



POLISH CHAMBER OF NATIONAL DEFENCE MANUFACTURERS

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POLISH DEFENCE INDUSTRY

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AFIT – FLYING LABORATORY



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**THE FAMILY OF SEMITRAILERS
FOR THE TRANSPORT OF MILITARY
VEHICLES**



AIR FORCE INSTITUTE OF TECHNOLOGY

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Polska
DEFENCE INDUSTRY



INNOVATIVE ECONOMY
NARODOWY PROGRAM ROZWOJU STRATEGICZNEGO



EUROPEAN UNION
EUROPEAN REGIONAL DEVELOPMENT FUND

Project co-financed by the European Union,
Sub-measure 6.5.1 of the Innovative Economy Operation Programme.



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 Post-graduate 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.

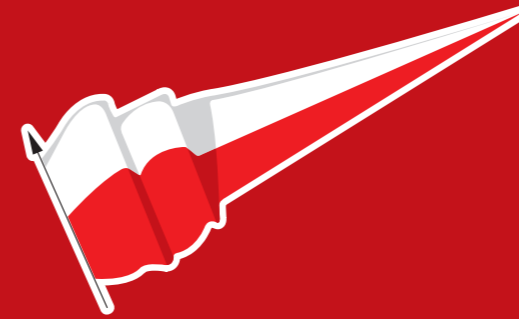
Polish defence industry products are still actively used. They meet the needs of our troops, not only in the country but also in different parts of the world where they serve. This is the best proof that the quality of equipment produced in Poland is very high.

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, 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 "Cło 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.

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

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 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.

POLAND

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

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

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.

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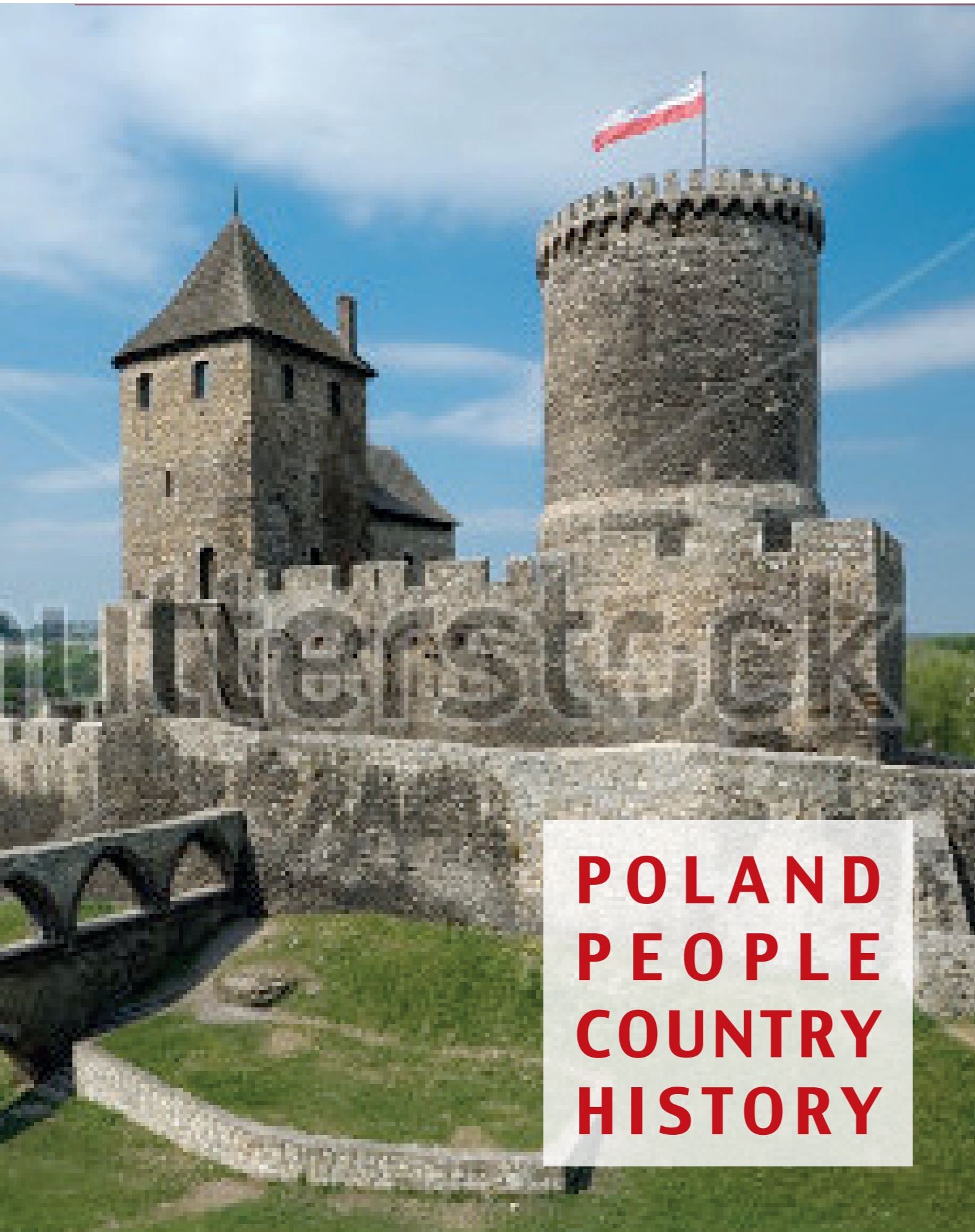
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POLAND PEOPLE COUNTRY HISTORY

