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MODERN DIDACTIC SUPPORT – SIMULATORS, LINK TRAINERS – IN PROCESS OF CADRE TRAINING

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Abstract

Present-day military vehicles are becoming more and more technologically advanced. The high-end technology in military vehicle it is not only information technology systems, telecommunication systems, weapon system, but there are also many changes of base chassis. Modern combat vehicles are well equipped with advanced more and driving systems and electronic control systems witch pushing the driver to better using of the vehicle performances. From the other side, because of great mass and the high level of centre of gravity it produce, that armoured vehicles should be only driven by very well trained driver. We have to remember also that trainings conducted to weapons systems in real conditions are very costly and they are connected with an increased risk level from security side.

From that reasons, company Rosomak S.A. from few years has been implementing training solutions connected to the wide range of simulators. Solutions concerning both types of simulators: drivers systems and the weapon systems. They allow for increasing the quality of the training process, with is very important for Rosomak company, as manufacturer of armoured vehicle call KTO Rosomak. The article present statistical results of the training process with using the simulators from few last years' time and their influence on achieved results of trainings process. The article present projects concerned to simulators, which company Rosomak S.A. executing as their own projects and with cooperation with scientific institutions and research and developments companies. [1].

Keywords: *simulators, training, armoured vehicles*

1. Introduction

The development of military equipment technology as well as newly surfacing, innovative technical solutions increasingly stress the importance of the training process, which has crucial impact on the future use of the equipment, both in the first stage of new product implementation, and in the stage of their development and upgrading. It should be emphasized that the training process for a combat vehicle should extend chassis-related issues only, but assumes the whole range of specialist equipment. At this point, the ROSOMAK S.A. training department has become one of the key elements of the company. With the Rosomak Wheeled Armoured Transporter as the example, this article will present particular elements of the personnel training process, stressing the application of modern didactic devices in the process.

2. The "Rosiczka" simulator

A cycle of training courses was launched with the 2004 delivery of the first vehicles for the future equipment user. It was initially assumed that these would only cover the operators, which, in the case of KTO Rosomak, included drivers, commanding officers and gun crew commander. Within the successive years, the need arose to extend the scope of training courses offered to incorporate specialist aspects intended for training mechanics working on the vehicles in the military repair workshops. Furthermore, the implementation of training for the supervisors of KTO Rosomak use and operation proved essential from the point of view of ensuring the correct service of the vehicles.

