

GRZEGORZ JASIŃSKI\*

Wojskowa Akademia Techniczna, Warszawa, Polska

## BUILDING COMPETENCE FOR MODERNISATION AND MAINTENANCE OF HEAVY ARMORED EQUIPMENT ON THE EXAMPLE OF MILITARY AUTOMOTIVE PLANTS S.A. IN POZNAŃ

**ABSTRACT:** The author, presenting the recent history of Military Automotive Plants S.A. in Poznań (WZM S.A.) shows the various stages of development of the country's largest military equipment repair plant. On the example of selected projects carried out in the plant, he shows how important the continuity was as well as a unified and coherent vision of their development, enabling a stable and systematic building of competences for modernization and maintenance of heavy armored equipment used today by the Polish Armed Forces. At the same time it proves that in the last decade the key decision for the development of WZM S.A. was creation of the authorized repair center for Leopard 2A4 and 2A5 tanks in the plants. It allowed not only to survive on the map of the Polish armament plants but it also gave the necessary impetus for further development of the machine park and the qualifications of the engineers and mechanics. Without it any further efficient functioning, or even the development of Polish armored forces using Western technical thought, would be extremely difficult if not impossible.

**KEYWORDS:** Wojskowe Zakłady Motoryzacyjne S.A., Leopard tanks, repair workshops, armored equipment, innovation

### INTRODUCTION

The end of the Cold War brought a gradual yet very consistent reduction of armored forces in Western Europe. Only Turkey and Greece retained strong mechanized units with its numbers

---

\*Grzegorz Jasiński, The Military University of Technology, Warsaw Poland



<https://orcid.org/0000-0002-9006-781X>



[grzegorz.jasinski@wat.edu.pl](mailto:grzegorz.jasinski@wat.edu.pl)

significantly exceeding the current holdings and combat capabilities of such economic powers as Germany, the United Kingdom or France. However, the events in Ukraine in 2014 and 2015 but above all the ongoing war with the Russian Federation in 2022 have ruthlessly demonstrated that heavy armored equipment, including tanks in particular, do not long belong to the past and in conventional conflicts it is still a very important weapon on the battlefield. It requires, however, efficient functioning of the system of which they are the main, but not the only link. In this context, building a national repair and overhaul base with competences to service modern armored equipment as well as creation of arms industry producing basic of military equipment is of the essence for the Polish Armored Forces<sup>2</sup> which in contrast to other European countries have a significant armored potential. Despite it being largely obsolete and post-Soviet.

In the Polish armaments industry the key role in maintaining the efficiency of tracked technology, both in peacetime and during military operations, is played by Zakłady Mechaniczne "Bumar-Łabędy" S.A. and Wojskowe Zakłady Motoryzacyjne S.A. (WZM S.A.) which are part of the Polish Armaments Group. This being supplemented by a number of smaller repair plants including those located directly in military units. The Gliwice plants modernize and service tracked vehicles for military use. They specialize in overhauls of PT-91 tanks, WZT-2 and WZT-3 Technical Support Vehicles and T-72 tanks. Moreover, they perform inspections of Leopard tanks at the F6 level, as well as they are the main contractor for modernization of Leopards 2A4 to the 2PL version. On the other hand, WZM S.A. located in Poznań, overhauls a wide range of armored, tracked and wheeled equipment of the Polish army and is currently the only Polish plant authorized to repair Leopard 2A4 and 2A5 tanks.

The history of the WZM S.A. established in 1945 in Poznań has not been the subject of any monographic study. Information about it comes mainly from specialist press articles, however being usually devoted to fragmentary aspects of the plant's operation and modernization in recent decades. Nevertheless, the juxtaposition of the information contained therein and a thorough analysis of publicly available information on the plants allows us to define the key events in its history, especially in the last decade. Large financial outlays and consistent building of competences in service and modernization of German tanks Leopard 2A4 and 2A5 made the WZM S.A. a leading plant in Poland in this respect. In addition, it allows to hope for further

---

<sup>2</sup> T. Wolski, *Europa bez czołgów*, „Dziennik Zbrojny Analiza” 2015, no. 3, p. 4-15; M. Gromek, *Jakość usług technicznych świadczonych Siłom Zbrojnym Rzeczypospolitej Polskiej*, Warszawa 2020, p. 162-196.

expansion of repair capabilities and thus to create appropriate conditions for securing the operation of Abrams M1A2 SEPv3 tanks purchased by Poland in early 2022. (this, however, requires further arrangements with their American producer).

## **POZNAŃ PLANTS - A HISTORICAL OUTLINE**

A few months after the end of the Second World War, in 1945, the WZM S.A., back then the Military Unit No. 2123, commenced its activity in Poznań. It specialized in overhauls and repairs of automobiles used by the army. In 1947, the unit was renamed Centralne Warsztaty Remontu Samochodów (Central Workshops for the Repairs of Passenger Cars) No. 42. Apart from its previous activities, the workshops started running trainings and courses for various types of specialists involved in the service of motor vehicles. Very soon, less than 5 years later, another change took place. In 1952, the workshops were reformed and WZM No. 5 in Poznań was established. As a result of the changes that occurred in subsequent years, the plant gradually began to expand the scope of its activities, first increasing the repair capabilities of subsequent types of vehicles and then began to produce spare parts.<sup>3</sup> Since then, together with the Wojskowe Zakłady Mechaniczne Siemianowice Śląskie (Military Mechanical Works Siemianowice Śląskie), WZM-5 as a plant of the “National Economy” (hereinafter NE) was of fundamental importance for the Służba Czołgowo-Samochodowa (Tank and Automotive Service) which was established in 1966<sup>4</sup>.

