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Manufacturers**

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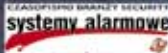
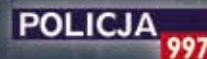


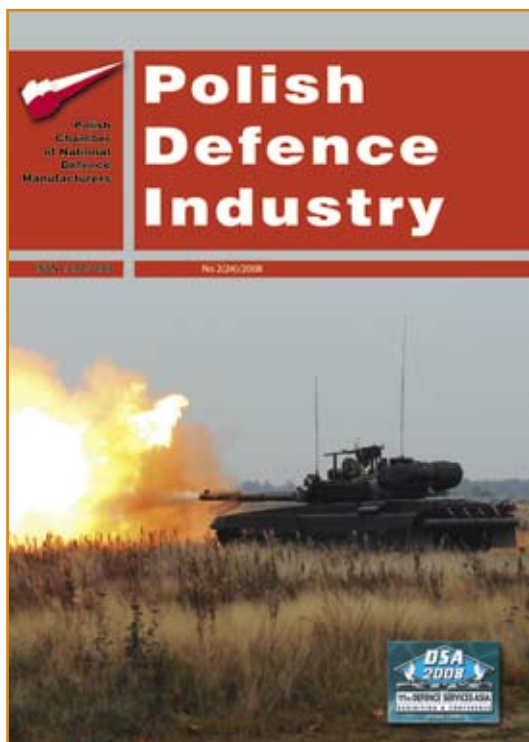
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Main Battle Tank PT - 91M

First PT-91 was built in Łabędy in winter 2005, and had hard tests on Polish ranges. In those tests took part representatives of Malaysian Army whose supervise realisation of the contract. In August 2005 after small modification, which is the result of analyses from the test, tank was transported to Malaysia.

The first public presentation of PT-91M took place on 31 August 2005 in Kuala Lumpur, during the big parade on Malaysia Independence Day. Tank, leading column of Malaysian Armour Corps, was in colours of 11th Regiment, 4th Mechanized Brigade. Tank presentation piques all spectators, and was subject of big interest in South - Asia Region, all information services from that region gave news about the new tank.

More see page 12-13

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New ammo from DEZAMET

ZM Dezamet from Nowa Dęba will produce 2 new types of modern ammo for automatic grenade launchers, using technologies obtained from Norwegian Nammo. Those two types will supplement 40mm ammo family.

After year of negotiations, ZM Dezamet and Bumar, signed agreement with Nammo Raufoss AS, which is part of the Lockheed Martin Aeronautics Company offset for buying F-16 planes by Poland. As per experts knowledge, agreement with Nammo is approx 225 mln USD worth. Basing on the agreement, in Nowa Dęba will be produced two types of ammo: 40mm x 53 HEDP fragmentation/cumulative with PD/SD fuse and modern programmable 40mm x 53 HEDP with RF fuse. As it comes from the Polish Army and Dezamet representatives, the deliveries will start earlier than it was planned. It is possible that the first batch might come to the recipient in year 2008, however schedule foreseen starting production and certification of the ammo for year 2009. ■

NUR and BLEND A for the Polish Navy

RADWAR from Warsaw signed with MoD 3-years contract for deliveries of fire detection and control systems. The contract is over 63 mln USD worth.

To the Army from the Warsaw's factory will go mainly two, the most modern NUR 22M (export name "N-26") 3D medium range radars, being able to detect low altitude targets and follow even tens of them on distance up to 100km. Contract includes deliveries of 4 sets of BLEND A artillery fire control systems, 2 ŁOWCZA – automated command vehicles and 5 command vehicles REGA-4 and REGA-5. Training and spare parts deliveries are also part of the contract.

Recently the Polish Army confirmed interest in LOARA selfpropelled anti-aircraft system offered by the CNPEP RADWAR. The condition of placing an order is conducting successful trials of the system with Swiss AHEAD programmable ammo. Trials of LOARA with the new ammo are supposed to be conducted in 2008. ■

ROSOMAKS (WOLVERINES) for export.

Five Rosomaks will buy Finnish Patria from Wojskowe Zakłady Mechaniczne from Siemianowice Śląskie as a part of contract for deliveries to United Arab Emirates.

It's the first export order for WZM. The UAE Army wants to try the vehicles and not rule out expanding the contract. Details of the transaction

are now a secret. Transaction has to be the part of the Finnish offset. Value of Patria compensation commitments is approx 0,5 bln EURO. ■

Novelties from PCO

Przemysłowe Centrum Optyki (Industrial Optics Center) has built recently modern factory and thanks to offset is adapting modern technologies. PCO will spend in the next few years 90 mln PLN (approx 36 mln USD) for development of innovative products. It will use technologies of Italian Galileo and Wojskowa Akademia Techniczna (WAT - Military Technical Academy).