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. ■

LAST VIP-VARIANT SOKÓŁ PROVIDED TO THE POLISH AIR FORCE

PZL-Świdnik, an AgustaWestland company, provided the Polish Air Force with the last, fifth Sokół helicopter in a variant for VIP transport. On December 23, the helicopter has joined the fleet of four machines that are in the service of the 1st Air Transport Base in Warsaw.

Five Sokół helicopters given to the Polish Air Force this year are used to transport top-level military and government personnel.

Sokół helicopters in the VIP configuration, manufactured in Świdnik, are among the best equipped machines of the Polish Air Force. The helicopters are designed to transport up to 8 people plus two pilots. The passenger compartment characterized by a modern and tastefully finished Italian interior that uses the highest quality materials, has been adapted to provide a high level of comfort. The latest generation of avionics in the cockpit reduces pilot workload and improve their spatial awareness, thereby increasing safety.

The compartment is also equipped with integrated audio system, allowing internal and external communication through a dedicated GSM communication system. With the additional sound insulation, the noise level is significantly reduced, which increases passenger comfort.

The helicopters are equipped with a modern GPS navigation system containing a database of obstacles, and weather radar. Through LCD displays, these systems give the pilot greater situational awareness and provide information on terrain and weather conditions, thus increasing flight safety during bad weather.

Delivery is the result of an agreement concluded with the Polish Ministry of National Defense in 2011.

TOP ITALIAN INVESTOR OF THE YEAR AWARD FOR PZL-ŚWIDNIK

PZL-Świdnik was awarded with the Top Italian Investor of the Year award in recognition of the achievements of the business and the investments made in its factories.

FDI Poland Investor Awards (awards for direct foreign investment) were presented during an official ceremony held at the InterContinental Hotel in Warsaw. Leading foreign investors were honored in recognition of their contribution to the development of the Polish economy, reflected by the scale of the investments, size of employment, innovations and performing a strategic role in the industry.

A jury of 22 representatives of chambers of commerce and embassies singled out 15 of the 78 reported world-class companies representing different sectors of the economy.

NEW TRUCKS FOR THE ARMY

In late November, an agreement was signed for the supply of 910 Jelcz trucks. The purchased model has been designed specifically for the military. Their acquisition is related to the generational replacement of vehicles currently used by the Polish army.

The agreement has a comprehensive character. According to the contract, the military will acquire 910 Jelcz 442.32 medium-duty vehicles as well as logistic and training packages. Logistic package consists of repair kits (ZR-1 and ZR-2) and portable diagnostic kits. The training package, guaranteed by the contract, includes the equipment for Logistics Training Centre in Grudziądz: image boards, multimedia presentations, instructional videos and Jelcz 442.32 model.

The agreement also provides training for mechanics of repair bases in technical workshops, training of trainers and training for drivers in the operation and use of the vehicles.

The value of the signed contract amounts to nearly PLN 674 million. All the ordered equipment and accessories from the two packages is expected to be delivered between 2014 and 2018. This is the first tranche of deliveries. According to the directive on defense industry procurement, further deliveries will be made in the mode of supply continuity for at least the next five years. The signed agreement is another step in the implementation of the provisions of "Plan of technical modernization of the Armed Forces in the years 2013-2022".

NEW SIMULATORS AT THE NAVAL ACADEMY

Two new simulators were given to the Naval Academy. One of them will be used to conduct trainings on military and non-military threats prevention; the other will be used in the training of marine artillery and missile weapons operation by the cadets, officers and ship crews.

The purchase of simulators and room adaptation was made under the Plan of technical modernization of the Polish Armed Forces in the years 2013-2014.

Naval Academy expanded its research and teaching base of with 'Integrated Simulator for Command and Performing Operations in During Military and Non-military Threats in Marine Areas' and 'Simulation System for Three-dimensional Models of Marine Artillery Armaments, Artillery Munitions Models and Missile Armament Models'.

