

## PT-91M. WHAT POLISH ARMY THINKS ABOUT THIS?

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### **Abstract**

*The article describes the new products of Zakłady Mechaniczne „BUMAR-Łabędy” S.A. developed on the order of Malaysia Government and in particular – PT-91M MBTs, WZT-4 Armoured Recovery Vehicles, PMC- LEGUAN Armoured Vehicles Launched Bridge , MID-M Armoured Engineering Vehicles as well as the training simulators and stands. Majority of the new design solutions used within the vehicles have been specified but due to commercial secret only generally without detailed description Author pays attention to innovatory design solution of WZT-4 Armoured Recovery Vehicles, which is unified with MID-M Armoured Engineering Vehicles and the base MBT. Such solution is extremely essential considering logistical and training matters. Test runs which have been conducted both in Poland and Malaysia under tropical conditions and endurance test results have been described. Sets of training stands making training process of service and maintenance easier have been also presented briefly. The material includes a dozen or so photos which depict novelties and evidence run of the tests.*

*The article is a proposal to undertake the issue for modernization of Polish Armoured Forces by the only all over the world reliable industrial centre for modernization of T-72 tanks family which are Companies collected in BUMAR Group.*

**Keywords:** *main battle tank, Armoured Recovery Vehicles, Armoured Engineering Vehicles*

### **1. Introduction**

The PT-91M MBT was developed in 1991, as it is indicated in designation of it. Speaking more exactly, tactical and technical assumptions were elaborated for this MBT in this year. It originates, as prototype from T-72M1 MBT which was modernized by OBRUM Gliwice. In the history of the armoured vehicles this type of MBT was known under a cryptonym WILK. Basing on elaborations of OBRUM we manufactured industrial (serial produced) version of the Wilk - PT-91. It was year 1993. During this time, the PT-91Z version was developed within which the fire control system were supposed to be delivered from RPA. Practical tests in Poland and Malaysia proved its technical correctness. MBT PT-91Z was tested on the ranges and mostly on Malaysia territory without greater „setbacks”. Fortunately for us, such setbacks happened to the Russians, the Ukrainians, the Slovaks and the Swedes. Further tests (1200 km trial run during one month at the range, firing at the range in Drawsko, assessment of offset offer and license politics including complex training courses, secured provision with the spare parts and making documentation available to start production in Malaysia, presentations of disassembly and assembly engineering processes of selected units and systems) have influence over possibility to sign the Contract for delivery of the quality-new armoured equipment.

### **2. Scope of Malaysian contract**

Zakłady Mechaniczne „BUMAR - ŁABĘDY” S.A. is the only Polish manufacturer of PT-91 and T-72M1 MBTs, WZT-3 Armoured Recovery Vehicles and the main producer of the base vehicle for the „LOARA” anti-aircraft set and the chassis KRAB provided for 155 mm howitzer

manufactured by Huta Stalowa Wola. In 2007 we realized also the contract for delivery of 228 WZT-3 to India (totally 359 vehicles have been sent there). The Malaysian Contract is the first such complexly realized Project at ZM and probably in Poland.

In April, 2003, „BUMAR” Ltd Warsaw signed the Contract for delivery of the armour equipment for Malaysian Army. ZM is the main contractor of this Contract. The Contract covers four vehicles: PT-91M MBT; WZT-4 Armoured Recovery Vehicle, PMC-Leguan Armoured Vehicle Launched Bridge and MID-M Armoured Engineering Vehicle (product of OBRUM-Gliwice). Practically, each of these vehicles has been designed from the grounds due to specific technical requirements of the contracting party. Moreover, the Contract comprises also the training stands and sets of the integrated logistic support. Specialistic training of the staff is conducting as well as assistance to start production of the selected assemblies and parts in Malaysia are rendered. In the future, assembly of MBTs in Malaysia will be started. Practically, it can be said that it is implementation of totally new equipment and involved infrastructure for equipment of the army.