Cooperation with Galileo is connected to Oto Melara offset obligation (Oto Melara delivered turrets for Rosomak APC worth approx 308 mln EURO). Italians passes to PCO not only cameras production technology, but also will equip Polish factory with necessary machines for their production.

PCO contractors assume that in the next 5 years, in the factory will be produced new laser finders, devices for the vehicles warning about shooting danger, family of NV sights and specially stabilised observation platforms for fighting vehicles.

In the recent years, the PCO, has a lot of reasons to be happy. The war with terror raised number of Armed Forces orders, where the factory products such as NVGs has a good opinion among soldiers. ■

Incomes of the Polish defence industry companies.

For the majority of the Polish defence industry companies, previous year was a record-year in spectrum of orders from the Polish MoD.

Foreign missions of the Polish soldiers, especially in Afghanistan and Iraq led to increase of MoD orders. Bumar Group consists of 19 companies earn on these orders over 90 mln USD more than in the previous year. The biggest increase noted companies of the Group producing ammo (Mesko had over 90 mln USD income) or producing NV devices (Przemysłowe Centrum Optyki – over 15 mln USD income). ■





The combat launcher ZB-WŁWD/Z

is designed for clearing passages in minefields by explosion using a line charge towed by rocket fired from launcher-container. Mineclearing with line charge is considered preliminary. Additional use of minesweeper is recommended. The combat launcher is characterized by reliable action, short set-up time for combat and safe handling.



120 mm Tank ammunitions:

- APFSDS-T ROUND
- APFSDS-T-TP ROUND
- HE ROUND
- HE-TP ROUND



125 mm Tank ammunitions:

- APFSDS-T ROUND
- APFSDS-T- TP ROUND
- APFSDS-T TRAINING ROUND WITH BM-C PROJECTILE
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New vehicle from AMZ Kutno

A year after "TUR", AMZ Kutno company showed the first of the new model. As the first in public, ŻUBR-P was presented. ŻUBR-P is a platform for carrying special systems.

After delivery to CNPEP RADWAR, column of POPRAD system launchers and SOŁA (N-26/MMSR) radar from RADWAR, will be placed on it. In such form POPRAD will be soon presented



for trials to the Polish Army. In June, the basic version of ŻUBR being able to carry 10 soldiers should be ready.

ŻUBR-P has to be considered as a prototype, of which final solutions will be accepted after comprehensive trials. Its outside might be also modified, mainly by adding masking frames and lockers.

ŻUBR should be able to reach speed of approx. 100 kph and has 600 km range. In the future installation of the automatic gear box should be possible. Also run flat system, similar to the one used in ROSOMAK APC would be used in the future. ■

FB Radom wins tender for pistols

Tender commission, meeting in Police Main Headquarters in Warsaw, on February 21st, 2008, announced that the winner of the tender for deliveries of 25701 automatic pistols 9mm Para for policemen and Border Guards is Fabryka Broni Radom, which offered P99 pistols.

Since today FB Radom has delivered to Policemen and Internal Security Agency over 50 000 pcs of P99. This pistol has a good opinion of the Polish uniformed services and the factory informed that since today they haven't received any claims.

The purchases request the whole batch of ordered weapon to be delivered to the Police and Border Guard in 9 months after signing the contract. ■

Tents from Lubawa

Lubawa JSC signed with MoD another annex to multiyear contract for military tents. The contract foresees deliveries worth 1,5 mln USD till the end of year 2008, rising this year orders pool twice.

Another annexes, according to earlier schedule, rise the value of the contract up to 21,5 mln USD, meaning 9 mln USD more than the value of the year 2006 contract. Current, 4th Annex is unique, because it takes account of faster production rate of Lubawa. Deliveries, initially foreseen on October, will be realised already in June.

NS-97 and N-6/97 tents are the scope of the new contract. The first ones are well known tents with shape similar to cut cylinder. In opposite to the older ones, they are covered with new cotton-polyester cloth. Thanks to ability of connecting several tents on a row and connecting heater, they might be used in winter time. Smaller, 6-people N-6/97 tents are covered with camouflage printed cloth. ■

First Rosomaks (Wolverines) WEM delivered to the Polish MoD.

Wojskowe Zakłady Mechaniczne (WZM) from Siemianowice Śląskie formally passed the first batch of 6 (of 31 ordered) MedEvac vehicles basing on Rosomak APC chassis.

Rosomak WEM is designed for use on battalion and mechanised company level (motorised, armoured) and has to make possible evacuation of minimum 3 wounded people in horizontal position and has ability to evacuate wounded in sitting position as well.