In the early 1990s, after the dissolution of the Warsaw Pact, there were major transformations in the military potential of the country, as well as ownership changes in the NE enterprises. This allowed to reduce the military service and repair base during the “P” time and began to transfer the major repairs to military repair and production enterprises and plants of the NE, including the Military Automotive Works No. 5<sup>5</sup>. The Poznan plants carried out repairs (main ones, maintenance, medium, post-mechanical failure) of T-55A and T-72 tanks as well as specialist vehicles based on their chassis, i.e. BWP-1 infantry fighting vehicles, 2S1 Goździk self-propelled howitzers, special versions using MT-LB chassis or BRDM-2 armored cars. Moreover,

---

<sup>3</sup> C. Nowicki, *Służba Samochodowa Ludowego Wojska Polskiego*, Warszawa 1975, *passim*;

<sup>4</sup>A. Wojciechowski, *Służba czołgowo-samochodowa w latach 1989-2018*, [w:] *Dzieje Służby Czołgowo-Samochodowej (1918-2018). Wybrane problemy*, red. Z. Moszumański, Łódź 2018, p. 413.

<sup>5</sup> *Idem*, p. 415-431

<sup>6</sup> W. Skrzypczak, P. Luzak, *Miejsce, rola i zadania polskiego przemysłu zbrojeniowego w systemie bezpieczeństwa państwa*, „Przegląd Strategiczny” 2014, no. 7, p. 467–479. <https://doi.org/10.14746/ps.2014.1.33>.

service and repairs of trucks, passenger-terrain vehicles and buses were carried out. Propulsion units were also repaired. In the year 2000 WZM-5 obtained ISO-9001 and AQAP-110 Quality Assurance Certificate and a year later the Certificate of Assignment of the NATO Commercial and Government Entity Code. In 2005, the company obtained the certificate of Quality Assurance System AQAP-2110. 1 January 2008, in accordance with the schedule: Strategy for Consolidation and Support of Development of the Polish Defense Industry in 2007-2012, Wojskowe Zakłady Motoryzacyjne No. 5 State Enterprise was transformed into Wojskowe Zakłady Motoryzacyjne Spółka Akcyjna<sup>6</sup> (a public limited company).

WZM S.A. with its headquarters located at 262/280 Dąbrowskiego Street, occupy a fairly large area near Poznań Ławica Airport and the city's Rusałka Lake. The location and facilities are therefore very good and the area occupied is equal to 280 000m<sup>2</sup>. In the 21<sup>st</sup> century, the basic profile of the company consists of main repairs, maintenance, medium and resultant repairs as well as modernizations of armored, tracked and wheeled equipment of the Polish army. This includes T-72 and Leopard 2 A4 tanks and mainly 2A5, self-propelled howitzers cal. 122 mm Goździk as well as BWP-1 infantry fighting vehicles and their specialist variants (BWR-1D and BWR-1S), BRDM-2 reconnaissance vehicles, STAR and JELCZ trucks and special vehicles on those chassis, UAZ 469B passenger-terrain vehicles, Tarpan Honker and special vehicles on those chassis and even AUTOSAN and JELCZ buses. The plant operates in the system of national capabilities for the maintenance of tracked technology, both in peacetime and during military operations. The company also specializes in the production of selected spare parts for repaired vehicles, production of special devices and tools, control and measuring stands, moulds for plastic and rubber products, machining devices, blanking dies, benders, templates, stamping dies and rubber products. It should be remembered that repair and maintenance capacity of WZM S.A. is crucial for the Polish army which has more than 30 years old T-72M1 and 40 years old BWP-1. Overhauls of tanks of this type, similarly to BWP-1, constitute a challenge, as it is necessary to obtain parts for them which are sometimes difficult to access and if this is not possible, to produce them by the company's own capacities<sup>7</sup>. In the near future the repair capabilities of those units may prove to be important in the context of possible repair and overhaul orders directed by the Ukrainian side. The first partner country approached by the Ukrainians in spring 2022 was the Czech Republic. In the Czechoslovak Group plants, Ukrainian

---

<sup>7</sup> N. Bączyk, *W poznańskich zakładach*, „Twoja Strefa Pancerna” 2018, no. 1, p. 10-15.

T-64s which are the backbone of the Ukrainian armed forces, will be repaired first. In Poland, the main plant capable of simultaneous overhauls of tanks of both Western and Eastern provenience is precisely WZM S.A. which consistently extends its technical facilities, as well as the necessary competence to modernize and service heavy armored equipment.

## **BEFORE THE LEOPARD**

In 1999, during International Defense Industry Exhibition WZM S.A. demonstrated prototype of modernized Combat Infantry Vehicle BWP-1. During development works engineers focused mainly on reduction of vehicle imperfections. Thus, there appeared the installation of new integrated propulsion system (so-called power pack), passive observation instruments, modified gunner's sight with night vision of new generation, laser beam warning system SSC-1B. Moreover, the engineers of WZM S.A. significantly improved the suspension and installed digital communication means. The vehicle was also equipped with rubber pads allowing for driving on asphalt surfaces, along with changing the external lighting. Among the significant upgrades, the company presented the possibility of replacing the turret system.

