



POLISH CHAMBER OF NATIONAL DEFENCE MANUFACTURERS

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POLISH DEFENCE INDUSTRY

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N22-N(3D) 3D MOBILE MEDIUM
RANGE SURVEILLANCE RADAR





AIR FORCE INSTITUTE OF TECHNOLOGY

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SŁAWOMIR KUŁAKOWSKI

Born on May 31st, 1952 in Jelenia Góra. Graduated from the Faculty of Law and Administration of the Nicolaus Copernicus University (1975), Reserve Officers School (1976) and Postgraduate Studies at the General Staff Academy (1989). Reserve colonel. Held many important functions in the institutions of the Ministry of National Defence (1976-1992 and 1996-98). Between 1992-1996 served as adviser of the head of the National Security Bureau at the President of Poland Office for Economy and Defence Affairs. President of the Polish Chamber of National Defence since 2001.

LADIES AND GENTLEMEN

Every company, especially operating in the armaments sector, is trying to cope with the dynamic changes and challenges brought by today's constant development.

One of the areas that the defence equipment manufacturers are currently focused on are new technologies allowing not only to cut costs, but also increase productivity. In a wider perspective, Polish producers create innovative solutions through research and new technologies – they introduce new products, services or even business collaboration models.

The wide range of possibilities offered by Polish manufacturers and the highest quality of their products provides customers with a full range of solutions and services tailored to the current and future needs of the dynamically growing army.

Polish defence industry products are still actively used. They meet the needs of our troops, not only in the country but also in different parts of the world where they serve. This is the best proof that the quality of equipment produced in Poland is very high.

In this edition of our Polish Chamber of National Defence Magazine, we wish to share examples of first-class solutions, characterized by excellent quality and durability.

I wish you an enjoyable read,

SŁAWOMIR KUŁAKOWSKI

President of the Polish Chamber of National



POLISH CHAMBER OF NATIONAL DEFENCE MANUFACTURERS

On the 11th September of 1995 a constituent meeting was held, at which, a resolution to establish the chamber, initiated by the representatives of the Polish defence industry, has been adopted. A temporary management and an auditing committee has been elected by the representatives of the 67 founders, in the presence of General Henryk Mika from the Ministry of Defence and the Colonel. Sławomir Kułakowski from the National Security Bureau.

DURING THE PAST 10 YEARS, THE CHAMBER HAS BEEN INITIATING ACTIVITIES TO ADVANCE THE TECHNICAL LEVEL AND PRODUCT QUALITY FOR THE NATIONAL DEFENCE

During the past 10 years, the Chamber has been initiating activities to advance the technical level and product quality for the national defence, promoted the cooperative relations, inspired projects which led to an increase in the production for the domestic and foreign markets, as well as has inspired and supported the restructuring and modernization of the Polish industry while preparing its integration with the European structures.

During that period, the organization of trainings for the representatives of the Polish industry and the facilitation of foreign contacts has been a significant element of the Chamber's activity. Besides the above, it has organized experience exchange within the areas of technical, organizational and trade solutions.

Since 1998, the Chamber has been a co-organizer of the BALT MILITARY EXPO exhibition in Gdansk, and has co-

organized the "Cto i Granica" (Border and Customs) Fair in Warsaw since 2004. In 2000, the Chamber has initiated and coordinated the Polish Defence Industry Days in Lithuania, during which, the associated companies have handed over equipment worth approximately 4 million Zloty, including the Chamber's contribution of 700 000 Zloty, to the Lithuanian part of the LITPOLBAT battalion. In 1998, the Chamber has been assigned to represent the Polish defence industry at the NATO Industrial Advisory Group (NIAG), and since December of 2000 it has actively taken part in the meetings of the Group.

In 1999, the Chamber initiated an industrial cooperation within the Visegrad Group. Two editions of the Polish and Czech defence industries were organized (1999 and 2001), I Visegrad Group Defence Industries Forum (2001) in Warsaw, II Forum (2002) in Trenczyn and III Forum (2004) in Warsaw.

In Poland, in addition to the agreement on cooperation with the Ministry of National Defence (12.08.1999), the Chamber signed cooperation agreements with the Army Workers Trade Union (1997), "Solidarity" National Section of Defence Industry (1998), Polish-Arab Chamber of Commerce (2004), National Association of Equipment Manufacturers (1999) and the Employers' Association of Defence and Aviation Industry Enterprises (2003).

In 1999, the Chamber issued the only catalogue of the Polish defence industry. In 1996 the Chamber started issuing the BULLETIN OF THE CHAMBER. In 2003 the Chamber started publishing a bimonthly POLISH DEFENCE INDUSTRY (in English), and a quarterly ECONOMIC – DEFENCE REVIEW in 2005.

Currently, the Chamber associates 147 public and private enterprises. These include market leaders such as BUMAR Sp. z o.o., the Polskie Zakłady Lotnicze Sp. z o.o. (Polish Aviation Works), Stalowa Wola S.A., MESKO S.A. and RADWAR as well as small businesses and private companies. ■

POLAND

POLAND IS THE LARGEST OF THE EAST EUROPEAN COUNTRIES WHICH JOINED THE EU IN MAY 2004. POLAND IS COMPARABLE IN SIZE TO ITALY OR GERMANY (IN USA LARGER THAN NEW MEXICO) AND WITH A POPULATION OF APPROXIMATELY 39 MILLION (E.G. MORE THAN CALIFORNIA) IT RANKS AMONG THE MOST INFLUENTIAL AND REMARKABLE COUNTRIES IN CENTRAL AND EASTERN EUROPE. POLAND IS A STABLE DEMOCRACY WITH A TRULY FASCINATING HISTORY, GREAT CULTURAL HERITAGE AND SEVERAL AREAS OF OUTSTANDING NATURAL BEAUTY.

PARTICIPATION IN PEACEKEEPING MISSIONS

From the initiative of the United Nations and other international organizations, activities are carried out to maintain peace and prevent armed conflicts in the world. Poland has been participating in peacekeeping missions and operations since 1953.

Between 1953 and 2009, Polish soldiers and civilian employees of the army participated in 83 peacekeeping missions and operations, 35 of them were organized under the auspices of the United Nations. The total number of professional soldiers, compulsory military service soldiers, extended military service soldiers, and civilian employees of the army that took part in the missions and operations amounted to 90,234 thousand.

In 2009, Poland took part in 9 (continuing and new) peacekeeping missions and operations.

Of the 7,138 people delegated in 2009 to serve in peacekeeping missions, 6,606 professional soldiers, 362 – compulsory military service and extended military service soldiers and 170 – civilian employees of the army.

In addition, from 2003 to 31 October 2008, Poland was part of the International Stabilisation Force in Iraq. During this period, the Polish Military Contingent (a total of 10 shifts) amounted to 15,839 people, including 13,260 professional soldiers and 2,154 compulsory military service and extended military service soldiers and 425 civilian workers. ■

POPULATION IN COMPARISON			SIZE IN COMPARISON		
RANK (IN THE WORLD)	EUROPEAN COUNTRY	POPULATION (mln)	RANK (IN THE WORLD)	EUROPEAN COUNTRY	POPULATION (km ²)
1 (12)	Germany	82.1	1 (43)	Ukraine	603 700
2 (20)	France	58.9	2 (47)	France	543 958
3 (21)	Great Britain	58.7	3 (50)	Spain	505 992
4 (22)	Italy	57.3	4 (54)	Sweden	446 964
5 (23)	Ukraine	50.7	5 (61)	Germany	357 022
6 (29)	Spain	39.6	6 (63)	Finland	338 145
7 (30)	Poland	38.7	7 (66)	Norway	323 877
8 (44)	Romania	22.4	8 (67)	Poland	312 658
9 (56)	Netherlands	15.7	9 (69)	Italy	301 268
10 (70)	Greece	10.4	10 (76)	Great Britain	244 100

MEMBERSHIP IN MAJOR INTERNATIONAL ORGANIZATIONS

- European Union
- United Nations
- Council of Baltic Sea States
- Central European Free Trade Agreement
- International Monetary Fund
- United Nations Educational, Scientific and Cultural Organization
- United Nations Children's Fund
- World Health Organization
- World Trade Organization
- Central European Initiative
- Organisation for Economic Co-operation and Development
- North Atlantic Treaty Organization

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POLAND PEOPLE COUNTRY HISTORY

THE BATTLE OF GRUNWALD

The Battle of Grunwald is one of the greatest battles in the history of medieval Europe. It was fought on the 15th of July, 1410. The battle was a part of the great war between the forces of the Teutonic Knights, assisted by West European knights, under the command of the Grand Master Ulrich von Jungingen, and the combined Polish and Lithuanian forces, under the command of the Polish king Wladyslaw II Jagiello. The battle ended with the victory of the Polish-Lithuanian army and a crushing defeat of the Teutonic forces. The outcome of this battle had a major impact on political relations in Europe of that time. Not only did it break the power of the Teutonic Order, but also elevated Poland and the Jagiellonian dynasty to the rank of the most important ones in the continent.