Vehicle crew consists of 4 soldiers: vehicle commander – medic NCO, 2 paramedics and driver-mechanic. ■





WOJSKOWY INSTYTUT TECHNICZNY UZBROJENIA



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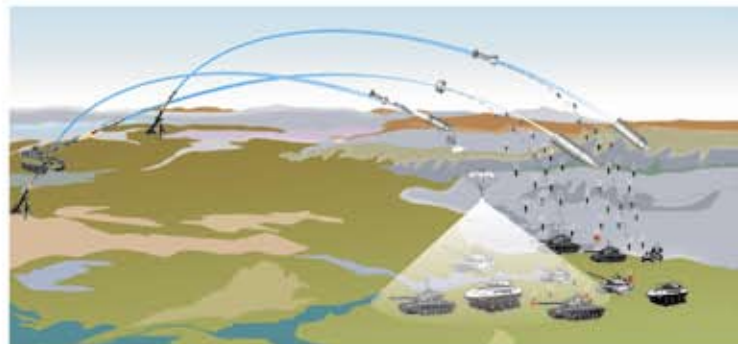
- The main compound - Zielonka n. Warsaw,
- Dynamic Testing Centre - Stalowa Wola,
- Dynamic Testing Centre - the range in Drawsko Pomorskie.

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- functional tests;
- standardisation and unification;
- software for the command and fire control systems;
- certification of weapon systems;
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- rockets and missiles;
- artillery;
- radar systems;
- service and maintenance of weapon systems..



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PERSPECTIVES FOR POLISH-MALAYSIAN DEFENCE INDUSTRIES COOPERATION

By Sławomir KUŁAKOWSKI

Malaysia is one of the most important partners of Poland in South-East Asia. During the last years, cooperation has been developing quite dynamically. In years 1999-2005 value of turnover between our countries increased for over 60%. Development of cooperation on field of science, culture and technology, including advanced technologies is one of the most perspective fields of cooperation between both countries. Very interesting is Polish export of educational services, meaning presence of Malaysian students on Polish universities, especially the medical ones.

Poland considered current level of bilateral relations as very high, including economical cooperation, especially in the area of defence industry. More frequent direct contacts of Polish businessmen, economic self-government organisations or governmental agencies responsible for promotion and supporting export, with their Malaysian counterparts.

Polish-Malaysian cooperation on field of defence industry has started in the middle of 90s. In 1994 trade mission of the Polish defence industry

representatives lead by Deputy Minister of Industry Mr. Roman Czerwiński visited Malaysia. One of the effects of that visit was sending T72M1 MBT to Malaysia, which passed the tests lasting for many months on firing range.

After a break, which lasted several years, talks on deliveries of armoured equipment to Malaysia were restarted. Worth 370 mln USD (around 1,4 bln Ringgits) contract between Bumar Group and Malaysian government for 48 PT-91M tanks with additional equipment, 6 Armoured Recovery Vehicles WZT-4, 5 self-propelled bridges PMC, 3 engineering tanks MID-M and training package was signed on April 11th, 2003. Training of 128 Malaysian soldiers on courses lasting from 3 weeks to 6 months is a part of the contract. Contact has to be realized till year 2008 and the first tank with 1000hp engine was delivered to Malaysia in August 2005 and took part in annual parade in Kuala Lumpur during national day.

As a part of the contract Poland will receive eg. 300 000 tons of palm oil worth 111 mln USD. Also there is an offset related to the contract. The offset consisting of transfer of Polish technologies to Malaysia and purchases is worth around 70 mln USD.

Negotiations of the contract were very hard, but the result is satisfactory. Bumar's PT-91M won with such competitors like

PT-91M MBT



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In July 2005 Mr. Marek BELKA, Prime Minister of Poland, accompanied by big group of defence industry representatives, officially visited Malaysia on invitation issued by Malaysian Prime Minister Mr. Abdullah Badawi. During bilateral and multilateral talks also with Deputy Prime Minister, Minister of Defence Mr Najib Tun Razak, discussed projects related to defence industry and military equipment. It was a great opportunity for revision of all cases related to contacts between Polish and Malaysian MoD. Of course the main point was realization of contract for 48 pcs of PT-91M MBTs deliveries. Medium range radar system, anti-aircraft system and other military equipment were also mentioned during the meeting. Apart of it, Poland declared readiness to teach Malaysian Army officers on the Military Technical University in Warsaw. Polish Prime Minister also took part in discussion during the meeting of the Economic Planning Unit (EPU) - government agency responsible for preparing plan of national development.

During this visit also another interesting meeting took place. President of the Polish Chamber of National Defence Manufacturers with representatives of the Malaysian Defence Industry Council (MDIC) were talked about potential areas of the cooperation between Polish and Malaysian defence industries. The most important might be joint approach to cooperation of electronic companies of both countries. Also quite profitable might be cooperation on field of production

of components for armour weapon, armoured vehicles and ammo production (eg. 125mm subcaliber) - there is a need for big quantity and wide variety of such products.