These simulators are not the only improvements that have emerged at the academy through the implementation of the aforementioned modernization plan. Navigation bridge was also modernized, training-research operating station was created to

study marine cannon barrels. In addition, academic maritime communication laboratory is equipped with a UHF / VHF Rohde Schwarz XT4410A M3SR 4400 Series radio. This multi-range and a multi-purpose radio designed to work in different modes can be used both during marine and land operations.

ORP "ŚLĄZAK": ALL AGREEMENTS SIGNED

Head of the Inspectorate of Armaments signed two last contracts for the completion of the ORP "Ślązak" patrol ship. The contracts signed on December 12 amount to a total of almost EUR 100 million and the ship will be commissioned to the Navy before November 2016. Thus, the contents of all contracts for the completion of the patrol ship have been concluded.

Parties to the agreement for the supply of Integrated Fighting System for the patrol ship are Thales Nederland from Holland and Enamor from Poland. The former is responsible for the delivery of Thales Modular Fighting System - hardware, software, and integration with external subsystems already installed and those that will be installed on the ship. Enamor from Gdynia will deliver and install the Integrated Navigation System with Vanguard sonar and Integrated Communication System with cryptographic devices for the elements of the Integrated Fighting System and communication equipment.

ORP Ślązak project also includes two barter agreements signed by the Ministry of Economy that cover a period of 10 years. The first offset agreement for the amount of EUR 66.7 million was signed with Thales Nederland and as a result, three Polish entities - Enamor, Research and Development Centre for Marine Science, both from Gdynia, and 1st Regional Logistics Base - will service and repair the Integrated Fighting System installed on the patrol ship. And the fourth contractor - ICT Support and Naval Command Center - will train the crew of the ship in the use of combat system.

The second offset agreement was signed with Thales Electronic Systems for the delivery of communication system components for the ship and amounts to EUR 16.4 million. Resources from the agreement will go to Enamor and 1st Regional Logistics Base. Offset obligations in the agreement relate to the transfer of rights for servicing, repairs and maintenance of data transmission networks - FOCON (Fibre Optical Communication Network).

PRACTICAL AJT VERIFICATION FOR THE AIR FORCE

In early January, the Inspectorate of Armaments sent an invitation to ALENIA AERMACCHI S.p.A. to submit an advanced training aircraft for verification.

The offer of ALENIA was chosen as the most favorable of the offers submitted in the first phase of the evaluation in the procedure for the delivery of the Integrated Advanced Training System (Advanced Jet Trainer - AJT).

The invitation is another step in the acquisition of eight jet aircrafts along with the training system and logistic package for the Air Force. This purchase is included in the "Plan for the technical modernization of the Polish Armed Forces in the years 2013-2022".

Checking of the offered aircraft is the second phase of the tender evaluation provided by the Purchaser in the Terms of Reference. The first phase was completed by the Inspectorate of Armaments on December 23, 2013.

Positive result of the verification is the ultimate condition for selection of the best offer. In the case of a negative result of the verification, ALENIA AERMACCHI S.p.A. offer will be rejected.

The deadline for providing the aircraft for verification is February 21, 2014.

AIR FORCE RECEIVED THE ORDERED BRYZAS

The last of the eight PZL M28 B / PT Bryza airplanes ordered by the Air Force (Glass Cockpit version) left PZL Mielec factory and was officially received by the committee of the Inspectorate of Armaments. The aircraft with side numbers 0225 will aid the 8th Transport Airbase in Krakow. However, this does not end the implementation of the contract from 2008, which also includes a flight simulator.

The simulator for training Bryza aircrews will be launched in "School of Eaglets" in Dęblin in September 2014. The new "glass" Bryza will go to the parent base in the next few days.

Externally, the machine does not differ essentially from the older M28 Bryza. Changes were made primarily in the avionics. A new navigation system, inertial platform, weather radar and aerodynamics data center were implemented.

The most apparent changes include the new, digital indicators using 4 LCD screens. They support both the basic functions of the universal flight parameters and navigation data display system as well as EICAS (Engine Indicating and-crew-alerting system) functions.

Machines in this configuration will be used in Krakow base both for training tasks and the implementation of operational tasks. ■

AUTO-HIT
G R O U P



AUTO-HIT S.A. low loader
NS 600WR

THE FAMILY OF SEMITRAILERS FOR THE TRANSPORT OF MILITARY VEHICLES

THE EXPERIENCE FROM COMBAT OPERATIONS CONDUCTED IN THE LATE TWENTIETH CENTURY AND THE BEGINNING OF THE PRESENT CENTURY TRANSFORMED THE REQUIREMENTS FOR MILITARY VEHICLES. THE NUMBER OF TYPES OF VEHICLES WHICH REQUIRE ARMoured CREW COMPARTMENT HAS INCREASED. AT THE SAME TIME, NATO STRATEGISTS HAVE DETERMINED THAT THE MBT WILL BE THE PRIMARY MEANS OF COMBAT DURING OPERATIONS IN URBAN AREAS AT LEAST UNTIL 2040. THIS RESULTS IN AN INCREASE IN THE WEIGHT OF VEHICLES, THEREBY INCREASING THE AMOUNT OF FUEL CONSUMED BY WARFARE EQUIPMENT.