In 2003, WZM S.A. demonstrated the Puma vehicle with a completely new turret system. It was a one-man Rheinmetall E8 design with a 30 mm cannon. In the following year Poznań BWP-1 received an unmanned RWCS-30 turret. Another proposal was to equip Puma with an unmanned MW-30 turret with 30 mm Mk 44 cannon and 7.62 mm UKM-2000C. Ultimately, the proposed modification package was not implemented in series. The issue was reexamined several times. Nevertheless, in 2012, works on a vehicle codenamed Borsuk began to take the lead resulting in resignation from the BWP-1 modernization concept for a few more years.

In the first decade of the 21<sup>st</sup> century, the Army showed more interest in the BWP-1 modernization. For quite a large batch of these vehicles produced in the 1980s, the Department of Armament Policy of the Ministry of Defense signed a relevant agreement with the Poznań company to conduct qualification tests. The analyses have shown that the reconfigured vehicle could serve for another 20 years. For this reason the Army expressed interest in modernizing the 444 BWP-1 units. It was supposed to take place in years 2011-2018. It would allow to equip the Polish infantry with modern unmanned turret integrated with Spike-LR ppk. However, the program was cancelled. The only changes implemented during BWP-1 overhauls consist of

installing passive night vision devices<sup>8</sup>. After years, it is apparent that the military is left with an age-old generation of infantry means of combat and transport and there are no new, tested and accepted solutions. Hope could be placed in the abovementioned vehicle codenamed Borsuk<sup>9</sup>. On the other hand, WZM S.A. from Poznań together with the Military Institute of Armor and Automotive Technology from Sulejów developed a package of additional ceramic-steel plates for transporters that could be used for BWP-1 modernization packages.

Apart from thorough modernization of BWP-1 called Puma, in past years WZM S.A. tried to promote the vehicle derived from wheeled transporter SKOT. In practice, it was to a large extent a deeply modernized design, since it contained as much as 70% of new components. WZM S.A. prepared a prototype wheeled armored personnel carrier Ryś with chassis in 8x8 and Irbis 6x6 configuration. The Ryś had several variants, including versions with the RCWS-12.7 unmanned shooting position, the Azalia artillery command vehicle, the M98 artillery Ryś or the Kaktus reconnaissance-jamming vehicle. In the end, only the project of medical evacuation vehicle Ryś-MED was realized which served soldiers of the Polish Military Contingent in Afghanistan. In cooperation with the Military Institute of Engineering Technology in Wrocław, as a part of research works, Ryś was also used to prepare the prototype of a specialized variant of Wheeled Engineer Reconnaissance Transporter code-named Tuja.

In early 2013 WZM S.A., having at the time probably the most experienced engineering team, formed a consortium with the task to develop documentation, create a prototype and implement by 2019 a Light Armored Reconnaissance Transporter (LOTR). It consisted of the Military University of Technology, Military Engineering Plants S.A., Stalowa Wola Ironworks S.A., WZM S.A. and Military Institute of Armored and Automotive Technology. The National Centre for Research and Development launched the competition proceedings but unexpectedly the task fell to a consortium led by AMZ Kutno with a 4x4 vehicle<sup>10</sup>.

## **OVERHAULS AND MAINTENANCE OF LEOPARDS 2A4 AND 2A5**

BWP-1 modernization proposals presented by the plant in Poznań and the offers of specialized variants of the transporter have not resulted in any significant orders from the Polish Army, which was interested in more modern solutions, striving to meet the standards

---

<sup>8</sup> M. Cielma, *Wojskowe Zakłady Motoryzacyjne z Poznania – budowa kompetencji*, „Nowa Technika Wojskowa” 2016, no. 6, p. 31.

<sup>9</sup> R. Michalski, *Zmodernizowany BWR-1S i nie tylko*, „Nowa Technika Wojskowa” 2017, no 9, p. 23.

<sup>10</sup> M. Cielma, op. cit., p. 32.

applicable to the NATO armies which Poland joined in 1999. The real breakthrough for the Poznań plants turned out to be the decision of Poland to acquire German Leopard tanks.

Under the intergovernmental agreement of 29 January 2002, the Polish Armed Forces received 128 Leopard 2A4 tanks from the Bundeswehr as well as other heavy equipment. These included: 10 Bergepanzer 2A2 technical protection vehicles, 4 Biber accompanying bridges, 18 M577 and M113 command vehicles including the Heros command system, 16 M113 medical evacuation vehicles, 6 SLT.50-2 heavy transport sets, 91 Mercedes 1017 trucks, 29 Mercedes Unimog 435 trucks and 25 Mercedes G290GD terrain vehicles. The German side also undertook to train soldiers at its own expense<sup>11</sup>.

Deployment of Leopards 2 to the Polish Army proceeded relatively smoothly and the vehicles entered the equipment of 10th Armored Cavalry Brigade. It quickly turned out that fifteen years old, though well maintained and regularly serviced vehicles in virtually every aspect are superior to the tanks PT-91 Twardy which are on the equipment of the Polish Army<sup>12</sup>. As an independent analyst specialist in Polish armored weapons Jarosław Wolski rightly points out: "[...] the problem turned out to be [...] the negotiated German logistics package. Its richness - both in terms of training and exploitation - put the decision-makers at the Ministry of Defense "to sleep" and caused them to rely on their ally instead of creating their own support and exploitation system for the Leopards from the very beginning. Then, in the face of locating the main efforts in the service of equipment prepared for foreign missions, the tanks were operated with the lowest possible expenditures, forced within the German system. The effect of such policy was, dating from 2006, gradual decrease of combat capabilities of 10th BFKP as a tactical unit"<sup>13</sup>.