Poland might offer Malaysian counterparts such weapon systems like: GROM mobile anti-aircraft set (efficiency of the Polish missiles is not worse than Stingers) and 35mm anti-aircraft gun (Oerlikon guns, for which Poland bought license are standard equipment of many NATO armies). Also possible is interest of Malaysians in KOBRA and POPRAD anti-aircraft systems, LOARA anti-aircraft artillery system, wheeled armoured vehicle ROSOMAK (Wolverine), communication systems by Radmor and WB Electronics, or KROTON scaterable mining vehicle by Stalowa Wola Steel Mill. Modernisation of command and informatics systems becomes the most important priority for the Army and Air Force.

Above mentioned examples don't exhaust subjects of potential Polish-Malaysian cooperation. There are more examples of the areas where our production abilities are complement. The most important factor in planning cooperation on field of armament is to realize that joint investment in military programs increases chances of our producers for receiving new orders. Optimal way for increasing effectiveness in production of armament is consolidation and establishing international capital structures in defence sector. Also small series productions of equipment according to clients' requirements, as well as many modernisation packages are currently common option. Our countries should prepare joint position in this case. ■

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A PT-91M main battle tank is shown in a forest setting, moving along a dirt path. The tank is dark green and has a long barrel. The background is a dense forest with green trees.

PT-91M

Signing on 11 April 2003 contract between representatives of Malaysian Government and Polish company BUMAR, for delivery of 48 PT-91M MBT, 6 WZT-4 Armoured Recovery Vehicles (which were adapted to Malaysian climate), 5 PMC- LEGUAN self-propelled bridges and 3 MID-M engineering vehicles, initiated active cooperation with Malaysian defence industry and Malaysian Armed Forces.

First PT-91 was built in Łabędy in winter 2005, and had hard tests on Polish ranges. In those tests took part representatives of Malaysian Army whose supervise realisation of the contract. In August 2005 after small modification, which is the result of analyses from the test, tank was transported to Malaysia.

The first public presentation of PT-91M took place on 31 August 2005 in Kuala Lumpur, during the big parade on Malaysia Independence Day. Tank, leading column of Malaysian Armour Corps, was in colours of 11th Regiment, 4th Mechanized Brigade. Tank presentation piques all spectators, and was subject of big interest in South - Asia Region, all information services from that region gave news about the new tank.

The same tank which was presented on the parade, since September till December 2005 passed very hard tests in extreme terrain and climate conditions, and confirms its high technical quality. Those tests allow implementing necessary modification related to normal exploitation, in first series, which were on the production line of BUMAR's factories. Parallel in Poland instruction courses for crew and technicians were started.

Final version of PT-91M is slightly different from tanks which are being used by the Polish Army. The tank is powered by new, developed in PZL Wola together with German Renk power pack consists of engine S1000R with 1000 HP

and SESM Renk ESM350M driving system. Tank is equipped with Slovakian DMD Defence company 125MS cannon, with electronic stabilisation system from EADS, and with new mechanisms of rising cannon and turret rotation. Also front and turret armour - plate configuration has been changed.

PT-91M is equipped also with SAGEM SAVAN 15 fire control systems with panoramic commander surveillance device VIGY-15. Also armour has been changed, by strengthening it. Tank from BUMAR has been equipped also with universal SSP-1 Obra 3M self-defence system from Industrial Optics Centre, which cooperates with 2 sets of 81mm 902A smoke grenades launchers from ZM DEZAMET. 7,62mm machine gun from Belgian FN Herstal is compound with tank's cannon. This company delivers also 12,7 mm M2HB-QCB large-bore machine gun operated by commander and installed on the turret.

In the Tank also many construction changes were implemented, mainly related to strengthening the armour and installation of ERAWA-2 reactive armour cassettes. Driver section was significantly changed as well. Also new driver's console was installed. For the first time in the T-72 family tanks steering-wheel instead drag-link was installed. Tank is also equipped with air-condition system, modern WMD protection and pollution detection system were installed. Also battlefield

control system, LNS navigation and GPS systems were installed. In accordance to the contract from March 2003, Malaysian companies have produced rubber elements of tracks, on German company Diehl Remscheid license.

PT-91M tank is an example of elastic treatment by BUMAR of their contractors. Especially for Malaysia and for special requirements of this country, tank which is one of the best in its category has been made. PT-91M has time to awake interest in three other clients. So there is a chance for other export contracts. This year Forecast International analysis show that tanks of T-72 family will determine 45% of all sold MBTs, over the world. ■



General Data

Producer - Mechanical Works
Bumar-Łabędy S.A.