THE BATTLE OF VIENNA

The battle was fought at Vienna on the 12th of September, 1683 between joint Polish, Austrian and German forces under the command of king John III Sobieski, and the army of the Ottoman Empire under the leadership of Vizier Kara Mustafa. The Turkish army numbered close to 140 thousand people. It was the largest army that was mobilized in the seventeenth century. Austria has managed to gather 32 thousand soldiers. Jan III Sobieski called up about 27 thousand Crown troops, including 25 hussar regiments, and marched to the relief of Vienna. The battle ended with the defeat of the Ottomans. This battle is considered to be one of twenty groundbreaking battles in the history of the world.

THE ROAD TO INDEPENDENCE

The Treaty of Versailles that ended World War I sanctioned Polish independence – before that Poland disappeared from the map of the world for 123 years as a result of partitions. The official date of the foundation of the Second Republic of Poland is the 11th of November, 1918, when Jozef Pilsudski took over the military authority in Warsaw. As a result of his actions the German troops withdrew from the city, and the Polish state institutions that were being formed conferred to him the title of the Chief of State.

INDEPENDENT SELF-GOVERNING TRADE UNION "SOLIDARITY"

"Solidarity" was a national trade union formed in 1980 to defend the rights of workers. Until 1989 it was also one of the main centers of mass resistance against the rule of the Polish People's Republic. One of the leaders of the workers' strikes that led to changes in the whole Europe was Lech Walesa, who later became a Nobel Peace Prize laureate. He was elected President in a two-round general election held in November and December of 1990.

THE POLISH POPE

John Paul II was the first Polish pope, as well as the first non-Italian Bishop of Rome in 455 years. The election of a person from a communist country for the head of the church had a significant influence on the events in Eastern Europe and Asia in the 80s of the 20th century.

ARMED FORCES

The Polish Armed Forces are divided into: the Army, the Air Force, the Special Forces and the Navy. Their main task is the defence of the Polish borders against outside attacks and cooperation with NATO. The armed forces are an essential element of the national defence system, designed for the effective implementation of the security and defence policy. The Polish armed forces number nearly 100 000 troops. They have taken and are taking part in a number of foreign missions of the UN, NATO and the EU.

LEGISLATURE

In Poland the legislature is a bicameral parliament consisting of the lower house – the Sejm and the upper house – the Senat. In direct, universal and secret elections, Polish citizens elect 460 members of the Parliament and 100 senators. Both MPs and senators are elected for a four-year term.

CONSTITUTION

The Constitution of the Republic of Poland is the most important Polish legal act and the foundation of the Polish state. It guarantees the rights and freedoms of citizens, determines the relationships between the legislative, executive and judicial branches, decides on the form and way of appointing key national institutions such as the Parliament, the Senate, the President and the Council of Ministers. The Constitution has a direct influence on the form of the judicial system, local governments and state control bodies.

SOCIETY

According to data from 2011, the territory of the Republic of Poland is inhabited by 38.5 million people. In terms of population Poland occupies the 29th place in the world and the 8th in Europe. The Polish population represents 5.3% of the European population and 0.65% of the population of the world. ■



ZM TARNÓW OBTAINED A MILITARY CONTRACT

ZM Tarnów has signed a contract to supply of materials for small arms equipment used by the Polish Army. Under the contract, signed on February 20th, the supplier agreed to supply equipment and supplies, for which he will receive 2.3 million PLN. The contract is due on December 10th.

POLISH DEFENCE HOLDING WILL REPAIR BERYLS FOR THE POLISH ARMY

District Logistics Base has signed a contract with Łucznicz Amrs Factory in Radom, part of Polish Defence Holding, for repairing and modifying Beryl rifles.

The contract was signed on February 22nd and amounts to nearly 4.4 million PLN. Under the contract, about 1500 weapons used widely by the Polish Army will undergo repairs and modifications. Since Łucznicz is the manufacturer of Beryl rifles, negotiations were conducted with only one tenderer.

LUBAWA S.A. WILL MODIFY VESTS

Lubawa S.A. has acquired the contract for the general renovation of the protective vests used by the Polish Army. OLV (155 units) and KLV (130 units) will be renovated. The contract was signed on February 22nd. The contracts amounts to nearly 800 thousand PLN.

TENDER FOR THE HYDROGRAPHIC BOATS FOR THE POLISH NAVY

Arms Inspectorate announced a tender for providing the Polish Navy with four hydrographic boats. Marine units are to be provided in 2013 and 2014. Offers are planned to start on April 3rd. Estimated purchase price amounts to 6 million PLN. Each unit will have the following equipment: hydraulic crane, lifting frame, navigation equipment, communication equipment and equipment designed for underwater work. The latter include echo sounder, underwater high-resolution sonar (Kongsberg MS 1000 or equivalent to meet the same parameters), towed sonar, remotely operated underwater vehicle.

Maximum total displacement should amount to 20 tons, hull length should be up to 15 meters. Full-time crew should include four people, four additional people should be able to get on board.

TENDER FOR ADVANCED TRAINING AIRCRAFTS STARTED

Arms Inspectorate has published a defence and security-related tender for providing in integrated "Advanced Jet

Trainer System". The tender invites companies to send offers or requests to participate in the tender.

Its goal is to buy a system composed of advanced training aircrafts (8 units), training system (including comprehensive flight simulator, pilot / part task simulator, emergency procedures – ejection simulator, computer training support system and training package) and logistics package (ground support equipment, aircraft ground equipment, repair & maintenance equipment, spare parts and consumables, technical support, IT support system, metrology safety measurements, technical documentation: for the aircraft, ground aircraft maintenance equipment, training devices – simulators for training flight and technical crew and operational system).

The purchaser allowed the tenderer to subcontract some of the work on the condition that the offer will indicate what part of the work this will apply to.

No detailed requirements have been published yet. They will be indicated in the Terms of Reference that will be given to the tenderers invited to make offers. The realization of the contract will start on January 1st, 2014 and will end on November 30th, 2017.

SERVICING CONTRACT OF WOJSKOWE ZAKŁADY ŁĄCZNOŚCI NO. 1

Wojskowe Zakłady Łączności no. 1 signed a servicing contract with the Army amounting to 4 million PLN. Under the contract, WZŁ no. 1 agreed to perform repairs, diagnosis, maintenance and servicing on satellite terminals used by the Polish Army in Afghanistan and Kosovo.

From the very beginning, the negotiations were conducted only with WZŁ no. 1, since the company has proper experience and references.

LOGISTICS TRUCKS FOR THE POLISH ARMY

2. District Logistics Base has announced a tender to buy 32 Jelcz 862 trucks equipped with Hiab 855 crane. These four-axle vehicles are becoming standard in the logistics of the Polish Army, and equipping them with crane will ensure independence while loading and unloading the transported equipment.

MILITARY ELECTRONIC WORKS CONTRACT

District Logistics Base has published a protocol related to the contract for the renovation of the NUR-31M radiolocation stations' special component and chassis.

The contract between the purchaser and Military Electronic Works from Zielonka was signed on January 30th and amounts to 453 thousand PLN. The work should be completed on June 10th.

PZL Świdnik started providing new Sokół helicopters for the Air Force PZL Świdnik provided the Air Force with the first unit of PZL Świdnik W-3WA Sokół helicopter from the batch ordered in 2011. The helicopter was given to the 1st Airborne Transport Base. In total, the base will receive five helicopters from Świdnik, all of them will be used for transporting VIPs within Poland. New Sokół helicopters will join older vehicles of this type that are already used by the airborne unit from Warsaw. PZL Świdnik plant will complete the contract by the end of the year.

POLISH DEFENCE HOLDING LEADING THE LEOPARD TANK MODERNIZATION PROGRAM

The new consortium will modernize Leopard 2A4 tanks used by the Polish Army. The consortium is led by Zakłady Mechaniczne Polish Defence Holding and also includes Ośrodek Badawczo-Rozwojowy Urządzeń Mechanicznych OBRUM S.A. from Gliwice as well as Polish Defence Holding.

The consortium was formed to develop, implement for production, deliver and maintain Leopard 2GB modernization package in close collaboration with a strategic partner – Krauss-Maffei Wegmann. This program is a response to the needs of the Ministry of National Defence related to Leopard 2A4 tanks.

POLISH DEFENCE HOLDING WILL PROVIDE RADARS FOR THE POLISH ARMY

Arms Inspectorate acquired NUR-15 Odra radiolocation stations from Polish Defence Holding. Under the contract, the manufacturer will provide the army with eight tricoordinate radiolocation stations along with two logistics packages. The contract amounts to nearly 330 million PLN. Such stations are already used by the Polish army. NUR-15 Odra is a tricoordinate device working in S band. It can locate airborne objects at a distance of 240 km and located at an altitude of 30 km. It can observe 120 objects at the same time.

POLISH DEFENCE HOLDING WILL PROVIDE "LIWIEC" ARTILLERY RADARS

Polish Defence Holding will provide the army with seven "Liwiec" stations. First unit will be received in 2015. They will join three systems of this type that are already used by the army to locate enemy firing positions.