As it has already been pointed out, 10 BKPanc - due to the lack of possibility of quick adaptation of national armaments industry to service and logistic service of Leopard 2A4 tanks - was included in the German logistic chain. For nearly 8 years parts were delivered at prices binding for Bundeswehr and the team of German specialists closely cooperated with the brigade. This allowed for quick and efficient repairs at a relatively low price. Problems started to appear when German parts for 2A4 vehicles were running out, especially in the area of the fire control system or the cannon stabilization. Serious difficulties also appeared when

---

<sup>11</sup> J. Wolski, *Od Leoparda 2A4 do Leoparda 2A5. Rozdroża eksploatacji i modernizacji*, „Wozy Bojowe Świata” 2017,

<sup>12</sup> N. Bączyk, *PT-91 Twardy*, „Wozy Bojowe Świata” 2017, no 2, p. 72–97.

<sup>13</sup> J. Wolski, op. cit., p. 36.

attempting to incorporate the tanks delivered by the Germans into the national service system. Already in 2006, the Zakłady Mechaniczne Bumar-Łabędy conducted an inspection of turrets of 60 tanks. In the opinion of vehicle users, however, there were significant discrepancies between German standards and the actual work performed by the Polish company that could be observed during further use. Subsequent years of service of Leopards 2A4 brought closer the deadline for the execution of repairs and, consequently, for the Ministry of Defense to take appropriate decisions<sup>14</sup>. The first major overhaul and maintenance works on the Leopards were carried out at WZM S.A. in Poznań. Two consortiums competed for the contract: WZM S.A. from Poznań together with Rheinmetall Landsysteme (hereinafter: RLS) and Zakłady Mechaniczne "Bumar-Łabędy" together with Krauss-Maffei Wegmann (hereinafter: KMW). At the beginning of June 2011 Ministry of Defense selected the consortium associated with the capital city of Wielkopolska. This was a breakthrough moment for WZM S.A. providing not only much needed stabilization but also opening the possibility of expanding the plant and building its competences related to Western armored technology.

16 July 2011 WZM S.A. and RLS signed an agreement on cooperation in the field of maintenance and repair of Leopard tanks. By the end of 2011, specialists from Poznań, with the support of the German partner and on the basis of infrastructure of technical services of 34th Armored Cavalry Brigade from Żagań, conducted services at the F6 level for chassis, turret and armament, extended by additional repairs of 30 vehicles. Only 2 hulls, which required non-standard welding works, were repaired in Germany<sup>15</sup>. During the realization of this contract, performed in military workshops in Żagań, equal to roughly 10 million PLN, the actual participation of the company from Poznań amounted to more than 30% of total man-hours and through cooperation or even lapping with German specialists, a priceless process of acquiring knowledge and skills in this field was initiated.

In 2012 the Polish Army commissioned the maintenance of 35 Leopards 2A4 to another major Polish armaments company, namely Bumar-Łabędy plants cooperating with German KMW. Within the contractually required deadline, i.e. until 15 December 2012, the

---

<sup>14</sup> F1 service is performed after 3 months of operation, F2 after 6 months or after the vehicle has consumed 5000 liters of fuel, F3 after one year and 10,000 liters used, F4 every 2 years and 20,000 liters of fuel consumed. After 10 years of operation, an overhaul of the F6p chassis is performed, and for the turret and weapon systems this occurs every 4 years (F6u). The permissible annual norm of the Leopard 2 tank consumption in the Polish Armed Forces is 900 km. As a result, it can be assumed that the equivalent of medium overhaul is performed on Leopard-2 after the mileage of about 8100 km (F6p).

<sup>15</sup> M. Cielma, op. cit., p. 32.



maintenance works were performed only on 17 vehicles<sup>16</sup>. The slow pace of work and the occurring technical and organizational problems caused that by the beginning of the next year the 12th Military Economic Division in Toruń announced a tender for performing the maintenance of the F6 level for turrets and hulls of the remaining Leopard 2A4 tanks. Ultimately, the German company RLS cooperating with the plant in Poznań received the order to carry out the maintenance works within two years in 81 tanks Leopard 2A4. This in turn would complete the process of carrying out the necessary maintenance works in Leopard 2A4 tanks. In accordance with the provisions of the contract in 2013, 35 vehicles were to undergo inspections, and in the next year - by November - as many as 46. Works on the hull were to be performed by specialists from Poznań, while the turrets and armament were worked on by Germans. In addition to the service review at level F6, the contract also covered the removal of defects and performance of repairs detected during inspection<sup>17</sup>.