Traction - tracks

Type - Main Battle Tank

Crew - 3 people

Technical Data

Engine – PZL-Wola S-1000

Power - 736kW (1000 HP)

Measurements

Maximum length - 10100 mm

Body length - 7030 mm

Width - 3340 mm

Width with anti cumulative screens
- 3590mm

Height till the top of the turret - 2405 mm

Ground clearance - 410 mm

Battle mass – 48,5 t

Armour - layer steel-laminate + reactive

Maximum speed

On the road - 65 kph

On terrain - 45 kph

Reverse – 20 kph

Terrain ability

Ford without preparing - 1,2 m

Trenches - 2,8 m

Vertical walls - 0,85 m

Range - 360 km, 490 km with additional fuel tanks

Weapon

Artillery –125 mm 125MS cannon

Rifles - 7,62 mm FN Herstal MAG Machine Gun, 12, 7 mm M2HB-QCB anti-air large bore machine gun.



ROSOMAK

Beginning of the AMV for the Polish Army has started in the mid 90-ties when constructors from Finnish works Sisu Defence and specialist from Finnish Army, has started elaborating technical-tactical proposition, for the successor of very good AMV Sisu Pasi (military name: XA - 180, XA - 185, XA - 200). New vehicle gets name Armoured Modular Vehicle or XC-360.

On 20th December 2002, Polish MoD tender commission decided that Patria, will be supplier, of wheeled armoured transport vehicles for the Polish Army. Contract for delivering in Years 2004-2013, 690 vehicles has been signed on 15 April 2003.

Those vehicles will be delivered in 10 different equipment and armaments variants:

- * 313 battle version with Hitfist - 30 turret and 30 mm cannon
- * 125 battle version with 12,7 mm large-bore machine gun
- * 78 command vehicles
- * 34 technical support vehicles.
- * 22 engineering vehicles
- * 5 engineering reconnaissance vehicles
- * 41 medical evacuation vehicles
- * 17 chemical reconnaissance vehicles
- * 23 artillery vehicles
- * 32 reconnaissance vehicles (6x6)

Assumption that the vehicles will be produced in Poland by Mechanical works in Siemianowice Śląskie was made at the beginning. So since the end of 2005 all vehicles delivered to the Army are being produced in Poland. Destination level of "polonisation" of vehicles will be about 53% (after 2010). Engines and gear box from abroad are import. Parallel has started works on specialised version. 86 vehicles, are actually being in use by the Polish Army. In year 2007 Rosomaks were

sent to Afghanistan with the Polish Army contingent. Vehicles gained really fast good reputation among the soldiers thanks to their reliability, fire power and especially thanks to their mine blasts resistance.

In the beginning of current year, Rosomaks family was expanded with "Rosomak WEM" (Wóz Ewakuacji Medycznej – MedEvac Vehicle), which was transferred to 17th Mechanised Brigade. First batch of four Rosomak WEM are the "zero" series vehicles, meaning fully operational but proposed design of inside and superstructure doesn't have to be final. Till 2010 the Army will have at least 33 vehicles of such type. Characteristic thing is protrusive superstructure having the same protection level as the rest of the vehicle. The rest of the basic APC parameters haven't change. It weight 22,5t and has floating ability, is able to take up to 7 wounded (3 in the worse condition will lie on the stretchers and 4 in better condition might be transported in sitting position). Currently Rosomak WEM is in the military unit, where it will be evaluated. It is not unlikely that vehicles will be sent to Afghanistan and mission in Chad.

According to General Staff announcements ROSOMAK will have soon their baptism on fire in Afghanistan, where he will be used by the Polish military contingent.

Construction description

The most popular construction system now is self carrying system, with chassis elements



installed directly on vehicles body. Constructors from Patria company, use another not so popular construction system. In ROSOMAK frame, transfer all ballast and secure stiffness of the body. Frame system, allows for making easy changes in body construction during repairs or modification, and increase body immunity for mines blasts. But the main disadvantage of this solution is bigger height of the vehicles. To realise air transport by C-130 planes requirement, and secure floating some steel elements of the body has been changed for aluminum. Reduction of the weight allowed also for armour immunity requirement against anitarmour ammo 14,5 mm from front and 7,62 mm from sides and back of the vehicles. Armour consists of two layers, principal made from 8 mm steel and from external armour, which is install on principal layer. External armour can have different resistance and have different weight dependence of clients requirements. Both armour layer are separate by few millimeters empty space, which could be filled by foam, what additionally increase displacement of the vehicle.

Vehicle has been developed according to the restricted psychical field, has installed fumes cooling systems and appropriate bend of the armour, to reduce effective reflexion surface.

Vehicle has 8 wheels with 14.00 R20 size, which cooperate with central pressure regulation system. All wheels have independent suspension, which allow to regulate gap from + 200 mm till – 250 mm. ROSOMAK has classical plan of the section: in front on the left side is driver section who have screen on which could display view from one of three cameras (two from the front and one from the back). For night surveillance driver has passive device PNK-72 Radomka. On the right side is propulsion system. Behind the driver and propulsion section is transport section which is connected with driver section by wide corridor. Vehicle transport 8 soldiers with full equipment who sitting on the sides face to face. Loading and unloading, are made through two back doors or two loopholes on the roof. Breakwater, which is manually disposable have also automatic deployment option and could be folded without necessity of leaving vehicle by the crew.