JELCZ WILL PROVIDE TRUCKS FOR THE ARMY

Arms Inspectorate has recommended negotiations for buying military trucks from a Polish manufacturer – Jelcz. Jelcz plants, belonging to Stalowa Wola Steelworks, apply

for a contract for the purchase of 866 medium-duty military trucks and further trucks for special purposes. This program is listed in the technical modernization of the Polish Army project until 2022. The potential value of the contract amounts to 400 million PLN. New trucks will replace Star 266 vehicles. Jelcz plants can provide product that can replace them – 442 Bartek – designed in this category of trucks. The potential decision to buy trucks from this manufacturer embodies the declaration of the department to make the largest orders in the Polish defence industry.

PZL RZESZÓW WILL RENOVATE THE W-3 SOKÓŁ HELICOPTER ENGINES

District Logistics Base has signed a contract with PZL Rzeszów to renovate engines of W-3 Sokół multi-purpose helicopters. The contract was signed on the 2nd of January and amounts to nearly 11 million PLN. Negotiations for the contract were conducted in December last year. Each Sokół helicopter uses two PZL-10W engines with 662 kW of power each.

CONTRACT SIGNED WITH NAUTA S.A. SHIP REPAIR YARD

Armament Inspectorate has signed a contract with the NAUTA S.A. ship repair yard to perform general and dock overhaul of ORP "DĄBIE" and ORP "RESKO", fulfilling the announcement of minister Tomasz Siemoniak concerning the cooperation with Polish companies in renovating and modernizing military equipment. The value of the work will amount to 45 million PLN.

The contract that was signed on the 22nd February includes renovation of the main armaments and military equipment, as well as of internal combustion engines and auxiliary equipment, modernization of control systems of monitoring, main propulsion, ship's power plant and ship's drainage installation. The completion of works is planned for the end of November 2013.

BCC AWARD FOR WZM S.A.

On January 26 the Grand Gala of Polish Business Leaders took place. Chairman of the Board and Chief Executive Officer of Wojskowe Zakłady Mechaniczne S.A., Adam Janik was given the "First Diamond to the Golden Statuette of the Polish Business Leader". This prize is awarded to winners of the competition who have maintained or improved their position in the market. The ceremony was the culmination of the 22nd edition of the Polish Business Leader competition, recognized by the entrepreneurs as the most prestigious economic competition in Poland.

DEFENDER AWARDS 2013

PRIZES WERE AWARDED FOR THE BEST PRODUCTS OF THE PAST YEAR IN THE DEFENSE INDUSTRY.

This year's XXI International Defense Industry Exhibition in Kielce was visited by over 13 thousand people. At the end of the exhibition, the prestigious Defender awards were given, for which 42 products from more than 60 companies competed.

The main idea of the competition is to reward the products that stand out with their originality and novelty of technical ideas, operational qualities and favorable economic indicators.



In this year's competition the jury – chaired by Deputy Minister of National Defense General Waldemar Skrzypczak – selected the following winners:

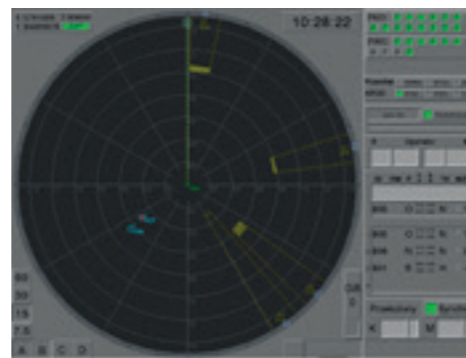
- **HUTA STALOWA WOLA S.A.** – Stalowa Wola, for the BAOBAB minelaying platform.
- **SZCZEŚNIAK Pojazdy Specjalne Sp. z o.o.** – Bielsko-Biała, for the "Atena II" demining patrol vehicle.
- **Military Institute of Armament Technology** – Zielonka in consortium with **EUROTECH Sp. z o.o.** – Mielec, for VERMIN multi-aircraft airborne target imitator.
- Jarosław Dabrowski **Military University of Technology** – Warsaw, **WB Electronics S.A.** – Ożarów Maz., for the programmable electronic device for remote firing of the field missile launchers.
- **BUMAR PCO S.A.** – Warsaw, for the MU-3M "KOLIBER" miniaturized universal monocular.
- **Zakłady Mechaniczne Tarnów S.A.** – Tarnów, for the RGP-40 40 mm automatic grenade launcher.
- **Industrial Research Institute for Automation and Measurements – PIAP** – Warsaw, for IBIS robot for reconnaissance and pyrotechnic operations.
- **HAVELSAN** – Turkey, for GENESIS CMS – Ship Integrated Combat Management System.
- Consortium of: **Wojskowe Zakłady Łączności nr 1 S.A.** – Zegrze, **TEL DAT Sp.J.** – Bydgoszcz, **Siltec Sp. z o.o.** – Warsaw, for the WTS (ZSI WTS) Integrated Information System
- **ARMPOL Sp. z o.o.** Innovation and Implementation Enterprise – Sulejówkę, for the air workshop container set for KWL.SX-02 airplanes and helicopters.



In addition, the prize was awarded by the President of Poland for the best product that raises the level of safety of the Polish Armed Forces. This year, it was given to the consortium of: **Wojskowe Zakłady Mechaniczne S.A.** – Siemianowice Śląskie; **Autocomp Management Sp. z o.o.** – Szczecin; **Trinity Interactive Sp. z o.o.** – Warsaw, for the KTO ROSOMAK "TASZNIK" commander and gunner training simulator. ■



N22-N(3D) 3D MOBILE MEDIUM RANGE SURVEILLANCE RADAR



INTENDED USE

THE N22-N(3D) MEDIUM RANGE 3D SURVEILLANCE RADAR IS INTENDED FOR TACTICAL USE. RADAR IS RECOMMENDED AS A SAM SQUADRON/BATTERY LEVEL SENSOR OR AS A MOBILE SYSTEM TO FILL THE GAPS IN COVERAGE OF THE AIR SPACE CONTROL NETWORKS.

ADVANTAGES

SYSTEM

The radar rotating phased array antenna features multiple stacked beams in elevation plane to determine azimuth, range and height of the target within wide range of elevation angles with short data refreshment time.

The radar can operate in two modes, depending on rotation rate of the antenna. The ECCM means as low antennae sidelobes, jam direction finding and tracking, automatic selection of the less jammed frequency, CFAR. The digitized radiolocation data are supplied by radio.

DETECTION CHARACTERISTICS

	COVERAGE	ACCURACY (RMS)	RESOLUTION
Instrumented range	60/100 km ^{*1}		
Detection range @ fighter	??	<60 m	120 m
Azimuth	360°	<0,50°	< 3°
Height	30 000 m	< 600 m	-
Manipulator's maximum lift	5-15 kg	Manipulator's maximum lift	5-15 kg

*1) depending on antenna rotation rate

FUNCTIONAL CHARACTERISTICS

OPERATING FREQUENCY	S-BAND (NATO: F)
Maximum number of traces	100
Initiation of tracking	automatic
Correlation of radar plots with IFF responses	automatic
Remote control	yes (optional)
Antenna type	phased, 6-beams at reception
Antenna aperture size	3 x 0,9 m
Antenna rotation rate (rpm)	12 / 24
	7

WB GROUP – INNOVATION SYNERGY

WB ELECTRONICS IS THE FIRST COMPANY IN THE POLISH DEFENSE INDUSTRY THAT IMPROVED ITS OFFER FOR THE POLISH ARMY, DECIDED TO ACQUIRE SPECIALIST SKILLS AND EXPERTISE BY JOINING FORCES WITH OTHERS IN THE INDUSTRY. THE MERGER OF WB ELECTRONICS, FLYTRONIC, AREX, RADMOR AND MINDMADE RESULTED IN A CREATION OF WB GROUP, WHERE EACH COMPANY HAS A POSITIVE IMPACT ON THE OPERATION OF THE OTHERS, THUS GIVING THE EFFECT OF BUSINESS AND TECHNOLOGY SYNERGY.

Creation of WB Group formally began in 2009, when WB Electronics took up shares in Flytronic Sp. z o.o. from Gliwice. The two companies began working together much earlier, in 2008. WB Electronics, after winning the 2006 tender for the supply of the unmanned reconnaissance aircraft Zophar 250 for the Hungarian army, after difficult experiences in working with the Israeli provider of aviation technology, Top-I-Vision, decided to undertake the construction of a mini-class drone. Flytronic – a young, but promising company from Gliwice – was chosen as a business and technological partner.



According to president of WB Electronics, Piotr Wojciechowski, a factor that determined the decision for closer cooperation was similar vision of how they research and development should be conducted.

- Without mutual chemistry, understanding and consensus on fundamental values, you cannot build a shared vision of development – said Piotr Wojciechowski.

The decision on the formal merger of the two companies, initially through the acquisition of Flytronic shares by WB Electronics, and then by adding more companies and thus building WB Group, was made in 2009.

- As one body we have profited in many different ways. By providing business synergy, and also by becoming more credible for a very difficult and demanding customer which is the armies worldwide. We also profited internally. A shared company gives the employees confidence that we are working for the same goals – explains Piotr Wojciechowski.