## 2.1. Tests in Poland and Malaysia

Completely a new think, in relation to the procedure of contracts that have been realized hitherto, was a condition imposed by the Malaysians to obtain firstly positive results of tests by the Sealed Pattern. The production process was started only after signing the official protocol with test results by Government Representative. Before it took place, ZM representatives with participation of Malaysian officers delegated to stay in Poland carried out very detailed tests. They were performed at two stages – in Poland and in Malaysia. Test program covered both running in different terrain, terrain obstacles negotiation and firing. Totally the MBT covered required distance of 2000 km and more than 220 rounds were fired from the gun. Unfortunately the tests of the first vehicle were not passed due to failure of one of the unit delivered from France.



*Fig. 1. MBT PT-91M one of the most modern tanks within its class in the world – tests at the range*

The second test which was repeated according to complete tests program was finished successfully in February, 2007. Results of such exacting and multi-furiously conducted tests of the MBT created the ground to implement improvements and modifications within many systems of the MBT.



Fig. 2. Obstacle negotiations and maintenance during tests

Package of the most modern devices for MBT PT-91M comprises:

- Fire control system SAVAN 15 / VIGY 15
- Stabilizer with electrical drives
- New version of the gun
- Backlash-free under-turret bearing with permanent resistance torque
- Land navigation system (LNS)
- Battlefield management system (BMS)
- OBRA-3 Multi-purpose self protection system of the MBT
- Auxiliary Power unit
- Air conditioner
- Means of communication
- Anti-explosion and fire suppression system
- Engine of power 1000 KM and automatic transmission ESM-350 blocked together into quick dismantled power pack system
- Modified running gear and suspension
- Wiring made in system of Raychem Company
- Thermal camouflage

Some of the required assemblies are used within all the vehicles (power-pack, air conditioning system, auxiliary power unit, navigation systems), however their assembly procedure is different as an effect of specific accommodation on each of the vehicles. That's why we made new versions of WZT-4 and tracked chassis mounted bridge PMC-LEGUAN. Except for modifications within

propulsion system the recovery vehicle WZT-4 is equipped with the hydraulic winch of pull force 30 ton and the crane of lifting capacity 20 ton. The bridge PMC-LEGUAN is completely new position in respect of quality. The bridge spans of German production of MAN Company were installed on special adapted for his purpose MBT PT-91M chassis.

### 3. WZT-4 Armoured Recovery Vehicle

Armour Malaysian Contract obliged Polish designers of the armour equipment to work out the armoured recovery vehicle which would be unified with the basic MBT PT-91M, e.g. driven by 1000KM engine PZL Wola S-1000R, integrated within the „power-pack” with the automatic transmission SESM Renk ESM-350M and with reinforced running gear. It would seem that the logical way is to design this vehicle basing on structure of WZT-3 vehicle. However analysis shown that the MID-M engineering vehicle would better as a pattern for the subject vehicle. Following this way, except achieving high degree of uniformity with MID-M vehicle, which resulting in, among other things, identity of: ergonomics of crew work for vehicles as well as many spare parts, maintenances and trainings. It caused also improvement of service operation comfort and increase of capability to perform lifting operation before the vehicle. The reason for this is position of the crane. In both vehicles WZT-4 and MID it is located at right side of the vehicles with area which is free from fumes from the main engine and the auxiliary power unit (fumes outlets are situated at left side).

Concept of „WZT” to make use of the hull of MID and systems of MBTPT-91M was initiated by OBRUM Gliwice and ZM Bumar Łabędy. The specialistic equipment – the hydraulic crane of lifting capacity 20 ton, the hydraulic winch with the rope force limiter and permanent measurement of force, the hydraulic control system via the network CAN as well as the suspension hydraulic locks are the products of OBRUM.

Designing works at the vehicle have been started parallel with elaboration of the MBT. However they have been concentrated mostly on the specialistic equipment. The hull of vehicle was already welded in 2006, but its equipment was started only in midyear of 2007, after successful terminations of tests of SP2 prototype of MBT PT-91M. Such approach allowed implementing all corrections resulting from the MBT tests on the stage of building the prototype and at the same time the first serial vehicle.