Propulsion systems.

Rosomak has Scania D1 12 56A03 PE high - pressure 6 cylinder engine with turbocharging, with maximal force 360 kW/ 2100 turn per minute, and with permanence force 294 kW / 2100 turn per minute. Engine with 11,7 l capacity is cooling by liquid. Engine cooperates with automatic gear box ZF 7HP 902S Ecomat with 7 gears to front and one to the back.

Hitfist-30P turret system.

This turret has been produced in Italian company OTO Melara has been made from strengthen aluminum, with amrou plates and composite materials. Thanks to this their weight without equipment is 2300 kg. Turret with equipment, two people crew and ammo store weight 2850 kg. Their height is only 59,5 cm, which can be achieved thanks to 9 surveillance periscopes hidden during air transport inside the vehicles body. In the turret fire control system, which is equipped in day-night foresight DNRS-288 from Kolsman Company and TILDE FC 2nd generation thermovision camera from Galileo Avionica has been installed. Polish Industrial Optical Center (PCO), will gain rights and technologies to produce both elements of fire-control systems. In vehicles will be also installed Polish self defence and warning system SSP-1 Obra- 3 from PCO, which can cooperate with 6 smoke grenades launcher. Two people crew will have two 10 inches screens: one to cooperate with fire-control system and second to cooperate with fighting management system made by WB Electronics. There are also two manipulators for steering and directing weapons. From other turret systems is worth to notice passive surveillance systems POD-72 Radomka (from PCO), sight blast secure system UOW Pandora, automatic pollution detection system CHERDES and internal communication system FONET. Main armaments of the turret are 30 mm cannon Mk44 with stabilisation systems and 7,62 mm machine gun UKM 2000C. Ammo supply is transported in two stores for 30mm ammunition and 700 for 7,62mm. 96 vehicles with Hitfist 30P turret will be armed with anti-armour missiles Spike-LR. ■



PZL M28 Bryza 1R Bis



By Mirosław WRÓBLEWSKI

After over 5 years since the first test flight modernised patrol-reconnaissance and ASW PZL M28 Bryza1R Bis (An-28B1R Bis) plane was introduced into the service in the Polish Naval Aviation.

The plane came from Polskie Zakłady Lotnicze Mielec to mother airfield of 44th Navy Aviation base in Siemirowice. After short break, Bryza Bis started – together with older M28 Bryza R1 – training flight over the sea in Łeba region. This was the symbolic introduction of Bryza Bis into service.

Programme of increasing BryzaR1 abilities, was started several years ago. On January 29th, 2003 the plane had test flight. The changes were: placing Maritime Reconnaissance System SRM-800, integrating e.g.: ARS-800 observation radar with approx 185km range and following over 100 targets in the same time, MAG-10 magnetometer (placed in “sting” behind the plane’s tail) and HYD-10 hydro acoustic buoys. It will allow for detection of submarines, the task which was impossible to do by Polish Navy Bryzas before. Similar novelty is using passive ESM-10 Lemur-10 system.

Also abilities to conduct SAR mission will increase. Except more effective radar (having almost twice bigger range, and which is less interfered than ARS-400 thanks to use of divertible undercarriage leg and foldable front wheel), CHELTON castaway search and location system has been used. The plane is also prepared for throwing rescue raft.

Under lengthen hull’s nose AN/AQQ-22 Star Safire II header able to follow 8 objects in the same time, equipped with daylight CCD-TV camera, thermo vision camera and laser rangefinder has been placed.

Bryza Bis crew consists of 6 people: two pilots, mechanic and three special systems operators.

Polish Navy will receive 2 more Bryza Bis in the future, which will be made of older versions. They should be equipped with LCD panels and be adapted for piloting with use of NVGs. ■



AIR FORCE INSTITUTE OF TECHNOLOGY

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THE SCOPE OF ACTIVITIES

- Logistics Systems
- Safety and Reliability
- Unmanned Aerial Vehicles
- Training Systems, including e-learning
- Air Armament
- Airfield and Road Infrastructures
- Alternative Fuels, Working Liquids and Lubricants
- Biocomponents in POL's Engineering Products
- Designing and Integration of Aeronautical Systems



Integration of avionics systems

THE UPGRADING OF AIRCRAFT, INCLUDING HELICOPTERS

OBJECTIVE:

Introduction of the new integrated avionics systems and airborne instruments to meet the requirements of the modern battlefield.