One should note that for the proper operation of every weapon system it is necessary to ensure, among other things, the means for dislocation. These measures allow to significantly reduce the cost of missions, including, in particular, those performed outside the country. In addition, by increasing the transport speed, we increase the effectiveness of the use of weapon systems such as self-propelled howitzers.

Semitrailers for transporting tanks and other heavy military vehicles were developed by Auto-Hit SA in order to ensure an effective transport of all combat vehicles deployed by the Polish Army.

Skilful grouping of technical parameters and unification of mechanisms allowed for optimal transportation of equipment, vehicles and military cargo in terms of functionality and costs. The development of family of semitrailers enables flexible adjustment of number and type of transport means dedicated for a mission.



**AUTO-HIT S.A. low loader
NS 500WZ**

Experience from numerous years of using the semitrailers in the Polish Army allow us to infer that the semitrailers can be an effective means of combat support for military equipment in foreign armies, too.

The following low chassis semitrailers are currently offered (main technical parameters can be found in the attached table):

- Low bed semitrailer type NS 300 WRS,
- Low bed semitrailer type NS 500 W,
- Low bed semitrailer type NS 600 WR,
- Low bed semitrailer type NS 700 W,
- Low bed semitrailer type NS 500 WZ.

Low bed semitrailer type NS 300 WRS is designed to transport vehicles with total weight up to 30 tons. It can also be used for the carriage of: containers, cargo on pallets and long loads (e.g. poles, tree trunks). The load space of semitrailer type NS 300 WRS can be widened for the transport of tracked vehicles, in other cases it has a standard width of container trailers used in the civilian sector. This solution, combined with self-turning axles of the wheels, can signifi-

cantly increase the mobility of the set of tractor and semitrailer. This allows the use of sets with low bed semitrailer type NS 300 WRS even in mountainous regions.

Low bed semitrailer type NS 500 W is designed to transport 50-ton tracked vehicles. The vehicle can also be used to transport other cargo within the limits of their transport space and capacity. The semitrailer suspension system with two turning axles allows adequate mobility in road traffic.

Low bed semitrailer type NS 600 WR is an universal means of carrying of MBT and other vehicles weighing up to 60 tons. With large number of attachment points, the semitrailer is characterized by versatility in the transport of various kinds of cargo: different vehicles, containers, etc. The use of completely flat surface allows the optional transport of the following containers: one 40', one 30', one 20' or two 10'. Semitrailer type NS 600 WR is equipped with the six axles, including three turning axes. This solution allows to secure the mobility required in road traffic. Control of turning axles applied in all semitrailers for the family is automatic.

Parameter	Lowloader semitrailer type NS 300 WRS	Lowloader semitrailer type NS 500 W	Lowloader semitrailer type NS 600 WR	Lowloader semitrailer type NS 700 W	Low Bed semitrailer type NS 500 WZ
Number of axles	2 + 1	3 + 2	3 + 3	3 + 3 + 1	3 + 2
Carrying capacity (kg)	30 000	50 000	60 000	70 000	52 000
Length of the loading platform (mm)	7 900	10 300	10 300	10 300	10 700
Width of the cargo area (mm)	2 540 ÷ 3 200	3 350	3 350	3 450	3 380
Height of the cargo area (mm)	960	960	960	960	960 (600)
Configuration of transported containers (container length in feet)	20'; 15'+10'; 2x10'	30'; 20'; 2x10'	30'; 20'; 2x10'	30'; 20'; 2x10'	—

Low bed semitrailer type NS 700 W is prepared to transport all versions of MBTs that are now deployed by armies worldwide. This semitrailer is also adapted for transport of cargo in container. Modifying the design of the suspension (the introduction of the first lift axle) the mobility similar to NS 600WR was achieved despite the increased load capacity of NS 700 W up to 70 tons.

Low bed semitrailer type NS 500 WZ is a specialized unit designed to transport high and heavy military equipment such as self-propelled howitzers, rocket launchers and anti-aircraft sets within the road infrastructure, which is characterized by low viaducts, tunnels, etc. Its load capacity allows the transport of all self-propelled howitzers deployed by armies worldwide.

The components provided by world renowned manufacturers are utilized in all semitrailers of our production. All of them have undergone many months of testing at a research institution of the Polish Army, prior certification and beginning of production.