In November 2013, Minister of Defense Tomasz Siemoniak and his German counterpart Thomas de Maiziere signed a contract worth about 760 million PLN for the delivery by the end of 2015 of 105 Leopard 2A5 and 14 Leopard 2A4 tanks. In turn, on 28 December 2015, a cooperation agreement was signed between Zakłady Mechaniczne "Bumar-Łabędy" S.A. and Wojskowe Zakłady Motoryzacyjne S.A. with regard to F6 technical inspections and repairs of Polish Leopard 2A4 and A5 tanks. According to its provisions, Zakłady Mechaniczne "Bumar-Łabędy" S.A. is responsible for the overhauls and repairs of Leopard 2A4 tanks and WZM S.A. is responsible for supporting the exploitation of tanks in the 2A5 version. According to the provisions of the agreement, WZM S.A. is also to be a leader in the future modernization of tanks of this type. In addition, in accordance with the division of competencies in the Polish arms industry, the Poznań plants conduct inspections and repairs of the propulsion systems of all versions of Leopards 2 that are in the armament of the Polish Armed Forces<sup>18</sup>.

In 2016, the first two Leopards 2A5 from the 34th BKPanc. from Żagań crossed the gate of the Poznań plant where they were overhauled. In the following year, the Polish Army commissioned WZM S.A. to carry out servicing work on several dozen tanks from the Warsaw and Żagań Armored Brigades. The maintenance work on the vehicles also allowed the company to develop its own proposals for improving the tactical and technical advantages of the vehicles.

---

<sup>16</sup> A. Kiński, WZM S.A. – *Leopardy, silniki i LOTR*, „Nowa Technika Wojskowa” 2013, no 9, p. 61-65.

<sup>17</sup> M. Cielma, op. cit., p. 32.

<sup>18</sup> A. Kiński, *Remonty Leopardów w Łabędach i Poznaniu*, „Wojsko i Technika 2016, no 2, p. 16.

Thus in Poznań a new communication system for Leopard tanks was developed<sup>19</sup>. The auxiliary armament Polonization program was prepared, i.e. the replacement of MG3 with rifles from Zakłady Mechaniczne Tarnów. Together with Lubawa Group, multispectral camouflage was developed. Moreover, it was proposed to replace thermovision cameras in the commander's and gunner's instruments to apply a new reversing camera and to Polonize the driver's desktop. All these solutions enable increasing the work comfort of the crew and definitely influence the vehicle survivability on the battlefield<sup>20</sup>.

## **FROM LEOPARD 2A4 TO LEOPARD 2PL**

In December 2012, the assumptions of the Technical Modernization Plan for 2013-2022 were publicly announced. One of the key tasks facing the Polish arms industry was the technical modernization of the army's new acquisition, namely Leopard 2A4 tanks. After a months-long technical dialogue (it was conducted from 15 March to 13 August), on 29 October 2013, the Armament Inspectorate announced a tender for modernization of 128 Leopard 2A4 tanks to the Leopard 2PL version. Among competitors for this contract were: the Zakłady Mechaniczne "Bumar-Łabędy" S.A., Przemysłowe Centrum Optyki (hereinafter: PCO) and Wojskowe Zakłady Motoryzacyjne S.A. However, PCO cooperating with Turkish Aselsan withdrew. The offer was submitted by plants from Łabędy and WZM S.A. forming a consortium with the Polski Holding Obronny and OBRUM Gliwice which in turn decided to cooperate on the project with the Wojskowe Zakłady Łączności nr 2 (Military Communication Works No. 2) from Czernica and German partner Rheinmetall Landsysteme.

In the modernization packages proposed together with Rheinmetall engineers from WZM S.A., in order to meet the expectations of the Polish Army, focused on maximal improvement of the soldiers safety and adjusting the vehicle electronics to the requirements of modern battlefield. Structural changes have been grouped into packages, allowing to carry out modernization works in the vehicles in stages and depending on the funds available in the budget for this purpose. In order to improve safety of the crew it was proposed to install additional armor panels increasing the resistance of the vehicle both to direct hit by anti-tank missiles and in case of detonation of various types of explosives. The construction of the driver's

---

<sup>19</sup> Application of the Radmor RRC9311 wideband individual infantry radio and data projection - vehicle terminal WB Electronics DD9620T.

<sup>20</sup> M. Cielma, *Gorąca zima w Wojskowych Zakładach Motoryzacyjnych*, „Nowa Technika Wojskowa” 2017, no 12, p. 23.

seat and the ammunition storage located at the front of the vehicle was also to be changed. In addition, it was proposed to replace the high-pressure hydraulic turret drive systems with all-electric systems. Thorough changes were also offered in the area of electronics. All analogue elements were to be replaced by modern digital devices, while observation and targeting instruments as well as internal and external communication systems were to undergo deep modernization. What is more, it was proposed to introduce an additional system of cameras monitoring the area around the vehicle, thus increasing the situational awareness of the crew, which in turn has a significant impact on their survival during combat<sup>21</sup>.

Despite, as it seems, quite an interesting proposal of the Poznań company, the consortium concentrated around Bumar was selected to the further stage of negotiations. Ultimately, the talks were not successful due to formal and substantive deficiencies of all offers and too low level of Polonization. In August 2014, Minister of Defense Tomasz Siemoniak announced the need to restart the tender procedure and several months later, in January 2015, the contract was entrusted to the newly formed national defense holding company, the Polish Armament Group (hereinafter: PGZ). Wojciech Dąbrowski, CEO of PGZ informed at the time: "We estimate that a new bid for the modernization of the Leopards will be submitted in the second quarter of this year. At the same time, I confirm that our intention is for Bumar-Łabędy to remain the leader of this modernization"<sup>22</sup>. However, it was not the end of the saga which has been dragging on for many months. On 1 October, Brig. Gen. Dr. Adam Duda, the head of the Armament Inspectorate, informed that the modernization program for Leopard 2A4 tanks is to cover not only the vehicles purchased in the years 2002-2003, but also those that were delivered to the Polish Armed Forces in 2013, i.e. 142 vehicles in total. What is more, the only thing that was certain was the necessity of conducting the modernization but who will ultimately receive the contract and from where the transfer of technology will take place, was still uncertain and largely depended on the ongoing political game before the parliamentary elections. The partner of Gliwice-based Bumar and PGZ, after the procedure was labeled of national security dimension, was to be one of three companies: Turkish Aselsan, German KMW and Rheinmetall. Interestingly, the latter which had so far closely cooperated with the Poznań plants, was finally chosen.