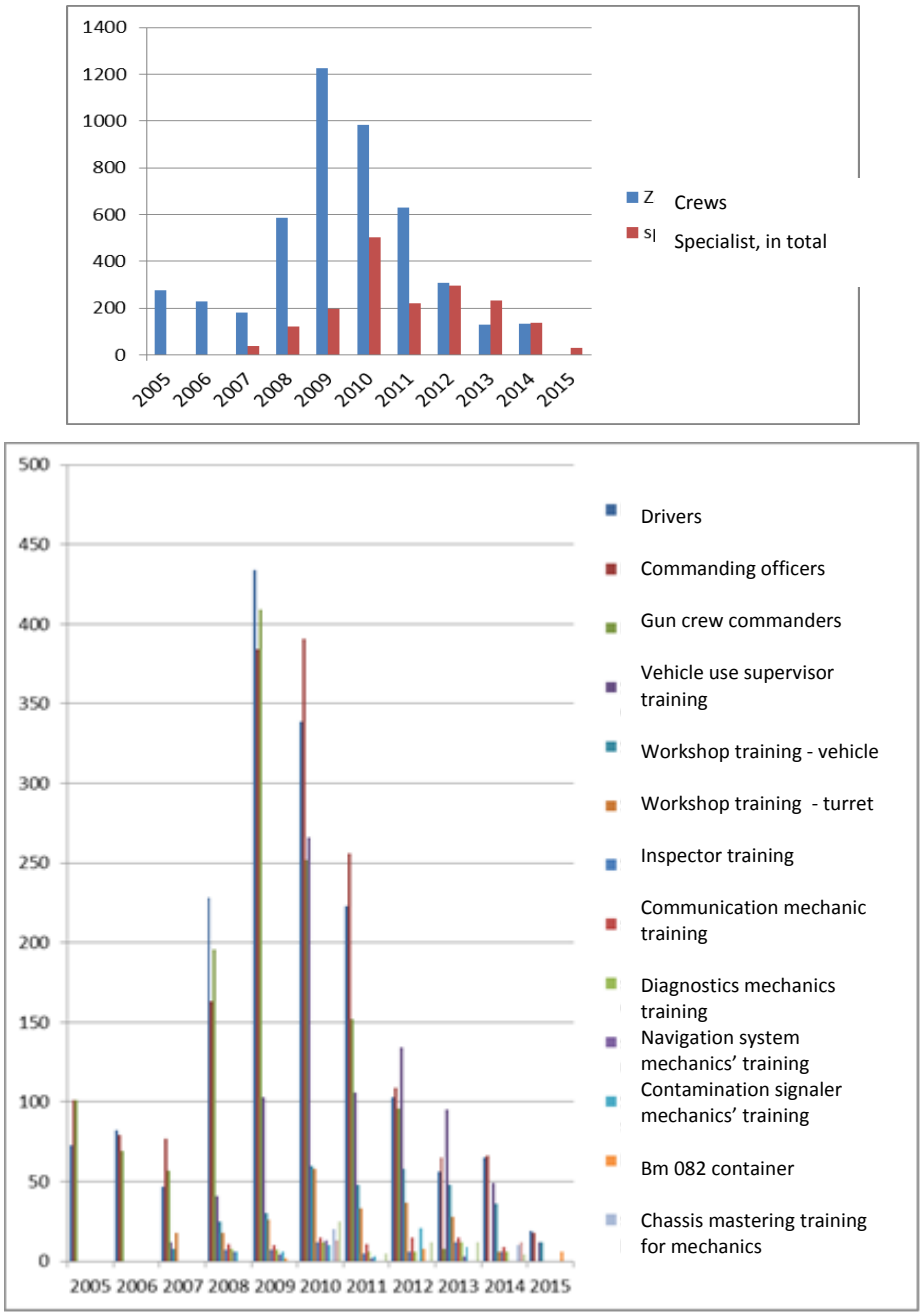

Fig. 1. Diagram presenting the completion of particular trainings, in a breakdown into successive years

The development of the scope of training courses offered entailed the simultaneous development of the training venues. Innovative teaching aids assisting in the courses were designed. One of the first devices to be developed was the KTO Rosomak driver's simulator, referred to as "Rosiczka". The device was designed in 2011 and, by principle, was to serve as a functional driver's cabin containing all of the primary equipment elements. The authors of the concept intended to create a tool that would allow future drivers to familiarize the functional elements of the driver's cabin, learn the basic emergency and breakdown types, which could easily occur in real-life use of KTO Rosomak. The device premiered at the International Defence Industry Exhibition in Kielce in 2011, where it received the DEFENDER award in the training device category. At the same time, the Specialist Training Centre located within ROSOMAK S.A. premises launched the use of the training simulator in 2011, allowing future drivers of the transporter to learn emergency situations, which could not be potentially presented on a real-life vehicle.

Fig. 2. "ROSICZKA" – KTO Rosomak driver's simulator

3. Fire Training and Special Systems' Room

The development of didactic aids providing support in the training of future KTO drivers brought about the need to develop devices aiding the process of training commanding officers and gun crew commanders. The output of developmental initiatives was the creation of the Fire Training and Special Systems' Room comprising Computer Base Training (CBT) devices. The room features 6 didactic stations containing devices and equipment allowing the trainee to familiarize the functional fire command system and to conduct practice with its use.

CBT computers allow the HITFIST 30 mm turret crew to learn and practice all processes and procedures of the original Fire Control System, and thanks to the use of manipulators, the trainees develop proper manual habits and abilities. The software allows for conducting simulated fire operations at stops, during brief stops, aiming at real-life targets, both immobilized and mobile. The simulation includes the effects of a shot being made, depending on the missile type used, considering its ballistics properties. The visualization software allows for generating shooting targets characterized by the properties of real-life training targets. The visualization can generate a virtual shooting range, including such elements as targets, smoke, etc. The above-specified devices were also launched in 2011 and have been used since in the training process implemented in the company.

Fig. 3. Fire Training and Special Systems' Room

4. JASKIER and TASZNIK simulators

Extensive use of the "Rosiczka" driver's simulator and the "Fire Training and Special Systems' Room" convinced the ROSOMAK S.A. military equipment training board of the necessity to develop successive devices to further expand the didactic curriculum offered. By assumption, the program should include simulators reflecting the full dynamic of vehicle motion.

In 2012, participating in a consortium of ROSOMAK S.A. in Siemianowice Śląskie, Autocomp Management Spółka z o.o. in Szczecin, and Trinity Interactive sp. z o.o. in Warsaw, the department launched the "JASKIER" driving simulator dedicated to KTO Rosomak. The simulator is a representative of the family of state of the art didactic-training devices intended for preliminary training of the driver of the Wheeled Armoured Transporter 8x8 Rosomak. The simulator is fully based on Polish software and visualizations.

The JASKIER – KTO Rosomak driving simulator is intended for the initial stage of driver's training, and aims at developing driving skills in adverse and dangerous conditions. Furthermore, the simulator is fully programmable with various types of exercises. The design team developing the simulator assumed that the system should utilize a mobile platform adjusted in 6 degrees of freedom, which should be sufficient for reflecting the behaviour of actual equipment.

Fig. 4. "JASKIER" – the KTO Rosomak driver's simulator

After the works on the driver's simulator were completed, the company decided to premiere it at the International Defence Industry Exhibition in Kielce in 2012, where just as its predecessor, the system was awarded with the DEFENDER in the training devices' category. At the same time, as of September 2012, the training centre commenced the first training courses with the use of the Jaskier simulator, covering in full the training needs of the drivers of Rosomak Wheeled Armoured Transporters and partially – of the transporter use supervisors, providing innovative didactic aids.