Three other companies, which joined the WB Electronics family in 2011, becoming the WB Group were Radmor, Arex and MindMade. Since it was a national company, overseen by the Industrial Development Agency, the purchase of Radmor required most endeavors. Efforts to its acquisition by WB Electronics started as early as 2010.

- From the very beginning, the concept of building the WB Group assumed that we would source the competence and expertise only from these companies, whose profiles, technology and range of products complete our competence and knowledge. Radmor, which is a leading Polish company in the radio industry, met all these conditions, and therefore we have taken up the challenge to purchase it – says CEO Piotr Wojciechowski.

Successfully completed negotiations on the acquisition of Radmor shares motivated the WB Electronics management to improve WB Group with additional competences. Engineers from Arex have brought knowledge of propulsion systems and automation of weapons, MindMade cryptographers and programmers brought with them much needed and sought for knowledge of cryptography and secure data transmission. In this way, WB Group was crystallized, with synergy of competence of its members becoming its strength.

WB ELECTRONICS – THE PILLAR

WB ELECTRONICS PROVIDES INNOVATIVE SOLUTIONS THAT PROVIDE SUPPORT AND AUTOMATE THE PROCESS OF LEADING THROUGH THE INTRODUCTION OF INFORMATION TECHNOLOGY, ELECTRONIC AND COMMUNICATION EQUIPMENT.



The company that merges WB Group with its competence and potential is WB Electronics. It company was founded in 1997. It was founded by three engineers active in the electronics solutions industry: Piotr Wojciechowski, Adam Bartosiewicz and Krzysztof Wysocki. The first business project of the company was the artillery fire control system, Topaz. In an interview for Wprost, Piotr Wojciechowski, who became chairman of the board of WB Electronics, explains that the first company's contract has fundamentally shaped the vision of its development:

- The Ministry of Defense wanted to buy an artillery fire control system. But, probably due to incomplete market intelligence, it has set requirements that go beyond the technical capabilities that were available back then. Most companies got scared. But we were young and we thought that any obstacle can be overcome. We won. But we could not buy ready-made technological solutions, because they were not there, and the contract was so prestigious its breach was not an option. We were able to create a system that complied with the requirements. This confirmed our belief that the basis of WB Electronics should be proprietary technologies: competing, meeting the requirements of users and also more modern than those produced by foreign companies – said Piotr Wojciechowski.

Since its inception, the most important customer for WB Electronics was the Polish army. The company provides it with innovative solutions to support and automate the process of leading through the introduction of information

technologies, electronic and communication equipment. Focus on the Polish customer does not mean that WB Electronics is not active in the international arena. It works very effectively, offering armies around the world ICT products, unmanned systems, command and communication systems that are proven and refined in collaboration with the Polish armed forces as well as proposing the integration of a wide variety of platforms – including combat, reconnaissance, engineering, and specialized platforms.

WB GROUP – FLYTRONIC

Flytronic was established in 2008. It was created by two engineers from the Silesian University of Technology – Wojciech Szumiński and Grzegorz Krupa, who were later joined by an electronics engineer, Piotr Postawka. From the beginning, the company was focused on the research and development in the field of mechanics, electronics and information technology, aimed at the aviation industry. After the success, which was the building of an unmanned reconnaissance aircraft miniBSL Fly Eye – the first Polish drone deployed to serve in the army – the company created a team of people who not only had the necessary skills but also the experience in working with military customers, thereby gaining the competence to perform research and development for other armies in the world. Therefore, the company profile has changed. In 2009, shareholders of Flytronic decided to transform the company into a research and development center and continue the research work

in the same industry, but in a much wider scope. The company expanded the scope of conducted research in the field of avionics, broadband communication systems, creating simulation software for the aviation industry and aimed at creating new unmanned platforms. In accordance with the decision of the Ministry of Economy from January 4 2010, Flytronic received funding for the "Transformation of the company into a research and development center for aviation" project as part of the Innovative Economy Operational Programme, Measure 4.5, sub-measure 4.5.2. New company headquarters was built in Gliwice, along with an independent building in Gliwice airport with hangar and laboratory. In addition, the company has purchased the necessary equipment to enable research and development of new technologies and an aircraft for conducting research.

WB GROUP – RADMOR

Radmor, which was established in 1947, is the largest Polish manufacturer of mobile radio equipment VHF FM – offers mobile and stationary radiotelephones; radiomodems and data transmission modules; mobile and backpack military personal radios. Devices offered by Radmor allow the construction of both very modern trunk networks such as digital TETRA and DMR networks, and conventional dispatching systems. Equipment manufactured by Radmor goes not only to serve all uniformed forces: the army, the police, fire brigade, municipal police and border guards, but also to prisons, foresters, or wherever needs reliable means of communication.



The management of the company is committed to obtaining the highest quality and reliability of the means of communication it manufactures. The company acquired its first ISO certificate in 1998, NATO AQAP – in 2001, and the WSK certificate – in 2002. Since then, the Quality System in Gdynia company is subjected to regular external audits. They always end in success and prolongation of the relevant certificates that provide the same quality devices produced by Radmor.

Next to quality, the second priority for Radmor is the investment in new technologies. Last year, "Rzeczpospolita" newspaper, in its eighth ranking of the most innovative companies in Poland, gave Radmor the title of the most innovative company. Distinction from "Rzeczpospolita" is so valuable because the ranking includes 2000 domestic companies, their financial data, information on the ownership structure, exports and employment. The ranking presents the best companies rated in different categories: the most profitable, the largest exporters, achieving most profits, most investors, increasing employment, etc. In the competition for the title of the most innovative company, the points were assigned for the share of expenditure on R&D compared to sales and for employees working on development compared to the total number of employees. Radmor won because the R&D has almost one quarter of all employees in the company, and the company is dedicating several dozen percent of its revenue for research and development. In 2011, it was as much as 30%.

The company is one of the few representatives of the Polish defense industry, which can boast an extensive portfolio of foreign clients. Our customers, aside from the Polish Armed Forces, include armies from Lithuania, Latvia,

Czech Republic, Slovakia, Estonia, Iraq, Indonesia and armies from North Africa. The last contract was signed in June 2013 for the supply of radio stations to Bangladesh. In addition to ready-made radios, the contract also includes the technology to produce them.



Radmor participates in European research and development programs. Since January 1, 2009, RADMOR S.A., together with five European companies – Selex Elsag (Italy), Thales Communications & Security (France), Indra Sistemas (Spain), Saab (Sweden) and Elektrobot (Finland) – has been involved in the implementation of the ESSOR program. The objectives of the program include: the development and validation of ESSOR SCA architecture based on six national SDR (Software Defined Radio) platforms, the development and validation of high data rate network waveform (HDR WF) based on six national platforms and performing interoperability tests on HDR waveform ported to the six national platforms.

WB GROUP – AREX

The company was established in 1989. It was founded by Andrzej Darski. Initially, its activity was related to the production of transducers of different physical quantities – temperature, pressure, tension. Over time, the company started to implement measurement and control systems for boiler-houses and gas reduction stations. A breakthrough for Arex was the development of a system for automated heating of railway junctions in 1994. The product turned out to be the proverbial jackpot. Railway workers have long needed such a solution and a bag of orders was filled quickly. This allowed Arex to further flourish and work on innovative solutions for military and uniformed services.

The company has decided to specialize in solutions for electric drive control, weapon control, and training sets for different types of weapons. As part of research and development endeavors, Arex works with leading technical universities, the Military University of Technology, Naval Academy and the Technical University of Gdańsk. Arex, as a supplier of technology, participates in a number of military projects. Engineers worked on: an artillery-rocket set ZUR-23-2KG "Jodek-G", modernization of quad 23mm Anti-aircraft Gun ZSU-23-4 "Szytka", remotely controlled weapon module ZSMU-127 "Kobuz", PLZ-W3 "Głuszec" combat support helicopter and "Rak" company 120mm self-propelled mortar module.

In addition to programs in which Arex is a supplier of engine technologies, the company specializes in military training equipment. Its products are not only in the service, but are also very often rewarded by fellow engineers. In 2011, the maritime anti-rocket artillery system ZU-23-2MR training system took first place in the national "Best Technical Achievement by 2011" competition, organized by the Polish Association of Mechanical Engineers (SIMP).



markets. In terms of offered and implemented solutions one should distinguish the following: Data transmission systems based on the InQL solution, which is a safe and effective platform for routers, provides a stable and guaranteed transmission based on the simultaneous use of multiple media (including different mobile network technologies). InQL solutions are used to aggregate telemetry data and for telecontrol in the energy network management systems, traffic control and other industrial applications. InQL is an important transmission part of the largest SmartMetering project in the systems of Energa Operator S.A.

WB GROUP – MINDMADE

The company was founded in 2010 as a competence and R&D center profiled in the direction of telecommunications, communications, telemetry and teleautomation. MindMade is the youngest, smallest and most specialized company within WB Group. By operating on the border of the civilian and special market (public administration, army, uniformed services), acting in the field of specialized B2B and M2M products, it often acts as WB Group's competence base.