THE SCOPE:

- Precise navigation based on INS, GPS, VOR/DME/ILS/MRK/TACAN, and Air Data Unit (ADU)
- Head-up display (HUD) with a rear-cockpit repeater, and multi-function displays (MFD)
- Real-time and rotary digital map
- Communication systems, including the wide-band radio station
- Armament management systems extended with some selected components of simulated air weapons
- The whole system integrated with MIL-STD-1553b airborne digital data bus employed
- Remote flight monitoring system (including on-line transmission of selected flight data to a ground station)
- Modified cockpit architecture and a new cockpit-abandoning system with modern ejection seats



Aerial weapon tests



The stationary terrain surveillance system

AFIT

**MEANS PROFESSIONALISM IN THE FIELD OF SAFETY
AND RELIABILITY OF AERONAUTICAL ENGINEERING**



TUR

Light Armoured Multirole Vehicle

By Grzegorz CHUDEK

AMZ-KUTNO Ltd. established in 1999, specialises in designing and production of special purpose vehicle buildings. However in the recent times it is better known as a producer of “Dzik” armoured vehicles. AMZ presented this year new vehicle protecting against mines and IED traps.

Technical Data

TUR armoured vehicle is a response on Polish soldiers serving in Iraq, Afghanistan or Balkans needs. TUR is currently the most interesting alternative for Honkers or Scorpions, their armoured version, which are being in use in the war zone more due to necessity than their real destination. TUR complies with world construction trends and might be compared with IVECO LMV or MOWAG Eagle IV. TUR class vehicle won't fulfil all needs, but properly equipped and used might increase effectiveness and security of Polish soldiers. And also it might be another Polish export bestseller.

Gross Vehicle Weight Rating (GVWR)	6200 kg
Payload	1000 kg
Wheel base	2800 mm
Track width	1700 mm
Total length	4870 mm
Height	2350 mm (to the roof level)
Total width	2230 mm
Fording depth (without preparation)	700 mm
Crew	5 people

The vehicle was created basing on prototype chassis of commercial IVECO off-road vehicle and is able to carry 5 people and 1000 kg payload with its own mass of 5 tons (depending on armament, used armour or other equipment). Propulsion is Iveco Aifo 4-cylinders Common Rail engine with turbocharger and intercooler. The engine has 2998 cm³ capacity and 122 kW (166hp) power, which allows for 120 kph max speed. The engine is equipped with 6-gear gearbox (+reverse). The vehicle has permanent 4 wheel drive mechanism which is transmitted by central differential and through Kardan shaft.

TUR has body armour protecting crew against 7,62mm x 39 ammo according to STANAG 4569 Level 2 with ability to upgrade it to level 3. Additionally all windows protect against 7,62mm x 51 API /7,62mm x 54R B32 ammo. The construction of the vehicle also protects against explosion of 6 kg TNT centrally under the chassis. It's the first Polish product where crew blast protection was a priority. As producer underlines according to buyer requirement armour might be made of steel or steel and composites. It also might have additional composite anti-splinter protection of the chassis' bottom.

TUR's armament is currently unknown but it'll depend on the customer requirement. There were very interesting proposal of using ZSMU-127 "KOBUZ" with 12,7mm heavy machine gun presented at "EUROPOLTECH" police exhibition in Poland.

TUR prototype is equipped with FONET internal communication system (made by WB Electronics) for all carried soldiers and DD9620T-10 tactical

command system terminal. Vehicle is also equipped with miniature FLIR camera placed in the front bumper. The image coming from the camera is shown on screen placed next to driver. FLIR camera allows for observing area in front of the car during day and night.

Currently tests of the new car are ongoing, including tests of the armour protecting the crew.

According to "Rzeczpospolita" (Polish daily newspaper), Polish Ministry of Defence is interested in sending vehicle to Afghanistan to check it in real battle conditions.

Prototype of the vehicle was created thanks to AMZ-Kutno own initiative, which meets Polish Armed Forces expectations. It is worth to underline short time from idea to prototype. It took only 8 months.

TUR would be very useful for Polish soldiers, who don't have a vehicle which will at least have similar mine resistance (not counting Rosomak (Wolverine) AIFV, which is serving in Afghanistan). Now everything depends on MoD.

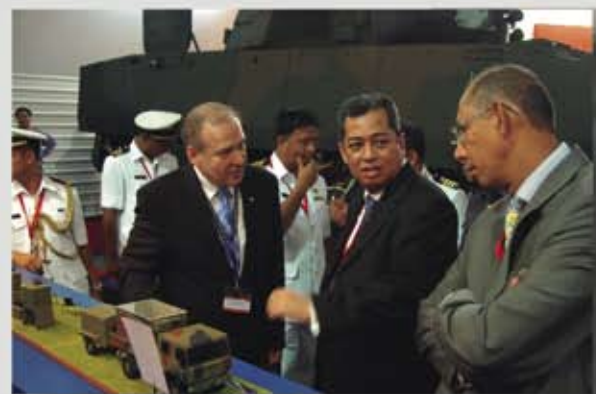
One is sure, TUR is not the last word of AMZ-Kutno. ■



DSA

2002-2006







EFFECTIVE PARTNER

*PCNDM stand
on the DSA 2006
exhibition*

Polish Chamber of National Defence Manufacturers was established on 11th September 1995 and is the eldest self-governing economical organisation in Poland in defence branch. The Chamber represents economical interest of its members on field of their production, service and commercial activities, especially in front of the governmental bodies. Because of its range, status and achievements the Chamber is still the organisation, which represents matters of defence companies the best.

