper echelon. As for their endowment, depending on the group or platoon, there are special equipment and techniques. Considering that the combat engineers structures are the main ones that ensure the mobility of the troops, their missions are correlated with the equipment, which leads to a strict necessity of equipping and training the military personnel according to the established standards. Specifically, in case of military aerodromes, it is necessary to provide adequate infrastructure for landing and take-off an aircraft and the transport of special equipment platforms.

Combat engineers structures technique endowment and especially the procurement process are components of defense procurement management that contain unit instructions, standards and procedures. This process is carried out in several stages, hierarchically and aimed at several interdependent decision centers to ensure the best (Stanciu, Badea, & Fodor, 2009). Thus, air force combat engineers have the necessary equipment for asphalting roads and related platforms. The acquisition of military technique also aims to increase interoperability by bringing the technical capacity of the combat engineers structures to a level close to the modern armies of the allies.

The asphalting mission carried out by the combat engineers is based on specific orders, provisions and norms, both military and civilian. Order no. 42/2009 regarding the modification of the Technical Norms for maintenance works and current repairs to the special buildings and constructions of the real estate patrimony of the Ministry of National Defense, approved by the Order of the Minister of Defense no. M.44 / 2008 covers both maintenance and repair work, which does not imply the need for an investment as stipulated in Order no. 151/2017 for the approval of the Instructions regarding the achievement of the investment objectives, the reception of the constructions and the determination of the final value of the construction works, included in the investment program of the Ministry of National Defense.

In order to create a new infrastructure, a much larger quantity of materials is required and also an investment, involving a longer period

of time. The investment involves the application of the order mentioned above. Asphalt investments involve the preparation of technical-economic documentation and an authorization for the works performed. To ensure efficiency and to avoid long-term missions, combat engineers choose to carry out current repairs where possible. The current repairs are „the works determined by the wear or normal degradation of the constructions and installations related to the operation or the action of the environmental agents have the purpose of maintaining the technical state of the constructions, they do not require technical expertise and consist of replacing elements, details or parts of constructions and installations elements, without altering the value or technical characteristics of the constructions" (Annex no. 1 to Order no. 42/2009). Due to the scale of the work, there are also special norms for roads current repairs, which helps to establish the necessary materials and procedures to successfully complete the missions. The most representative norms used by the combat engineers are:

- AND 529- Normative regarding the use of geosynthetics when reinforcing road structures with asphalt layers
- AND 605- Normative for asphalt mixtures. Technical conditions regarding the design, preparation and commissioning
- Technical norms regarding the design, construction and modernization of roads
- AND 552/2002- Normative regarding the maintenance and repair of public roads

The specific equipments have the role of ensuring the quality of the works by their mechanized realization and at the same time, protection and efficiency for the personnel who serves them. The main equipment and machinery that can be used by the combat engineering structure responsible for asphalting are:

- Asphalt pavers BOMAG BF 300 C;
- Rolled asphalt compactor BOMAG BW 100 ADM-5;
- Cold asphalt milling machine WIRTGEN W 100 Ri;

The BOMAG BF 300C asphalt paver is an extremely efficient machine, having advantageous characteristics for the accomplishment of the mission, some of its advantages being

- the small dimensions that ensure easy transport;
- opening the cup with a capacity of 4.8 m^3;
- opening the rear beam to a width of 3.6 m, ensuring the release of a traffic lane;
- simultaneous use of the two lateral sensors to modify the slope of the terrain.

The BOMAG BW100 ADM-5 asphalt roller uses water to ensure

proper grip of the molded material. It is characterized by two rotary drums and has a hydraulic rolling system. The disadvantage of this machine is the small size, having a width of 1m, ensuring three passes for a traffic lane.

The WIRTGEN W 100 Ri cold asphalt mill is essential for removing the aged wear layer and operates on a 1m wide strip. The running speed for maximum efficiency gravitates around the values of 5-8 m / min. It can be used both in the asphalt mixing layer and in the concrete layers, being extremely efficient for roads, runways and concrete platforms.