Since the beginning of 2013, the company undertook to develop the further use of simulations in the training process and launched works on the next simulator, grouped in the aforementioned consortium. This time, the simulator was dedicated to commanding officers and gun crew commanders, which, integrated with the Jaskier simulator, could serve as a complex training simulator for complete Rosomak crews.

At the first design stage, the simulator was named "TASZNIK" and it has been functioning under this name until today. Tasznik is a member of the family of high-class, innovative KTO

Rosomak simulators. It was developed with the use of a mobile platform with 6 degrees of freedom, supplemented by Polish software and visualizations. This is a missile fire and combat simulator, intended for use in the process of training commanding officers and gun crew commanders operating KTO Rosomak vehicles. The simulator is furnished with original commanding officer and gun crew commander seats, a system of cameras providing the instructor with an overview of the trainees during training, as well as a PA system generating a multi-sensory training experience.

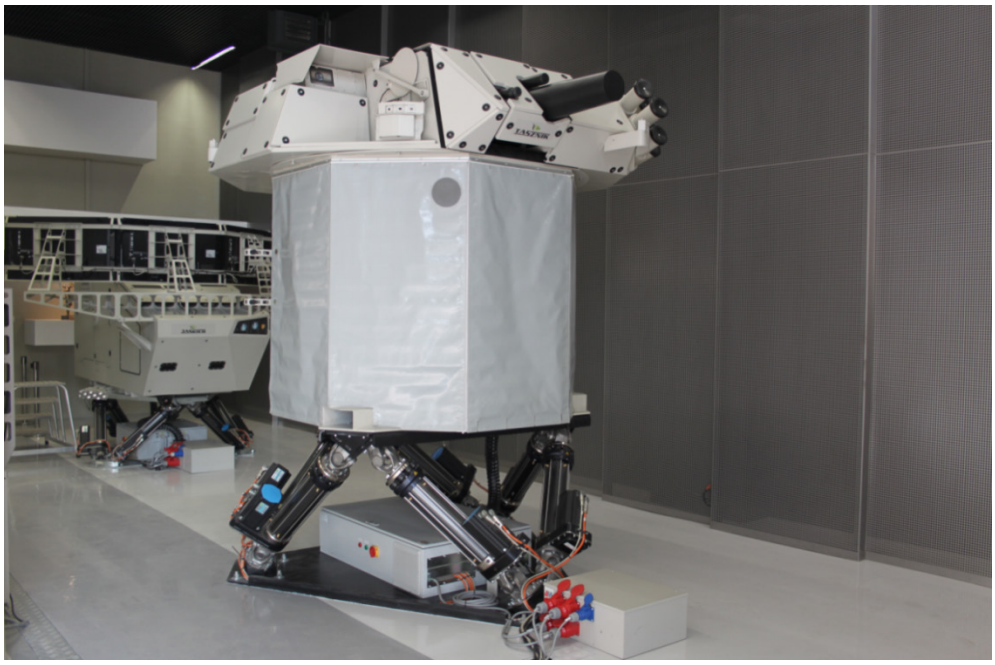

Fig. 5. TASZNIK Commanding Officer and Gun Crew Commander Training Simulator

The software allows for conducting simulated missile fire during vehicle stop, during brief stops, to real-life targets, both immobilized and mobile. Depending on the type of missile used, the simulator produced a fire effect, considering the missile's ballistics. The visualization software allows for generating shooting targets characterized by the properties of real-life targets. The simulator debuted at the 2013 International Defence Industry Exhibition in Kielce, where is received the award of the President of the Republic of Poland.

Fig. 6. Model visualization developed for the purpose of depicting the area in reference

At this moment, both simulators are connected via a shared instructor's station, which allows for training the entire vehicle crew (driver, commanding officer, gun crew commander) all at the same time. Such a solution enabled the implementation of tactical training, where the instructor specifies the subject of the assignment, provides guidelines for the vehicle commander, and the rest of the task is completed through communication of the crew, all under the instructor's supervision.

Fig. 7. Instructor's station in the complex KTO Rosomak training simulator

5. Conclusion

All of the aforementioned training devices have been implemented in the military training program dedicated to KTO Rosomak crews. They have become an integral part of the program, thanks to which each person beginning the didactic process with ROSOMAK S.A., apart from learning theory taught during lectures, performs a series of practical exercises with the use of simulators before entering an actual vehicle. Such a solution has considerably enriched the range of training courses offered, expanding them to include thematic blocks regarding emergency situations, which cannot be displayed on physical equipment. Thanks to the new training program, before driving an actual vehicle on the range, each person acquired the basic abilities allowing for safe use of the vehicle on the simulator.

The company is currently promoting the use of didactic devices in military training centres, striving at the development of cadre training, to meet all contemporary requirements and expectations posed by soldiers starting their career and acquiring knowledge on the use of state of the art military equipment.

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