The statue's obligation of the Chamber are: initiating activities for improving technological level and quality standards of products manufactured by the companies - national defence suppliers, activating co-operation efforts, inspiring efforts aimed at increasing of the domestic defence production and export, inspiring and supporting process of restructuring and modernisation of the domestic defence industry and its preparations for integration with European structures. Important part of the Chamber's activities is expertise and opinion-making and conducting training for representatives of Polish defence industry and facilitating their contacts with foreign partners. There is also conducted exchange of technical, organisational and commercial experiences.

Currently the Chamber has over 190 members, including private as well as state-owned companies. Among them are potentates as well as small enterprises.

Since 6 years the Chamber co-ordinates majority of joint appearances of the Polish defence industry on international exhibitions (in years 1999- 2005 the Chamber organised 23 national stands of the Polish defence industry) and the Chamber was the organiser of many economic missions (e.g. to India, Indonesia, Norway, Malaysia, Singapore, UK, Greece, Turkey, Romania, Moldova, UAE).

The Chamber is the initiator of the military-industrial co-operation among Visegrad Group. Its part were two editions of Forum of Defence Industries of Poland and Czech Republic (1999 and 2001), 1st Forum of Defence Industries of the

Visegrad Group (2001) in Warsaw, 2nd and 3rd Forum (2002-2004) in Trencin, Slovakia.

Except co-operation agreement with Ministry of Defence (12th August 1999), the Chamber formalised contacts with defence industry associations of some of the European and Asian countries by signing separate agreements with them (e.g. with France, India, Malaysia, Indonesia, Czech Republic, Slovakia, United Kingdom, Norway, Romania, Spain, Portugal, Italy, USA, Indonesia).

In 1999 the Chamber published Polish Defence Industry Catalogue, its next edition is currently in preparation. Additionally the Bulletin is published frequently, bimonthly "Polish Defence Industry" and quarterly "Economic-Defence Review" and extraordinary promotional publications (e.g. in Polish, English, Czech and Slovakian language) are also published.

In 1998 the Chamber was selected for representing Polish defence industry in NATO Industrial Advisory Group (NIAG) and since December 2000 is actively taking part in the Group meetings.

Since August 22nd, 2005 the Chamber initiate Internal Control System according to law about turnover of the products, technologies and services important for national security and also for keeping international peace and security and received ISO 9001:2001 and IQNet certificate (No. PL-JW-172/1/2005 valid up to August 21st, 2008). On October 20th, 2005 the Chamber received concession of Polish Ministry of Internal Affairs and Administration for special equipment turnover (No. B-062/2005), on December 27th, 2005 the Chamber received NATO Commercial and Government Entity Code (N-CAGE No. 1082H. ■ SK.

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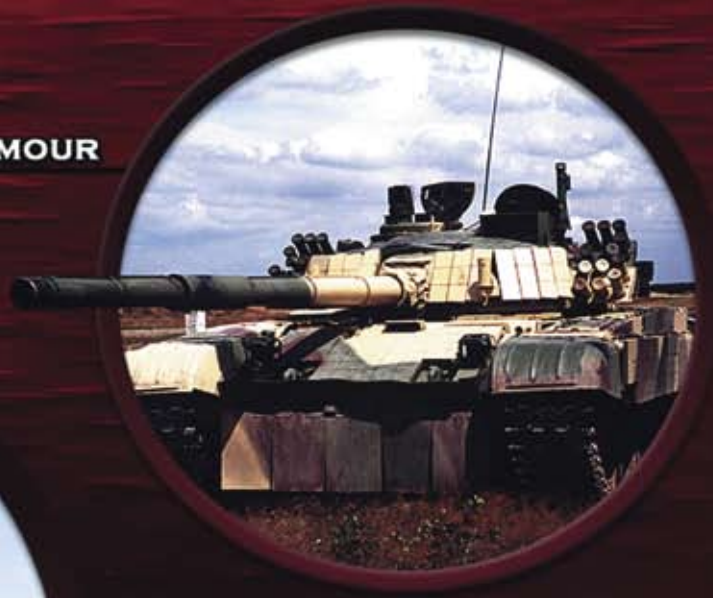
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