Suspension of all offered semitrailers is based on pneumatic springs coupled with trailing arms. This system provides stabilization of the plane and maintains a high "comfort" of cargo carriage. Furthermore, in case of failure, the suspension is easy to repair (without the need for stationary service base). At the same time the pneumatic suspension does not require collection and storage of additional – and costly – consumables.

Offered semitrailers are equipped with elements allowing for cooperation with tractor and evacuation winches. When combined with such tractor they constitute "evacua-

tion set" that allow loading the damaged equipment, and – what is especially important – unloading of the transported damaged vehicle. This solution has been tested during operations outside Poland and is widely used by logistic units of our army.

All our semitrailers can be equipped with a mechanical system for changing the king-pin height (this is patented by our company). This mechanism allows to couple semitrailers with tractor of the different height of chassis. This solution increases the flexibility of the use of our equipment forming a system of logistic support for combat equipment. This way a significant reduction of the number of tractors necessary for combat operations was achieved. At the same time, the semitrailers are adapted to king pin replacement, for example, with a pin of a different size.

Offered semitrailers can be tailored according to a customer requirements (e.g. using central lubrication system, CTIS). Auto-Hit SA has its own design office, which can introduce the necessary changes in the design of the chosen semitrailer in order to adapt it to the conditions of intended operation. At the same time, our company can carry out the adaptation of the chassis indicated by the Customer to the tasks of the tractor, including technical evacuation vehicle option. We will undertake the development of revised technology for adaptation and production of evacuation sets cooperating with a potential of other companies that previously collaborated with the customer. ■

OUR EXPERIENCE IS AT YOUR DISPOSAL!



**AUTO-HIT S.A. low loader
NS 700W**



VEHICLE INTERCOM SYSTEM JASMINE (CALLED VIS JASMINE OR VIS) IS THE COMPONENT OF ON-BOARD VERSION OF THE JASMINE SYSTEM AND MAKES AN ON-BOARD DATA COMMUNICATION NODE. THIS SOLUTION IS A NETWORK CENTRIC MULTISERVICE HARDWARE AND SOFTWARE PLATFORM PROVIDING RELIABLE COMMUNICATION AND NECESSARY SERVICES WHICH IMPROVES THE WORKS OF THE CREW IN A SIGNIFICANT WAY. THE SYSTEM CAN BE USED IN ALL TYPES OF VEHICLES (INCLUDING MILITARY), VESSELS (SUBMARINES) AS WELL AS IN AIRCRAFTS.

VIS combined with a suitable software module of **C3IS JASMINE** makes a **C4ISR** class system. It is an innovative solution, friendly in using, more mobile and has many more functionalities than other similar currently used systems. It has an optimal construction with smaller dimensions and lower power consumption. **VIS** devices are made in the latest technology according to military standards of mechanical and climatic resistance. Its design and implementation is the new quality in a development of on-board communication systems.

MAIN FEATURES:

- modern superINTERCOM in IPv6 technology, provides digital processing of speech, guarantees high quality and intelligibility of information on the battlefield for all crew members;

- high mobility, smaller dimensions, low weight, low price, less power consumption with high system performance in comparison to existing, similar devices;
- high quality of communication with other battle vehicles via optimal wireless communication (e.g. radio and satellite), possibility to work in remote location;
- easy and intuitive to use, similar to the smartphone type devices;
- different operating systems can be deployed;
- cooperation with **C3IS JASMINE** system or other C4ISR systems;
- **VIS Terminals** simultaneously provide: voice, data, alarms, use of **C3IS JASMINE (DSS C3IS JASMINE)** dedicated for soldier) or navigation software;
- up to 6 on-board radios;
- possibility to use **VIS Terminals** outside of a vehicle through wireless communication;
- **VIS Terminals** provides: GPS, magnetometer, accelerometer, light and temperature sensor, video camera, built-in battery, interface for external sensors, auto-selection of available network connection (wired or wireless);
- signals and responses to threats (alarms, sensors and effectors) are displayed and reproduced on the **VIS Terminals** and transferred e.g. to **BMS (Battlefield Management System)**;
- creating and synthesizing of alarm messages integrated with any number of sensors;
- possibility to use geographic position data sources (e.g. vehicle GPS);