In addition to these specific equipments, there are endowed structures of genius and others that help in the accomplishment of the mission, among which must be mentioned dumpers, machines for brushing and aspiration, bitumen smelting for clogging of joints and cracks and other specific materials and tools. Also, the asphalting procedure involves the use of special materials such as asphalt mixtures or asphalt concretes, geosynthetics (geotextile or geogrid), bituminous emulsion (according to the Technical Norms regarding the design, construction and modernization of roads).

The management of material resources is an extremely important indicator in the fulfillment of the mission, because it aims to request the necessary materials based on specific types of documents and it must be taken into account that all these are established according to the norms in force, based on regulation and provisions such as those for current repairs. on roads (Order no. 42/2009). The requirement is calculated on the basis of the surface calculated in square meters and of the specific rules for each mix or concrete used, depending on the molded height (3,4,5 or 6 cm) (AND 605/2014).

As part of the operations for asphalting, as a managerial tool is used a graph of execution of the works where the activities and the time allocated are foreseen. The beginning is difficult, because the milling procedure can take longer due to the slow speed of the machine, but as the operations progress, it gets faster. After milling, the surface is cleaned, the joints clogged and the preparation for pouring the first layer, considered the base layer (AND 605/2014 - Normally hot asphalt mixtures). Above the base layer is used a bituminous emulsion heated to 80-900 C and one of the two types of geosynthetics to prepare the release of the bonding layer. Between the connection layer and the wear layer (final) emulsion is used with or without geosynthetics depending on the nature of the material used (AND 605/2014 - Normally hot asphalt mixtures).

The runways for airports and parking platforms for airplanes and land vehicles require the repair, completion or replacement of the

wear layer and joints (Order no. 42/2009), which is why most often the three layers are not used, but only two of these, considering that the base layer already exists. The genius structures continued to participate in the management of civil emergencies whenever it was needed, especially in floods, snowfalls and landslides, carrying out works for landscaping or temporary crossing points on bridges or on bridges. bridges made from the complete metal low bridge on fixed supports. Combat engineer brench is, in most modern armies, a component of great importance due to the genistic works realized for the use of the fighting forces, the diversity of the works and the support provided by the combat engineers units. (Vladu, 2006). The post-war conflicts demonstrate the importance of the contribution of the actions of the combat engineers units to the success of the military actions carried out both within the genistic protection and within the combat engineers general support. A good example in this direction is the conflicts in Iraq (Persian Gulf) and Yugoslavia (Grecu, 2005). The response of the two states to the air attack, executed by the US and its allies, was the use of reinforced gene protection, which sought to limit the effects of the blows from large heights. Iraq has invested significant amounts in communications, fortifications and especially in models that mimic the technique, have built their military objectives so as to imitate civilian targets, thus putting them in shelter, they have given importance to the dams to reduce enemy mobility and create losses in the armor (Grecu, 2005).

In order to gain the experience necessary to build a platform or runways necessary for aerodromes, the combat engineers carry out missions such as: making logistic routes from the air bases, making the platforms for parking or those for the radiolocation stations. These elements within the aerodromes are critical points in achieving the capability of the aviation structure. Their importance is manifested by limiting, slowing down or even blocking the daily activities specific to the air forces, which ultimately affects the fighting power. The lack of a runway for an aircraft at an aerodrome leads to a military operation being blocked or even to an emergency or emergency. Also, the logistical roads used for aircraft supply and the transport of logistics materials are vital for logistical support.

Within the framework of the missions to ensure mobility, the combat engineers structures contribute to the achievement of the viability of the roads and the logistical transport or the circulation within the normal parameters for the smooth conduct of the military actions.

Given that the technique used for asphalting is a modern technique and adapted to the current working conditions, providing both operators comfort and precision in execution, the work of the engineers becomes much easier and thus they perform a work that is resistant in time and with a bearing corresponding to.

To point out the contribution of a combat engineers structure in the integrated framework of the activities of an aerodrome, it can be exemplified by the arrangement and restoration of a logistical road that provides the connection to a landing-take-off runway.