---

<sup>21</sup> WZM S.A. website, <http://www.wzm.pl>, Modernizacja czołgu Leopard 2a4 do wersji MBT Revolution p,l (retrieved May 3, 2022).

<sup>22</sup> BiznesAlert.pl website – Rynek Opinii, <https://biznesalert.pl>, Dąbrowski: PGZ przygotowuje projekt modernizacji Leopardów, (retrieved May 3, 2022).

On 28 December 2015, in the presence of Bartosz Kownacki, Secretary of State in the Ministry of Defense, the Ministry of Defense represented by the Armament Inspectorate signed a contract with Polska Grupa Zbrojeniowa and ZM Bumar-Łabędy for the modernization of 128 Leopard 2A4 tanks to the PL version until 2020 for the amount of 2.415 billion PLN.

In February 2016, the ZM “Bumar-Łabędy” signed the relevant agreement with Rheinmetall Landsysteme. At the same time, the already new Board of the Polish Armament Group divided the scope in the Group in the area of Leopard tanks, assigning WZM S.A. the already mentioned specialization in maintaining the potential for maintenance and modernization of Leopard 2A5 tanks. This decision of PGZM S.A. confirmed essential role of WZM S.A. in servicing of Leopard 2A5 and their later eventual modernization that cannot be transferred to Leopard 2PL. Such an agreement between WZM S.A. and “Bumar-Łabędy” was signed on 28 December 2015 with the ceremonial signing of the modernization contract. The Poznań-based company has also become the contractor for work on the power units of all Polish Leopard 2 tanks, with which it has guaranteed its market share for the coming years and the development of competence in this area.

## **LEOPARD 2 SERVICE AND LOGISTICS CENTER IN POZNAN**

The next step of building competences for modernization and servicing of heavy armored equipment by WZM S.A. was the opening of Service and Logistics Centre (CSL-WZM-Leopard 2) on 18 June 2018. This Centre is tasked with monitoring and maintaining full technical efficiency of Leopard 2 tanks belonging to the Polish Armed Forces. Zbigniew Hoffmann, Governor of Wielkopolska region, reading a letter sent for this occasion by the Prime Minister stated: “[...] today’s event is another step to increase the potential of our army. Because the security of our country depends on the strength of our economy. It is here in Poznań, the Polish Leopard 2 tanks used by the army will gain new youth”<sup>23</sup>. It is worth noting, however, that both the authorities of WZM S.A., as well as decision-makers associated with the Polish arms industry, indicate that in the near future the center will not only be used for comprehensive maintenance of Leopard tanks but - as indicated Sebastian Chwałek, vice-president of the Board of Directors of PGZ S.A.: “[...] is to improve our ability to modernize and service this equipment. We intend

---

<sup>23</sup> J. Dopierała, *Poznań: Otwarto nowe Centrum Serwisowo-Logistyczne czołgów Leopard 2*, <https://gloswielkopolski.pl>, (retrieved April 13, 2022).

to use the skills acquired as part of the CSL project in the area of caterpillar platforms in our future armored projects currently being developed by PGZ”<sup>24</sup>.

The center was built in close cooperation with Krauss-Maffei Wegmann GmbH & CO (KMW) having the status of general contractor for tanks of Leopard 2 family. CSL consists of: a hall for tanks servicing, Center of Power Assemblies (“W” hall), Authorized Service Center and buffer warehouse and Specialized Training Center. The cost of its construction is estimated at 46 million PLN of which 15 million PLN are the stored spare parts. This is undoubtedly a milestone in the maintenance of the most modern tanks of the Polish Army and at the same time the result of working through the experience and drawing the right conclusions from not very efficient service of Leopard 2A4 tanks at the beginning of the second decade of the 21<sup>st</sup> century. Currently, the center can monitor failures and damages, conduct ongoing analysis of the condition of equipment, as well as collect critical data for individual vehicles, thus allowing for efficient management of resources, as well as indicating current needs and directions of development. This allows, among others, better planning of maintenance and repair works, thus shortening the time of service works.

The heart of the Service and Logistics Centre is the tank service hall with ten workstations, each with a separate entrance for vehicles. Between them there is a crane with a lifting capacity of up to 25 tons which allows for safe and efficient disassembly of the tank turrets and power unit and their further transport. After removal from the tank hull, the turret goes to a specially designated, separate, two-level stand where specialists perform inspections and possible repairs. Other components of the tank, including the power unit, after their disassembly, go in turn to other halls of WZM S.A., where there are specialized stands for verification of their technical condition and further specialized treatment. The scope of works performed is each time approved by the Polish Army on the basis of technical condition protocols approved by the regional military representative. So far, in WZM S.A. most repairs have been carried out on the chassis, engine and drive system, electrical installation, fire control system, as well as the drive system.