- dissemination of information from different sources inside vehicle, also through loud-speakers;
- simultaneous usage of many channels controlled by **VIS Terminal** and PTT buttons (Push-To-Talk);
- call recording in **VIS** system (all calls to the central unit **WAN Access Box** and individually for each **VIS Terminal**);
- operational reliability through, i.a. automatic diagnostics of **VIS** system and monitoring of all its devices, including warning messages display and visualization of faults;
- possibility to deploy **VIS** software on smartphone devices and connecting via wireless network;
- advanced energy management depending on power supply and used functions;
- friendly usage, possibility to customize according to user needs;
- visualization of the status of internal and external communications;
- communication by selected radio or multiple radios simultaneously;
- active noise reduction in the system;
- scalable number of users connected to system;
- dedicated interfaces providing reliable operation of the system in combat vehicles, e.g. for connections between a tower and a chassis, through sliding connector;
- full compliance with Polish specifications and military standards of mechanical and climatic resistance as well as electromagnetic compatibility requirements:
 - the **VIS** system devices meet Polish military standard NO-06-A101 and NO-06-A103 (groups of devices: N.11-0-II-

A/B, N.12-0-II-A/B and N.14-0-II-A/B),

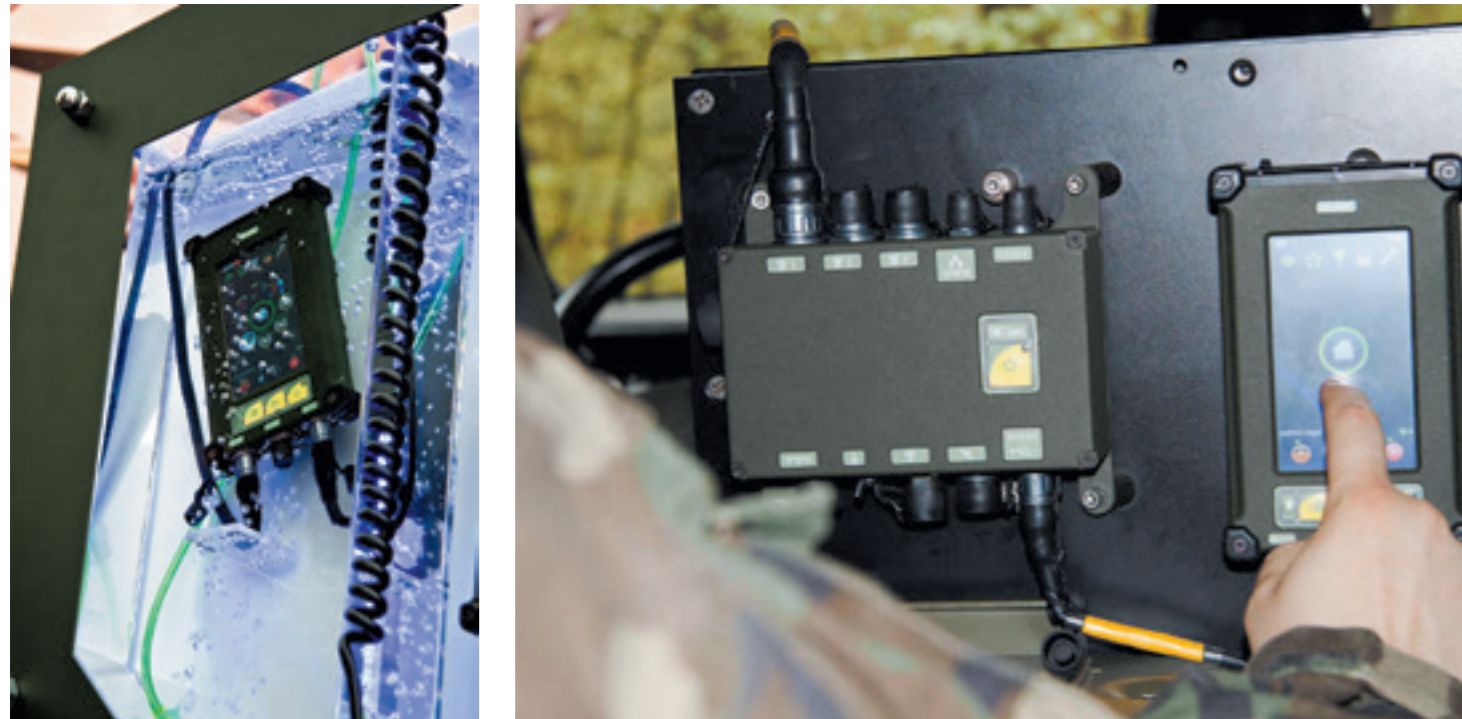
- permissible level of side emission and electromagnetic immunity are fulfilled in accordance with Polish military standard NO-06-A200;
- tempest standards available upon request of the Client.



Examples of use of **Vehicle Intercom System JASMINE**, including variants of implementation of this solution on different on-board platforms, are presented in the chart and pictures below.