According to the Romanian Air Code, in which civil and military flight activities are stipulated, in order to ensure the aeronautical operations from a military air base, the presence of a logistical route is required. This logistic road has the role of allowing the transport of materials and equipment necessary for a flight or for an intervention in case of emergencies. Specific non-conformities in this case are those aimed at the malfunction of the lighting system, malfunctions at the runway infrastructure or at the level of the flight apparatus. Specifically, the lack of a logistical route is an impediment to the conduct of military aeronautical operations.

The logistics road must have the specific characteristics to ensure the safe movement of vehicles and tehnique in a short time. A damaged logistic road hinders the achievement of these objectives and thus slows down the process of aeronautical operations. Thus, in order to restore a logistical route from a military air base, the presence of a combat engineer structure is necessary to fulfill this mission. For the restoration of the logistical road, a measure is required that establishes the initial technical data and the quantities of materials. Also, depending on the base layer that holds the road, the number of layers of asphalt mixes cast is determined. The procedure of casting asphalt mixing layers involves milling 3 cm from the base layer, cleaning, casting an equalizing layer with fiberglass reinforcement (geotextile) and pouring a wear layer. The aforementioned equipment is sufficient as a typology for restoring a logistic road from a military air base. It should be noted that according to AND 605/2014, the waiting time for casting the wear layer is at least 12 hours after casting the equalizing layer.

3. CONCLUSIONS

Military aerodromes require adequate infrastructure for landing, take-off, aircraft transport and special platforms. The lack of such infrastructure leads to poor performance of missions within the air forces, but it can also be considered an emergency situation.

Therefore, the combat engineer structures are the ones that have the mission to intervene in solving the problems.

Complementary to the operational component comes the economic aspect, the cost-effectiveness analyzes being necessary to substantiate the decisions to assign peace missions.

Clogging joints, repairing roads or paved or paved platforms, as well as carrying out a work from scratch are some of the tasks of air force combat engineers.

The ability of a combat engineer structure in this case is primarily dependent on the technical component through the characteristics regarding the necessary, the existing and the functioning state. In particular, in emergency situations, the intervention time is the parameter of appreciation the capacity.

REFERENCES

[1] AND 605 (revizuire AND 605-2013) - *Normativ mixturi asfaltice executate la cald. Condiłii tehnice privind proiectarea, prepararea şi punerea în operă a acestora.*

[2] Atanasiu, M. (2014). *Implicaţiile participării României la dezvoltarea capabilităţilor.* Bucureşti: Editura Universităţii Naţionale de Apărare „Carol I".

[3] Correia, J. *Military capabilities and the strategic planning conundrum,* Security and Defence Quarterly I (2019), available at: https://securityanddefence.pl/MILITARY.

[4] Grecu, P. (2005). *Componenta genistică în acţiunile militare.* Bucureşti: Editura Universităţii Naţionale de Apărare Carol I.

[5] Grigoraş, C. (2011). *Operaţii de stabilitate şi de sprijin în generarea şi regenerarea forţelor*. Sibiu: Editura Academiei Forţelor Terestre Nicolae Bălcescu.

[6] *Norme tehnice privind proiectarea, construirea şi modernizarea drumurilor/* 30 august 2017.

[7] Ordinul nr. 151 /2017 pentru aprobarea Instrucţiunilor privind realizarea obiectivelor de investiţii, recepţia construcţiilor şi stabilirea valorii finale a lucrărilor de construcţii, cuprinse în programul de investiţii al Ministerului Apărării Naţionale.

[8] Ordinul nr. 42/2009 privind modificarea Normelor tehnice pentru lucrări de întreţinere şi reparaţii curente la clădirile şi construcţiile speciale din patrimoniul imobiliar al Ministerului Apărării Naţionale, aprobate prin Ordinul ministrului apărării nr. M.44/2008.

[9] Stanciu, L., Badea, D., & Fodor, M. (2009). *Logistica-Abordare metodologico-managerială privind sistemul militar şi sistemele tehnico-economice civile*. Sibiu: Editura ALMA Mater.

[10] Vladu, M. (2006). *Înzestrarea forţelor de geniu potrivit cerinţelor viitorului.* Bucureşti: Editura Universităţii Naţionale de Apărare „Carol I".