There is also a paint booth in the tanks service hall, a power packs testing booth and a washing station. An important part of the CSL-WZM-Leopard 2 is the warehouse for spare parts, assemblies and components, as well as paints, varnishes and other means of vehicle repair and

---

<sup>24</sup> WZM S.A. website, <http://www.wzm.pl>, Inauguracja prac centrum serwisowo-logistycznego czołgów Leopard w Poznaniu, (retrieved April 10, 2022).

maintenance. All of this has been located in three separate large-area rooms. An important issue connected with the warehouse is keeping there a number of critical elements, for which the waiting time is counted in months, including mainly engines or sight gauges. The ongoing digitalization of the infrastructure is also worth mentioning. A very important element facilitating both service and repair works are IT kiosks enabling, among others, quick access to selected elements of technical documentation as well as enabling access to KMW's electronic catalog of leopard spare parts with descriptions, also in Polish, of repair technologies developed so far by WZM S.A. It also has programs for company management, use of CAD system, product life cycle management, development of construction and technological documentation, designing machining processes on CNC machines<sup>25</sup>.

From 2012 onwards, the WZM S.A. commenced to create Military Engine Centre responsible for supply, overhaul and servicing of all engines for wheeled and tracked vehicles of the Polish Armed Forces. On 28 October 2013, an investment agreement was signed between the Minister of Defense, the Industrial Development Agency and WZM S.A. on the launch of the Centre for Powertrain Units (hereinafter: CZN). The creation of the CZN, with its strategic partner - the German MTU, was an important element of the logistical protection of the armed forces in all states of national defense readiness<sup>26</sup>. On 2 September 2014, during the International Defense Industry Exhibition, WZM S.A. signed an agreement for technology transfer with the German MTU, the manufacturer of engines for Leopard 2 tanks<sup>27</sup>. Just over a year later, on 2 December 2015, the WZM S.A. signed a service agreement in Augsburg with RENK AG to establish in Poznań an Authorized Service Center for HSWL 354 gearboxes of Leopard 2 tank up to level three. This successive expansion of competence has paid off in recent years. Among others, the Company feels more and more confident in working on MB873 Ka501 engines used in Leopard 2A4/PL/A5 tanks. Repairs of MB 873 engines are currently performed on the advanced level L-4 and are developed to the broadest level L-5 (including regeneration of assemblies and components). Great improvement in the work on engines is provided by one of the first major infrastructural investments in WZM S.A., i.e. the dynamometer for engines with power up to 1500 KM.

---

<sup>25</sup> M. Cielma, *Poznańska klinika Leopardów*, „Nowa Technika Wojskowa. Numer Specjalny: Modernizacja Techniczna Sił Zbrojnych RP” 2019, p. 50-53.

<sup>26</sup> WZM S.A. website, <http://www.wzm.pl>, Centrum Zespołów Napędowych, (retrieved March, 2022).

<sup>27</sup> WZM S.A. website, <http://www.wzm.pl>, WZM rozpoczyna współpracę ze światowym producentem elementów napędowych, (retrieved March, 2022).

Ultimately, in the “W” hall, disassembly and assembly of engines, heads, electrical repairs, repairs of crankshafts and camshafts, compressors, etc. will be carried out. From the organizational point of view, the building, divided into three naves, will ultimately have 10 positions for servicing engines of Leopard 2, T-72/PT-91 and BWP-1 tanks.

It is planned to develop training opportunities on the basis of modern center equipped with simulators and trainers of appropriate quality. The company also conducts activities to develop competence in the field of highly advanced electro-optical and electrical solutions (optics, thermal imaging, turret drives, rangefinder) - supporting in this respect domestic partners, including primarily PCO S.A.

## **SUMMARY**

After the changes that took place in the 1990s, the Polish defense industry went through various vicissitudes and not all plants were able to meet the expectations placed in them, as well as the rules of the free market. Military Modernization Works in the recent history also tried to find its place in the military industry and lead to playing a key role in maintaining the efficiency of caterpillar technology of the Polish Armed Forces, both in peacetime and during military operations. A breakthrough for the Poznań plants turned out to be the decision on Poland’s acquisition of Leopard tanks in 2A4 version, followed by 2A5 version. As the German logistic package was running out, the WZM S.A. gradually took over from the German side the responsibility for maintaining technical efficiency of the vehicles, acquiring necessary technical knowledge, expanding the machine park. Furthermore, it continued acquiring additional funds that allowed to stabilize financial situation of the plant, but above all to invest in development, new technologies and personnel. Currently, the WZM S.A. employs over 300 workers, including 60 engineers. The increase in the capacity of the plant in the field of repair and modernization of Leopard 2 vehicles or the engine center, also affected the jump in the company’s revenue in the military segment. In 2014, they amounted to 43.7 million PLN, 2015 - 50 million PLN, 2016 - 88 million PLN, 2017 - 91 million PLN, 2018 - 121 million PLN to reach a record revenue of 230 million PLN in 2021<sup>28</sup>.