BASIC HARDWARE COMPONENTS OF THE VIS JASMINE:

- **WAN Access Box (Master)** – it is a ICT integrator dedicated to internal on-board systems that provides an integration with wireless means of communication e.g.: HF and VHF radios, WLAN module / Bluetooth, GPS or inertial navigation;
- **WAN Access Box (Slave)** – it is a ICT integrator dedicated to internal on-board systems that provides on-board communication between all crew members, support and monitoring of vehicle sensors as well as integration of field and fixed telecommunication networks;



WAN Access Box devices in the **Master** and **Slave** versions can operate autonomously and independently from each other. The flexibility of implementation of a specific version may be dependent on the needs and requirements of the Customer.

- **VIS Terminal** – personal mobile computer that has advantages and features of PDAs and Smartphone devices and it is made in military standards. The device is light, has an optimal construction with smaller dimensions and less power consumption. Terminal is friendly in use and dedicated to software: **VIS JASMINE**, **C3IS JASMINE** (optional in **DSS** version) or navigation.



Vehicle Intercom System JASMINE was awarded with three prizes:

- DEFENDER prize (at the 21st International Defence Industry Exhibition in Kielce 2013) awarded for **Integrated Information System WTS** – the comprehensive, innovative, mutually consistent, unique in many areas and the reference solution, dedicated to the national defense and security. One of the major components of this system is **VIS JASMINE** and: JASMINE Web Portal, C3IS JASMINE, HMS JASMINE in shelter and a portable version, BMS JASMINE, DSS JASMINE and IEG JASMINE;
- DEFENDER prize (at the 21st International Defence Industry Exhibition in Kielce 2013) for vehicle for demining patrols ATENA II, which was equipped with a **BMS (Battlefield Management System) JASMINE**, including **Vehicle Intercom System JASMINE**;
- prize for the innovative **Vehicle Intercom System JASMINE** and tactical terminals with C3IS JASMINE software, obtained at the VII International Exhibition AIR FAIR 2013. ■





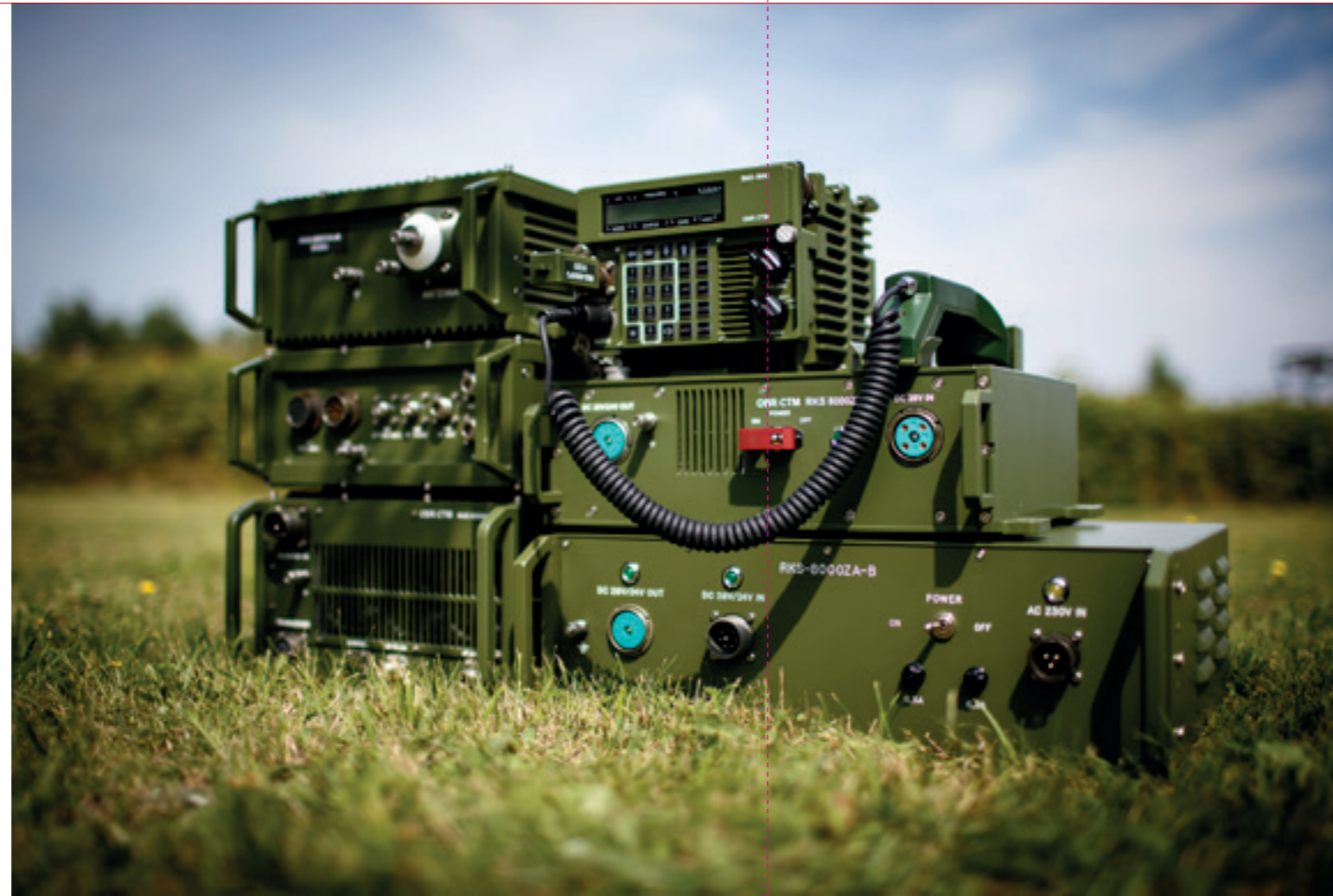
Command, Control and Communication Systems