MindMade's offer is based on its own designs which allows the company to deeply modify and configure products and thus allowing it to provide products and services that are fully tailored to the most specific and specialized applications and

Communications Integration Platform (PIK) is a multi-system solution integrating a variety of radio communication technologies used by various services (Army, Police, Fire Brigade, Emergency Medical Services, Energy Services, Gas Services... etc.) into one information technology platform using fixed and mobile gateways, working simultaneously in different networks (GSM/3G, CDMA). Thus, PIK provides general (through the use of several infrastructure operators) ability to combine a number of gates (MIS) in various incompatible voice communication systems belonging to different services, as well as the possibility of communication to and from the "civilian" mobile phones of authorized users. In addition, each MIS will take over the role of the main channel of communication for officers in the area covered by their native system or beyond the range of direct (native) communication. Access to various mobile media increases the reliability and availability of the system and provides high-speed data transfer over the whole country with its own stand-alone WiFi connection to telecommunications equipment.

MindMade also specializes in cutting-edge technological solutions, including the underwater PDT solutions (immersion up to 3 km) for contactless data transmission and electric power (up to 400W) and activities in the design and manufacture of specialized telecommunication production boards testers.

The company also designs and manufactures cryptographic telecommunications devices. ■



THE MODERN S-70i™ BLACK HAWK HELICOPTER INCORPORATES ADVANCEMENTS THAT CONNECT THIS REMARKABLE AIRCRAFT INTO THE FAST-PACE, DIGITAL INFORMATION WORLD THAT EXISTS TODAY. SO WHATEVER YOUR MISSION IS, THE BLACK HAWK HELICOPTER WILL PROVIDE EXCELLENT SUPPORT TO YOUR EVERY-DAY NEEDS.

Polskie Zakłady Lotnicze Sp. z o.o. – PZL Mielec – is a largest aircraft manufacturer in Poland. Thanks to development of R&D base and expansion of the production to S-70i™ BLACK HAWK helicopters the company is currently, from the technological perspective, the most advanced representative of the state aviation industry.

COMPANY'S CURRENT PRODUCTS LINE INCLUDES:

- Sikorsky S-70i BLACK HAWK™ – an utility helicopter intended for international market
- Cabin sections for UH-60M BLACK HAWK™
- Helicopter's structure elements (tail cone and pylon)
- M28 – STOL (short take-off and landing) dual turboprop engine aircraft, used for cargo and passenger transport, parachute jumps, medevac, patrolling and maritime reconnaissance and for search and rescue actions.
- M28B Bryza – military model of M28, used for special operation (depending on the installed equipment)

Currently the company has 2200 employees, including the technical-engineering and production staff with highest professional qualifications, as well as it has adequate technical, organizational and production capabilities to manufacture aircrafts and conduct the aviation development programs.

S-70i helicopter is a BLACK HAWK type helicopter intended for international customers and manufactured using international suppliers chain. It is also the first BLACK HAWK helicopter to be manufactured in Europe and at the same time, the first helicopter to be manufactured in PZL Mielec in Poland. The deliveries of those machines are being successively increased until reaching, after 2012, an intended production level, which foresees the production level of 20 complete helicopters per year.

PZL Mielec, a Sikorsky Aircraft subsidiary, as a manufacturer of S-70i BLACK HAWK helicopters plays a leading role in creation of a modern product which has a high reliability, proved itself in the field and provides the highest usage values and technical performance.

From the beginning of the S-70i BLACK HAWK production in 2010, Polskie Zakłady Lotnicze manufactured 19 complete helicopters and had delivered them to customers in USA, Saudi Arabia, Mexico, Colombia, and Kingdom of Brunei.

The company with a success still manufactures and sells the aircrafts of its own construction M28 and M28B/PT. The aircrafts are manufactured in civil and military version intended for variety of missions including transportation, landing operations, passenger and patrol.



SIKORSKY S-70i BLACK HAWK HELICOPTER

INDUSTRY-LEADING SERVICE AND SUPPORT

Sikorsky Aerospace Services brings together its OEM expertise with the unique strengths of our leading aircraft service companies to provide innovative platform solutions to meet your demanding aviation service needs.

PILOT AND MAINTENANCE TRAINING

- Basic to advanced courses
- Partnered with Flight Safety International

HELOTRAC® 2X MAINTENANCE MANAGEMENT TOOL

- Significantly reduces maintenance record keeping
- INTEGRATED VEHICLE HEALTH AND USAGE MONITORING SYSTEM
- Speeds entry into service after maintenance

FLEET MANAGEMENT OPERATIONS CENTER (FMOC)

- Provides predictive data to reduce operational costs and increase aircraft availability

ENHANCED UTILITY CONFIGURATION

AVIONICS

- Troop Commander ICS + Antenna
- Digital Map Software (Regional Maps)
- Integrated Vehicle Health Management System (IVHMS)
- Cockpit Voice Recorder/Flight Data Recorder (CVR/FDR)
- ARC-220 HF Radio

FUEL SYSTEM

- Auxiliary Fuel Pump (External / Internal)
- Auxiliary Internal Fuel Tank 200 Gallon Provisions and Completions (Crashworthy)

INTERIOR

- Custom Paint Scheme
- Armored Pilot/Co-Pilot Seats with Armored Wings Crew Chief Seats (LH/RH) (2)

AIRFRAME

- Cargo Hook, 9,000 Pound Capacity
- External Electric Rescue Hoist
- Fast Rope Insertion/Extraction System (FRIES)

ARMAMENT AND SURVIVABILITY EQUIPMENT

- Engine Exhaust Suppression System
- Cockpit Armored Floor and Doors
- Cabin Armored Floor, Lightweight Removable
- M60 / MAG-58 / M134 Structural Provisions
- M134 Electrical Provisions
- M134 Ammo Pallet

STANDARD CONFIGURATION

- GE-T701D Engines with Integral Particle Separator
- Wide Chord Main Rotor Blades for Improved Performance
- Glass Cockpit with Digital Automatic Flight Control System
- Four Landscape Color MFDs
- Integrated NVG Compatible Displays and Lighting
- 4-axis Autopilot through Coupled Flight Director
- Dual Embedded Global Positioning / Inertial Navigation Unit, Honeywell H-764
- Active Vibration Control
- Dual Raytheon MX-4027 UHF/VHF – AM/FM Radios
- APX-117 IFF Transponder
- Artex C-406N ELT
- VOR/ILS
- Low Frequency Automatic Direction Finder
- Terrain Awareness and Warning System
- Wire Strike Protection System
- Dual Independent Hydraulics with additional backup.

Note: This Enhanced Utility Configuration is available for delivery contingent upon approval of required U.S. Government export licenses.

PERFORMANCE		
Maximum Takeoff Gross Weight	22,000 lbs	22,000 lbs
Maximum Gross Weight with External Load	23,500 lbs	23,500 lbs
Maximum External Load	9,000 lbs	9,000 lbs
Maximum Cruise Speed*	160 kts	160 kts
HIGE Ceiling**	15,000 ft	15,000 ft
HOGE Ceiling**	11,000 ft	11,000 ft
AEO (All Engines Operating) Service Ceiling**	20,000 ft	20,000 ft
Number of Engines	2	
Engine Type	T700-GE701D	
Cabin Width	7.0 ft	7.0 ft
Cabin Height	4.5 ft	4.5 ft
Cabin Area	88 sq.ft	88 sq.ft
Cabin Volume	396 cu.ft	396 cu.ft

*Standard day, sea level
 **Ceiling for 18,000 lbs GW (8,165 kg)



ONE HELICOPTER, MANY SOLUTIONS

The S-70i helicopter's durable, straight forward design allows for maximum flexibility under extreme conditions. Rigorously tested and combat proven, the BLACK HAWK helicopter is an ideal solution for

- Personnel Transport
- Cargo Transport
- Medical Evacuation
- Search and Rescue (SAR)
- Special Warfare Operations
- Border Protection
- Law Enforcement
- Armed Fire Support
- Forestry Services and Land Management
- Humanitarian
- Assistance

RELIABLE

Nearly 3,000 BLACK HAWK helicopters are in service today. This fleet has flown more than 9 million flight hours in some of the most rigorous conditions known, successfully completing missions ranging from utility transport, search and rescue, to combat assault armed support, and beyond.

LEGENDARY

The Sikorsky BLACK HAWK helicopter has earned its standing as the preferred utility aircraft of militaries worldwide. Designed to strict military standards, its ruggedness, dependability and versatility have made this aircraft a legend.

SUPPORTABLE

Sikorsky Aerospace Services (SAS) brings together its OEM expertise along with unique experiences to support the S-70i™ helicopter. From spares, overhaul and repair to programs such as performance-based logistics, contractor logistics support and military depot partnerships, SAS offers innovative services designed to increase flying time, improve ease of use and reduce cost of ownership, allowing you to focus on your mission.

AFFORDABLE

Many mission equipment options are available for the S-70i helicopter, enabling you to configure your fleet to suit your unique requirements. Options range from wide chord rotor blades, extended range fuel tanks, medical litters, crash-worthy seats, armament, ballistic protection, sensors, radar, cargo hook, external rescue hoist, and more.