---

<sup>28</sup> Rzeczpospolita Polska website, <https://www.gov.pl/>, Centrum serwisowe czołgów Leopard rozpoczęło swoją działalność, (retrieved May 6, 2022); Puls Biznesu, <https://www.pb.pl/>, Wojskowe Zakłady Motoryzacyjne SA, czyli synonim prosperity, (retrieved May 7, 2022)

Thanks to consistently built competences and introduced innovations, the WZM S.A. does not intend to stop at this stage but wants to further develop modifications of the armored equipment used by the Polish Armed Forces. All of this happening along with further development of competences and capabilities in the field of repairs and maintenance of armored technology. Currently, over a thousand BWP-1 vehicles constitute the basic means of transport and combat for mechanized infantry subunits. Through subsequent modifications of the Puma project, the WZM S.A. has repeatedly submitted proposals for vehicles for the Polish Army. In the first projects only people familiar with the design and performance of BWP-1 could see that the vehicle has different, better parameters. Presented during the XXIX International Defense Industry Exhibition (Międzynarodowy Salon Przemysłu Obronnego) in Kielce in 2021, the new version of the vehicle meets the requirements set by the Armament Inspectorate to a much greater extent and becomes an interesting bridge solution until the introduction of a new combat infantry vehicle. Further modifications to Leopards 2A5 appear to be interesting as well.

Thanks to the technical service of Leopard 2A4 and 2A5 tanks conducted in the last decade, the WZM S.A. became one of the leading plants of the Polish defense industry. Through consistent increase in competences and technical conditions for maintenance of the latest military technology, the plant continues to expand its capabilities for operational security of armored vehicles of both Eastern and Western production. In the context of the ongoing conflict in Ukraine and plans of technical modernization of the Polish Armed Forces for the years 2021-2035, as well as currently conducted purchases by the Polish Army, these properties are invaluable for building a complementary system of national security. Increasingly, the armored equipment used by the Polish Armed Forces, as well as that acquired, may be assembled, serviced, overhauled, and modernized in Poland.

## REFERENCES LIST

### LITERATURE

- Bączyk N., *PT-91 Twardy*, „Wozy Bojowe Świata” 2017, no 2.  
Bączyk N., *W poznańskich zakładach*, „Twoja Strefa Pancerna” 2018, no 1.  
Cielma M., *Gorąca zima w Wojskowych Zakładach Motoryzacyjnych*, „Nowa Technika Wojskowa” 2017, no 12.  
Cielma M., *Poznańska klinika Leopardów*, „Nowa Technika Wojskowa. Special edition: Modernizacja Techniczna Sił Zbrojnych RP” 2019  
Cielma M., *Wojskowe Zakłady Motoryzacyjne z Poznania – budowa kompetencji*, „Nowa Technika Wojskowa” 2016, no 6.  
Dopierała J., *Poznań: Otwarto nowe Centrum Serwisowo-Logistyczne czołgów Leopard 2*, <https://gloswielkopolski.pl>  
Gromek M., *Jakość usług technicznych świadczonych Siłom Zbrojnym Rzeczypospolitej Polskiej*, Warszawa 2020.



Kiński A., *Remonty Leopardów w Łabędach i Poznaniu*, „Wojsko i Technika” 2016, no 2.  
 Kiński A., WZM S.A. – *Leopardy, silniki i LOTR*, „Nowa Technika Wojskowa” 2013, no 9.  
 Michalski R., *Zmodernizowany BWR-1S i nie tylko*, „Nowa Technika Wojskowa” 2017, no 9.  
 Nowicki C., *Służba Samochodowa Ludowego Wojska Polskiego*, Warszawa 1975.  
 Skrzypczak W., Luzak P., *Miejsce, rola i zadania polskiego przemysłu zbrojeniowego w systemie bezpieczeństwa państwa*, „Przegląd Strategiczny” 2014, no 7. <https://doi.org/10.14746/ps.2014.1.33>.  
 Wojciechowski A., *Służba czołgowo-samochodowa w latach 1989-2018*, [w:] *Dzieje Służby Czołgowo-Samochodowej (1918-2018). Wybrane problemy*, red. Z. Moszumański, Łódź 2018.  
 Wolski J., *Od Leoparda 2A4 do Leoparda 2A5. Rozdroża eksploatacji i modernizacji*, „Wozy Bojowe Świata” 2017, no 2.  
 Wolski T., *Europa bez czołgów*, „Dziennik Zbrojny Analiza” 2015, no 3, p. 4-15.

## SOURCES

Puls Biznesu, <https://www.pb.pl/>, Wojskowe Zakłady Motoryzacyjne SA, czyli synonim prosperity.  
 Rzeczypospolita Polska website, <https://www.gov.pl/>, Centrum serwisowe czołgów Leopard rozpoczęło swoją działalność.  
 BiznesAlert.pl – Rynek Opinii, <https://biznesalert.pl>, Dąbrowski: PGZ przygotowuje projekt modernizacji Leopardów.  
 WZM S.A. website, <http://www.wzm.pl>, Centrum Zespołów Napędowych, (retrieved 24.04.2022).  
 WZM S.A. website, <http://www.wzm.pl>, Modernizacja czołgu Leopard 2a4 do wersji MBT Revolution pl.  
 WZM S.A. website, <http://www.wzm.pl>, WZM rozpoczyna współpracę ze światowym producentem elementów napędowych.  
 WZM S.A. website, <http://www.wzm.pl>, Inauguracja prac centrum serwisowo-logistycznego czołgów Leopard w Poznaniu.



Copyright (c) 2022 Grzegorz JASIŃSKI



This work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.