WZT-4 was completed at Zakład Produkcji Specjalnej ZM Bumar Łabędy in July this year, and the factory tests were started at the end of July. The factory tests were conducted together by ZM Bumar Łabędy and OBRUM.

WZT-4 has the specialistic equipments enabling to perform such tasks as:

- Tracked vehicles evacuation from a battle - field;
- Recovery of got boughed tracked vehicles in different terrain conditions; towing of unserviceable armoured tracked vehicles;
- Earth moving activities with the use of the dozer blade (preparation of trenches, combat stations for MBTs, clearance works through banks and scarps and others);
- Execution of assembly-disassembly works by means of the crane;
- Execution of works related to repair of the structures made of the armour steel by means welding and cutting equipment and by delivery of spare parts and assemblies;
- Participation in repair of the combat vehicles with the rich sets of tools and instruments;
- Application of the first aid medical care as well as evacuation of the wounded from the battle-field;
- Keeping two-sided communication between vehicles thanks to use two radio-stations in vehicle.



Fig. 3. WZT-4 during terrain tests (interchangeable power pack is visible on the loading box)

#### 4. PMC- LEGUAN Armoured Vehicle Launched Bridge

It is vehicle for two persons which enables negotiation of terrain obstacles of width 25 m by MBTs and other vehicles. The bridge spans are of 26 m in length the load capacity corresponding to class MLC60 (54.75 t) have been installed on MBT PT-91M modified chassis. The bridge is launching in slidably way what is the new solution In Poland. Armament of the bridge consists of the machine-gun of the 12.7 calibre (NATO standard) and smoke grenades launchers.

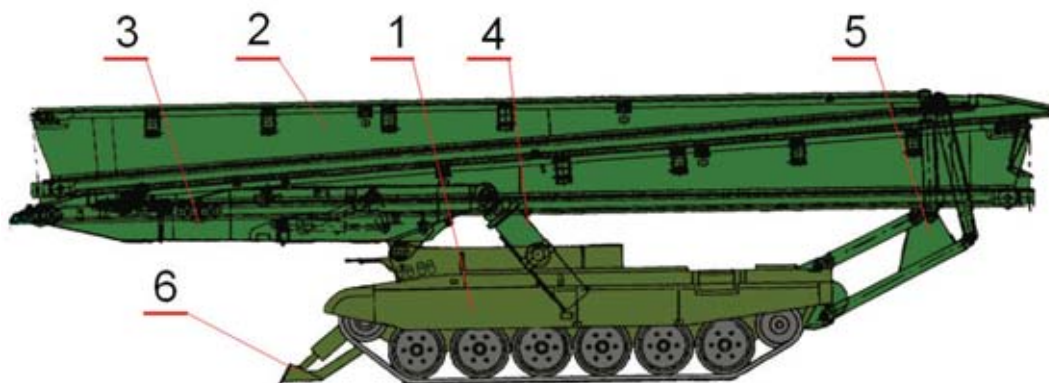


Fig. 4. PMC-LEGUAN bridge: 1-base vehicle, 2-bridge span, 3-laying arm, 4-laying arm cylinder, 5- span main bracket, 6-auxiliary blade (support)



*Fig. 5. PMC-LEGUAN bridge during factory tests*

## **5. MID-M Armoured Engineering Vehicle**

MID-M is designed for realization of works related to protection of combat missions of the engineering troops mainly and in particular: protection of troops movements, earth moving works including possibility of crossings, rescue-evacuations activities, execution of earth barriers (the dozer with changeable angle of the blade positioning), pulling out and towing unserviceable combat vehicles. The manipulator of lifting capacity 7 ton makes possible to perform complex reloading works. The interchangeable bucket of capacity 0, 96 m<sup>3</sup> and the jaw grab constitute general-purpose working set. Practically MID-M can make its tasks within each intermediate zone and at direct contact with the enemy, in different terrain and atmospheric conditions, in area contaminated with nuclear and chemical weapon, in mass-destructions area as a result of use of conventional and nuclear weapon. As a result of unification with WZT-4 this vehicle is also equipped with the winch of pull force 30 ton as well as the auxiliary winch of rope pull force 2 ton and rich range of equipment what allows to determine the MID-M as the perfect field repair workshop.