KTO ROSOMAK SIMULATORS IN THE USER TRAINING PROCESS

TECHNOLOGICAL DEVELOPMENTS AND MODERN MILITARY EQUIPMENT CURRENTLY IN USE IS FORCING MANUFACTURERS TO DEVELOP TEACHING AIDS WHICH ENABLE THE IMPLEMENTATION OF HIGH-LEVEL TRAINING THROUGH THE USE OF COMPUTER GENERATED GRAPHICS AND MODELS, WHICH IN REAL TERMS ARE DIFFICULT TO REPRODUCE DURING THE USE OF SUCH EQUIPMENT.

In order to implement the above Military Mechanical Works Joint Stock Company established a consortium with AUTO-COMP MANAGEMENT Ltd. Their task was to develop modern teaching aids by developing a comprehensive Rosomak AMV Driver Training Simulator, known as JASKIER and the TASZNIK Commander and Gunner turret training simulator.

In the design phase designers reproduced the interior of the driver's compartment and HITFIST 30 turret system as closely as possible to the real thing with full functionality of all components. They used a platform with 6 degrees of freedom (DOF) getting the right behavior of the interior of the vehicle and turret to the actual operating conditions. Such assumptions allowed the development of simulators that are currently the most advanced teaching devices designed to train crews (driver, commander, gunner) in the Rosomak AMV.

The JASKIER Driver Training Simulator is intended for use in the teaching of mechanics-drivers and to improve their driving skills in difficult and dangerous conditions, and it is intended to assist with the realization of the following exercises:

- The construction and operation of mechanisms in the mechanic – driver compartment.
- Starting the engine under various conditions.
- Starting and stopping on flat surfaces and on slopes.
- Driving on a roads with an average degree of difficulty.
- Driving under different road conditions.

- Driving in various weather conditions and lighting.
- Obstacles (tackling water obstacles, limited passages, bridges, anti-tank ditches).
- Instilling in the Driver the habit of observing the engine operating parameters and transfer of power system.
- Driving in convoy and close formation.
- Driving on the battlefield while firing.
- Assessing driver behavior in dangerous situations on and off road.

As mentioned above, the Simulator's interior is built using actual Rosomak AMV components and equipment found in the driver's compartment allowing full realism and durability of the interior as the real vehicle. The interior of the simulator is fitted out with such items as:

- Driver dashboard with switches and controls.
- Reverse camera screen.
- Navigation screen.
- Control panel for heating system, air conditioning and ventilation.
- Panel with main switches for powering-up the vehicle.
- Driver's seat (complete seat with electric motor controlling seat position, brake pedal, accelerator pedal and means of reading the positions).
- Complete steering column with hand brake.
- Gear shifter.
- Set of internal communication devices.
- Cabin light.

The JASKIER simulator was first shown at the International Defense Industry Exhibition in Kielce, Poland, in September 2012, it was received very well by both existing Rosomak users and military instructors. As a proof of the concept, the consortium was awarded the "Defender" prize for the simulator. This was a special award in the category of Training devices.



The award made the establishment decide to expand the range of teaching aids for the Rosomak AMV. This has led to the development of a new type of complex simulator known as TASZNIK, for training Commanders and Gunners. Just as in the driver training simulator, engineers have reproduced a functional turret interior allowing the training of crews in firing exercises.

TASZNIK is a simulator used for training turret crews in the HITFIST 30mm turret. It consists of a functional turret mounted on a platform with six degrees of freedom (DOF) that reflects the full dynamics of the combat vehicle.

The device allows the following exercises:

- The construction and operation of the turret mechanisms.
- Start-up procedures.
- SKO system operation.
- Firing exercises.
- Instilling operational habits in the commander and gunner.
- Simulating emergency situations which cannot be replicated on the real turret.

The solutions and technologies allow for the configuration of the two simulators in two variants:

- A basic cabin simulator on wheels.
- An advanced simulator where the cab is mounted on a mobile platform, simulating the vehicle dynamics under different driving conditions.

JASKIER and TASZNIK can be linked to create a comprehensive training simulator for crew training; by increasing the number of simulators, the trainer can create a platoon or

company. In addition, the simulators can be connected to the small arms training systems. The equipment, in addition to the driver and turret also includes an instructor station comprising of indicators and warning lights, a camera for viewing the cabin interior, topographical maps and images as seen by the driver during simulation. The simulator is equipped with a communication system for direct audio contact throughout the entire training process. The most important advantage is the ability to simulate emergency situations which cannot be carried out under real conditions, due to safety aspects. An example of such an emergency for the trainee driver, the instructor can simulate high oil temperatures in the engine which forces the trainees to take preventive measures to eliminate damage to vehicle components.

A camera inside the driver cabin allows the instructor to monitor the trainee at all times in order to determine the correct procedures performed in an emergency that has been simulated by the instructor. The images seen by a crew member are displayed on a screen giving the opportunity to conduct a variety of different angles of view both with periscope observation devices and such as with the windshield up when simulating driving under normal operating conditions.

ADDITIONAL TRAINING

The Company has developed modern teaching aids, stationary equipment as well as multimedia devices. Recent years have shown that WZM S.A. is gaining substantial experience and support from suppliers as a well-established manufacturer of the above mentioned range of simulators. The Company continues to widen the offer for teaching aids which include:



DRIVER TRAINER AMV ROSICZKA TK-1 SIMULATOR

Developed by Military Mechanical Works S.A. in Siemianowice, in cooperation, this trainer is the first of a family of educational and training devices for the initial stages in training drivers. It is designed to teach ROSOMAK AMV drivers. The simulator allows:

- functionality training inside the driver's compartment,
- simulating a crash,
- teaching the correct procedures in an emergency.

The simulator provides high quality training, while reducing costs compared to a real vehicle.

TH-1 SIMULATOR

Another training aid offered by WZM S.A. for the training of Commanders and Gunners who use the HITFIST 30mm turret system is the TH-1 simulator. This piece of equipment is used in the training process which makes it possible to train in the fire control system operated by the Commander or Gunner.

TR-3 SIMULATOR

This is a more advanced and expanded version of the TH-1 allowing the possibility of training the entire crew of the turret [Gunner Commander] at the same time with an

instructor. This gives the possibility of training fire control system operations for the Commander and Gunner. It teaches the basic principles of habits, allows us to understand the principles of operation. The simulator comprises of monitors, screens, controls, etc.), which allows getting the right conditions for training.

OBRA TRAINING SYSTEM

Developed for the Training Department at WZM S.A. it allows the training of turret crews on how to use the various countermeasures devices. OBRA, allows the crews to learn the correct procedures under duress, and through the use of functional models it can simulate laser beam emissions and teaches the correct behavior to be taken by the turret crew in an emergency.

MULTIMEDIA TRAINING DOCUMENTATION

WZM S.A. can also provide operational and educational documentation prepared in electronic form. It contains all illustrations, charts, and graphics. In addition, we have developed for the implementation of training educational videos and how to perform the necessary preventive measures.



FUNCTIONAL EDUCATIONAL MODELS

In relation to the training of turret crews and the needs for these crews to get to know the design and function of weapon, WZM SA developed in cooperation a functional model of the ATK 44 cannon. This program allows the demonstration of all the parts of the weapon and the individual components to allow the showing of internal parts without the housing. It shows the cycle of shots fired from placing the round in the chamber, the round leaving the barrel and case ejection. ■

POJAZDY SPECJALISTYCZNE®
— ZBIGNIEW —
SZCZEŚNIAK

PASSION CREATES PROFESSIONALISM – PROFESSIONALISM ENSURES QUALITY

SZCZEŚNIAK POJAZDY SPECJALNE SP. Z O.O. IS HEAVILY INVOLVED IN THE PRODUCTION OF EQUIPMENT FOR THE ARMED FORCES, IN PARTICULAR FOR THE MILITARY FIRE PROTECTION.

SZCZEŚNIAK Pojazdy Specjalne Sp. z o.o. is a company located in Bielsko-Biala, which employs more than one hundred highly qualified specialists in various fields and produces more than one hundred specialized vehicles, for both domestic and foreign markets. Currently, these are mainly special vehicles used by fire protection units. The company offers both special military vehicles, such as armored tractors, sapper vehicles, heavy evacuation vehicles and

technical rescue vehicles. The vehicles have many characteristics that set them apart from the competition: first of all, they are made of high quality corrosion-resistant materials and are equipped with equipment and components supplied by the world's leading manufacturers. The concept of the offered product and the production system itself are based on the patented modular construction that allows easy customization of vehicles in the initial phase of the project. An extremely important asset of the company is the production technology, refined over the years, that takes into account the specific conditions of specialized vehicles, especially fire vehicles.



Production for the military

The company has recently engaged in the production of equipment for the Polish Armed Forces, in particular for the Military Fire Protection. It should be emphasized that the Military Fire Protection, aside from duties performed inside the country, performs many tasks outside Poland, providing fire safety for soldiers serving in the Polish Military Contingents. According to the NATO standardization documents, fire protection is one of the elements of Force Protection, and all tasks in this field have been imposed on the Military Fire Protection. Military Fire Department operates both within the country and outside the country, securing air operations including aircraft fueling and engine testing, fighting fires in military bases and outdoor areas, removes the effects of accidents, disasters, and the attacks on military bases, removes the effects of natural disasters, protects works that involve fire risks.

Special recognition should be given to vehicles based on the chassis of Scania G440 – airport firefighting-rescue car, Iveco Eurocargo ML15E28 WS 4x4 – medium firefighting-rescue car. In its solutions, the company constantly follows the latest guidelines and user expectations, looks for innovative, economical solutions which improve the safety and quality of rescue and firefighting operations.

Scania G440

Heavy airport firefighting-rescue car with Scania G440 chassis is a vehicle designed to operate military airports and air operations carried out by the Armed Forces. The vehicle is based on proven chassis from the Swedish company – Scania – with selected assembly that differentiates it from other Scania vehicles used in other formations of the fire brigade. The vehicle has a 13-liter engine with 440 hp that allows this 26-ton vehicle to accelerate from 0 to 80 km/h in less than 32 seconds which, in turn, in accordance with the airport regulations, allows it to reach every section of the airport within four minutes.

The advantage of the drive system, aside from high dynamics, is the four-wheel drive that allows it to move beyond the hardened sections of the airport and a fully automatic transmission from Alisson [identical to the one used in Rosomak armored vehicles] that allows the administration of fire-fighting while driving [pump and roll function]. Vehicle specification allows it to drive using military F-34 fuel which is used by all the vehicles in armed conflicts [from tanks to trucks] and ensures operation in temperatures ranging from -20 to +50 degrees Celsius. However, this is not what makes the vehicle special. It's the unique housing constructed by Szczęśniak company, designed for demanding users such as the Military Fire Department. The housing is a block construction based on the intermediate



frame that eliminates stress resulting from the movement in rough terrain. Block construction consists of a specially designed subframe made of three components: equipment compartment + extinguishing tanks + pump compartment, each of them is independently mounted on the flexible elements on the subframe.

The first element, when looking from the vehicle cabin, is the equipment compartment designed as a frame from high quality stainless steel with anodized aluminum plating lacquered on the inside and outside in accordance with the requirements of the armed forces – green according to RAL6006. Access to the interior is accomplished through aluminum blinds, bryzo and dustproof, protecting mounted inside the powder generator unit with the capacity of 250 kg, filled with ABC powder, which is administered through the roof or a special plot where the powder, along with working agent, which is mostly nitrogen, can extinguish jet fuel, light metals and combustible gases. Another element located centrally on the vehicle in order to obtain the highest possible angle, is the extinguishing agent tank with the capacity of 8,000 + 800 [l] [water + foaming agent]. Extinguishing agents are transported in containers placed in laminated shells made of stainless steel, coated with aluminum plating similarly to other compartments. It is a unique design used exclusively by Szcześniak. It protects the tank from the harmful effects of UV radiation, high temperatures and allows for easy upgrades in the future. The last element of the housing, located at the end of the vehicle, is the compartment constructed in the same way as equipment compartment, but containing the heart of the vehicle – the water-foam system. The main element of the system is the two-band automatic pump with the capacity of 4000 l / min at 10 bar, which can be

used through remotely controlled (from the cabin of the vehicle) roof turret. It is also equipped with compression caps mounted at the back of the vehicle, hose reel for extinguish small fires and sprinklers placed under the chassis used in the case of grass ignition.



Iveco Eurocargo ML150E28 WS

Another equally interesting and unusual vehicle is a medium rescue-firefighting car based on Iveco Eurocargo ML150E28 WS chassis designed to protect line units, training grounds, ammunition depots and training on the ranges. Characteristic element of the vehicle, which cannot be missed, is the impressive single tire size 14.00 R20 that allows it to reach the difficult areas of bases and training grounds, which the typical firefighting and rescue vehicles are not able to reach. Vehicle crew is made up of six members transported in the crew cabin of the vehicle together with individual respiratory protection equipment. Just like Scania, the vehicle is prepared to work in extreme weather conditions and use battlefield F-34 fuel, as with the previous vehicle it is not the chassis that makes it unique. It's the housing which allows it to perform specific functions. The modular housing is another unique design offered by Szcześniak.

As in the previous vehicle, the housing is based on a subframe that does not carry stress of the vehicle frame and does not cause breakage of the housing or extinguishing agent tanks. Modular housing also allows for economical and simple repairs in case of any damage in the event of a collision, which becomes impossible when using complex composite structures.

Rescue and firefighting equipment is arranged in compartments and on the roof of the vehicle, taking into account the division into different areas of emergency as well as phases of operations and order of using the individual equipment by the rescuers. Mounting of the equipment was carried



out in a manner that prevents movement of items during driving, emergency braking and ensures quick and easy placement and removal. The vehicle has a portable power generator, carried in the housing on a retractable platform. Power generator's power rating adapted to the power of electronic devices onboard. Electric winch installed on the front of the vehicle can hold up to 7.4 [t] and has a line with a length of 30 [m]. A lighting mast is installed between the crew cabin and the housing to ensure adequate night time visibility at the site of rescue-firefighting operations. The lighting mast can be automatically folded. This function is activated by pressing a single function key.

The tests carried out on the training grounds revealed that the construction of the fire-fighting vehicle from Szcześniak based on Iveco Eurocargo chassis is a very good solution. The vehicle meets the expectations set by the emergency services, has very good field specifications with maximum security, which is provided from the first phase of the operation - when it drives to its designated area. The vehicle is equipped with signaling equipment - sending warning acoustic and lighting signals, made in LED technology. The installed device also allows the driver to send voice messages as well as transmit information through the transceiver. Emergency-warning lighting is installed on each side of the vehicle and, irrespective of the location of the vehicle, ensures visibility from all sides.

Special vehicles built by Szcześniak are perfect partners to ensure the safety of rescuers and maximum support even in the most difficult rescue operations. ■

Łaciok Łukasz

TACTICAL TERMINALS



– THE TOP WORLD SOLUTIONS FOR LAND, SPECIAL FORCES & CIVILIAN EMERGENCY SERVICES

NETWORK CENTRIC DATA COMMUNICATION PLATFORM JASMINE TACTICAL TERMINALS FAMILY – THE NEWEST TELDAT SOLUTION, CURRENTLY THE ONLY PRODUCT OF ITS KIND IN POLAND AND ONLY ONE OF FEW IN THE WORLD. THEY MEET ALL MILITARY STANDARDS IN TERMS OF CLIMATIC AND ENVIRONMENTAL CONDITIONS.

TELDAT as the only Polish manufacturer of IT equipment in 2012 joined a small group of the top world manufacturers of computer terminals meeting all military requirements and standards. In the Tactical Terminals the best features of COTS computers and meeting of criteria for mobile military computer equipment have been combined. In the result of design and development the terminals meeting requirements of conditions of work in all climatic and environmental zones, rugged, moistureproof and resistant to dust have been produced. Moreover they are waterproof terminals, as the only in the world are able to work 1 m under water for two hours. The functions of accelerometer and magnetometer are implemented. Software implemented in terminals allows to transfer information from battlefield to commanders in a real time.

Tactical Terminals offered by TELDAT company are components of complex IT solutions: Network Centric Data Communication Platform JASMINE and Crisis Management System JASMINE dedicated to: land, special forces and civilian emergency services. These solutions support command and management as well as real battlefield imaging processes in military, crisis / emergency operations.

JASMINE TACTICAL TERMINALS ARE DEDICATED TO:

- land forces (including: command vehicles, battle vehicles, armored personal carriers, tracked vehicles and tanks – other vehicles, flying objects and dismounted soldiers),
- Fire Brigade, Police, Forest Service civilian emergency services (Emergency Medical Service, Chemical Rescue),
- private security agencies,
- emergency organizations (mountain, water, rescue) and commercial emergency companies.

TELDAT TERMINALS ARE AVAILABLE IN TWO VERSIONS:

- Tactical Terminal Tablet (12.1”),
- Personal Tactical Terminal (7”).

Tactical Terminal Tablet – mobile tactical computer, part of on-board or manpack equipment for end-users dedicated to: land, special forces (Network Centric Data Communication Platform JASMINE) and civilian emergency services (Crisis Management System JASMINE).



TACTICAL TERMINAL TABLET CAN BE USED AS:

- clip-in kit with the BMS JASMINE (Battlefield Management System) connected to the on-board network of the battle vehicle,
- standalone manpack for DSS JASMINE (Dismounted Soldier System).

Tactical Terminal Tablet is dedicated mainly to effective use of the C3IS JASMINE (Command Support System) software in BMS and DSS versions.

Personal Tactical Terminal – mobile tactical computer, an element of manpack or on-board equipment for end-users dedicated to: land special forces (Network Centric Data Communication Platform JASMINE) and civilian emergency services (Crisis Management System JASMINE).

PERSONAL TACTICAL TERMINAL CAN BE USED AS:

- standalone manpack for DSS JASMINE (Dismounted Soldier System),
- clip-in kit with the BMS JASMINE (Battlefield Management System) connected to the on-board network of the battle vehicle.

Personal Tactical Terminal is dedicated to effective use of the C3IS JASMINE (Command Support System) software in DSS and BMS versions. ■





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WB Electronics, a private company of Ożarów Mazowiecki, with entirely Polish capital, is one of the major companies of the Polish arms market.