*Fig. 6. Engineering Vehicle MID-M after stationary tests*

As shown by above mentioned examples, the workers of Zakłady Mechaniczne „BUMAR ŁABĘDY” S.A. and Spółki Zależne have conducted entire implementation process of the new MBT and its application, they have achieved tremendous knowledge and experience during realization of the contractual statements. It also creates unique possibility of low-cost use of the new solutions for other buyers.

Therefore, in our opinion – a lot of the new solutions used within the „Malaysian” vehicles can and should be used also in Polish MBTs. It is most likely that such unusual occasion, in the form of possibility to implement solutions coming from the world leading manufacturers into serial production will not be probably repeated. That is why we from our side declare readiness for widely understood cooperation. Some of the solutions as individual systems (navigation systems and battlefield management system, air conditioner, auxiliary power unit, fire suppression system, machine-guns with NATO ammunition) can also be used in another vehicles such as KTO Rosomak, LOARA, KRAB and others. From our side, we also declare active participation in each undertaking which will be aimed at development of Polish Armour Forces. Polish Nation can not afford to finance development of the armour industry, the industry itself also will not able to bear it, sub-vendors are waiting for financial support. So, today we have unique chance to make use of new experiences. We have found a serious partner who had financed majority of the new solutions. It means directly that the army decision-makers should active participate in upgrading process of PT-91 MBT and make use of this process skilfully in future. So far, as BUMAR Group we are the only reliable centre for industrial modernization of T-72 tanks family all over the world and for sure we will not want to resign of it.

## 6. Training stands

Several training stands have been designer and manufactured together with the combat and technical vehicles.

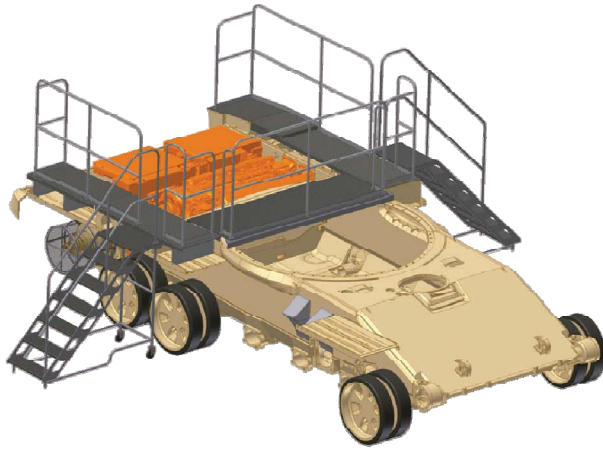


*Tank mock-up*

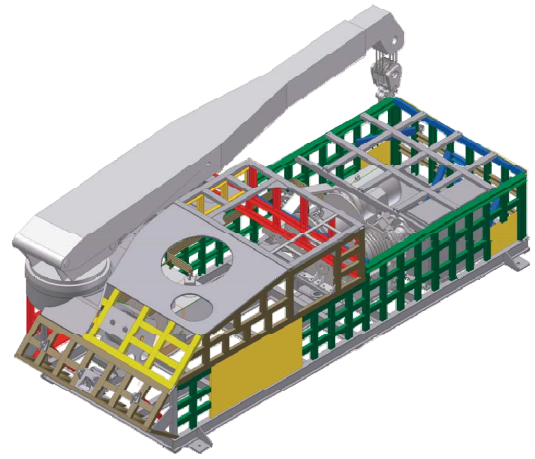


*Vehicle to train drivers*





*Stand to train service of Power pack*



*Imitator of armoured recovery vehicle working units*

*Fig. 7. Training stands*