The company, as one of the major supplier for the Armed Forces of the Republic of Poland, has been actively contributing to improving the defence capabilities of the Polish army for more than twenty years. This contribution consists in creation of new technologies as well as modernisation of military equipment.

Compared to large world corporations, WB Electronics is a small company, but with a comparable range of product offerings. WB ELECTRONICS for years has consequently been conquering new areas of electronics and IT applications in the military technology.

Proprietary solutions in new technology make it possible to develop innovatory products with unique utility properties. The offerings of WB Electronics include mainly military electronics, software as well as services associated with integration of military vehicles. The primary client of WB Electronics are the Armed Forces of the Republic of Poland. The company is also actively involved in overseas trading.

The technology offered by WB Electronics is based on long – term experience resulting from the use of the company's solutions implemented in the Polish army as well as from participation of WB Electronics in international tenders and long – term cooperation with the most demanding customers from around the world.

WB Electronics is a resilient and rapidly growing company, which undertakes new challenges in the field of development and modernization programs for security and defence. Consistency, perseverance, commitment and the belief in continuing development makes company one of the best participants in the Polish and foreign arms markets.

The strategic directions of development of the offer of WB ELECTRONICS S.A. include:

- C4ISR systems – integrated command support systems and battlefield visualisation systems,
- Software – integration of platforms and systems
- Military Electronics – gun and cannon automation, communication systems, sensors, computers and terminals,
- Integration of Military Vehicle Electronics – in combat vehicles, command vehicles, reconnaissance vehicles, specialist vehicles as well as gun and cannon automation.



WZM S.A.

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Wojskowe Zakłady Mechaniczne was established in Siemianowice Slaskie in 1952 and since then is strongly involved in overhauls, modernization and special Production for necessity of Armed Forces.

Military Mechanical Works developed in scope of documentation and production following equipment:

- T-72/SKZ-T-72/ tanks field control stands
- Tracked vehicles SKS – G engines' field Control stands
- Maintenance and lubrication equipment
- Compressor installation
- Power generation

Factory started repairs in scope of following engines: Henschel, Ikarus, Star 200, Leyland, Jelcz.

In 1996 upgrading works of the BRDM-2 armoured reconnaissance care began. As a result of this work the whole family of upgraded armoured reconnaissance vehicles was generated: from the BRDM-2M96i model through the BRDM-2B, BRDM-2A and BRDM-2M96iK "Szakal".

A number of vehicles were produced, which have been successfully exploited in the Polish Army, especially during peace keeping missions. Now the persisting construction works tend to follow upgrading of these vehicles, for the purpose of upgrading their reliability and battle possibilities.

In the year 2001, Ministry of National Defence invited Wojskowe Zakłady Mechaniczne, among other companies, to participate in a tender for the delivery of Wheeled Armoured Transporters (KTO) for the Polish Army. In this tender, WZM offered a fourth generation armoured modular vehicle AMV 8x8 designed by Finnish concern Patria, armed in combat version with HIFTIST 30mm weapon system of Italian concern OTO Melara.



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Vehicle bearing the Szczęśniak logo have many characteristic features distinguishing them against the backdrop of the competition. Above all, they are produced using the highest quality materials and components supplied by leading global producers. The product concept, and the production system itself, is based on a patented system of modular structures, these enabling vehicle configuration freely as early as the initial design phase, with the application of existing solutions.

The firm employs over 100 highly qualified specialists in a variety of fields, guaranteeing the high standard of the products manufactured. The construction department has at its disposal modern technical solutions supporting the design and computation stage. Each new product comes into being in the form of a spatial model, allowing a thorough analysis of all sub-assemblies and far-reaching optimization of the solutions applied. This formula for action permits the active participation of the user in the design process and the creation of a structure entirely in conformity with requirements.

Zbigniew Szczęśniak Specialist Vehicles is a leader in the production of specialist vehicles in Central and Eastern Europe, having commenced operation in 1992 in Poland. Since the beginning, the firm has focused on the automotive trade and, more precisely, specialist productions for uniformed services, including the fire brigade, army and police.

The high quality products and the manner in which the enterprise is managed together provide the firm with market success, and are reflected in the numerous awards received by Zbigniew Szczęśniak Specialist Vehicles, both domestic and international:

- Highest Quality – Quality International 2011.
- Title of Winner and Silver Emblem in the QI Product category.
- Innovation Certificate, from the Polish Academy of Sciences.
- Responsible Employer and HR Leader 2011.
- EDURA Fair Prize 2011 – EDURA International Rescue and Fire Technology Exhibition.
- Polish Export Leader 2011.



PZL MIELEC A SIKORSKY COMPANY

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Polskie Zakłady Lotnicze Sp. z o.o. – PZL Mielec A Sikorsky Aircraft Company is the biggest Polish manufacturer of aircraft, currently expanding its production profile to include aerostructures and helicopters. On March 16, 2007, 100% of the shares of Polskie Zakłady Lotnicze Sp. z o.o. were purchased from ARP S.A. by United Technologies Holdings S.A. (UTH), a subsidiary of United Technologies Corporation (UTC). The new era was initiated not only in the history of Mielec aviation industry but also in the history of the company itself. As a part of UTC, PZL initiated cooperation with Sikorsky Aircraft Corporation – a world leader in helicopter production, including the UH-60 BLACK HAWK, S-76 and S-92 models.

Our current product line includes:
S-70i BLACK HAWK – multitask helicopter for international markets.

M28 – a turbo-prop, twin-engine, STOL class (short take-off & landing) aircraft designed for passenger and/or cargo transportation, paradrop, medical evacuation, marine reconnaissance and patrol flights, and Search & Rescue missions.

M28B Bryza – the military version of the M28 model, designed for special operations (depending on configuration).

M18 Dromader – a single-engine aircraft used in agricultural, fire fighting and forest protection operations.

UH-60M BLACK HAWK™ Cabins, the major structural assembly used to build the Sikorsky UH-60M BLACK HAWK™ Helicopter.

Following the free market rules and operating in accordance with Polish Commercial Code, we pursue manufacturing and commercial activities in the field of PZL designed aviation products and introducing them to international markets. We also cooperate with such aviation industry leaders as: Sikorsky Aircraft, Spirit Aerosystem, Pratt & Whitney Canada and SAAB Aerostructures.



TEL DAT

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TEL DAT is a Polish business entity, which has been dynamically operating in the defence market for sixteen years. It is the leading constructor and producer of the world's most innovative data communications solutions, which are dedicated mostly to security and national defence.

The solutions has been awarded by Buyers and Users (also from NATO). TEL DAT solutions in many cases are unique in international scale and reference to the systems of other countries. Their advantages and reliability have been confirmed by the following certificates and awards signed by NATO Communications and Information Agency / NATO C3 Agency.

The company has the all necessary capabilities to meet requirements and standards imposed to the companies participating in bid projects and research and development in the area of C4ISR systems. It comprises: research and development, production capacity and service, lessons learned drawn from the participation in NATO and USEUCOM exercises, certificates, awards and honors. These attributes locate the company closely to the top of producers of the specialized military data communication solutions.

Since the beginning of its operation the company has been involved in: research & development, designing, development and production, implementation and maintenance (including remote supervision) of specialized electronic, data communication, IT, telecommunication and alarm systems and devices dedicated mostly to security and national defence.

In this field company has collaborated with many national and international institutions which develop for security and defence. TEL DAT has provided for them with research and development, supplies, technical support of implementation and maintenance of specialized data communication systems (including mobile and stationary versions), which are implemented into the Polish Armed Forces (in accordance with required procedures).

All of above mentioned activities have been performed with the highest accuracy, faultlessly and always on time what is confirmed by awarded certificates, prizes, numerous references.



THE POLISH DEFENCE HOLDING

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The Polish Defence Holding is the biggest manufacturer and supplier of military equipment in Poland and in Central, Eastern Europe. We are the biggest supplier for the Polish Ministry of Defence. 40 defence companies domestically and abroad operate within the Polish Defence Holding with 10 000 employees. Bumar Ltd is the leading body of the Polish Defence Holding.

For over 40 years the company has been a leader in the domestic and international market of weaponry, construction plant, mining and handling equipment. Its extensive experience, world-recognized and distinguishable brand, achievements in implementing new technologies in the Polish industry and in initiating relationships with renowned producers all over the world, professional and skilful personnel are company's main assets. PHO has been supplying and selling its equipment and services to the Polish Army and in over 40 countries in Europe, Africa, Asia, South America and the U.S., winning many international bids.

Market activities of the Polish Defence Holding are concentrated around four product groups constituting the subject matter of production and service divisions respectively:

- AMMUNITION AND ROCKETS – ammunitions and missiles (shooting ammunition, artillery and missiles, SPIKE, GROM, FENIKS missiles);
- SOLDIER – the soldier and the official (individual equipment and armament of the soldiers including: pistols, guns, optoelectronic equipment, protective means: gas masks, helmets, bullet-proof jackets);
- ELECTRONICS – electronics and IT (commandment systems, radars, sensors, anticraft and anti-missiles systems);
- LAND – lands platforms (wheel, caterpillar platforms, military vehicles, tanks).

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Polska

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