The **RKS-8000** HF transceiver is a modern radio compliant with STANAG 4203. The multipurpose RKS-8000 transceiver is the basic element of stationary and mobile (mounted on board of vehicles and caterpillar vehicles) radio communication systems. The digital voice transmission complies with STANAG 4198 and MIL-STD-110B App. B standards. The remote control of the transceiver is performed according to STANAG 5066 ANNEX E requirements. The transceiver supports ALE (Automatic Link Establishment) function according to MIL-STD-188-141B App. A. The robust design and construction guarantee high performance and operational reliability of the RKS-8000.

The **RKP-8100** transceiver belongs to a generation of new digital transceivers compliant with STANAG 4203, STANAG 4204 and STANAG 4205. The RKP-8100 radio is a modern manpack transceiver that provides reliable tactical communication. It offers solutions to all kinds of tactical communication, uniform and reduced logistics services. The manpack transceiver can be also used as an exciter for the RKS-8000 transceiver family. The universal RKP-8100 transceiver can be used as an element of a mobile communications sys-

tem mounted on vehicles and caterpillar vehicles. The digital voice transmission is compliant with STANAG 4198 and STANAG 4591. The transceiver supports the ALE (Automatic Link Establishment) function compliant with MIL-STD-188-141B App. A. and STANAG 4538. The transceiver is adapted to establish ad hoc networks (mobile ad hoc network – MANET) compliant with STANAG 4691. High performance and reliability of operations is guaranteed by a robust design and construction of the transceiver.

The **RKL-8200 transmission module** was designed and constructed to meet the needs for radio data transmission for training aircraft type ORLIK for a 30÷88MHz frequency band. Its functionality was adapted to customer's requirements. The RKL-8200 transmission module ensures reliable communication at a tactical level (digital data transmission). It can be used as an element of mobile radio communication systems mounted on aircraft, vehicles and caterpillar vehicles. The transmission module is intended for use in ŁEBA systems (Polish Navy) and SARCASS (Maritime Search and Rescue Service). The RKL-8200 transmission module is powered by 27V DC (voltage range from 23,7÷29,5V). The RKL-8200 parameters can be tailored to a specific order at any time to meet the individual requirements of the client. The module allows to work in the hopping operation mode. Software module definition give the possibility of easy implemen-



The network software was implemented in the **RKS-8000 PW** remote control unit containing an integrated incoming messages server that communicates itself with the user through the POP3 protocol SMTP, outgoing messages server and an FTP server. Therefore in the radio transmission the TCP/IP layer that provides some redundancy and adjusts poorly to the conditions reigned in the HF radio channel can be omitted. The use of popular protocols allows an easy integration with other communication system elements and fast verification of the operation correctness. Data sending and receiving can be performed with standard e-mail clients and FTP. The IP protocol can also be used for working purposes. Protocols and modulations described in STANAG 4538 are used during operation with the FTP, SMTP, POP3 and IP protocols. All external data sources are connected directly to the RKS-8000 PW remote control unit. The RKS-8000 PW was designed to control the HF RKS-8000 receivers and transmitters through the communication network and/or LAN. In co-operation with the RKS-8000 transceiver ensures the exchange of voice data within the HF frequencies; Digital voice transmission according to STANAG 4198 and STANAG 4591, as well as MIL-STD-188-110B p. 5.3 – within HF frequencies; Parameters remote control mode in accordance with STANAG 5066 Annex E.; Capability to configure the routing parameters using the RRC-9100 program.

The **RNC-8201 Radio Network Controller** executes functions of a multi-hopping dynamic IP network according to STANAG 4691 ANNEX A. These are in particular: automatic identification of neighbouring nodes and distributing of information about them in the network, network organization, operations within the "ad-hoc" network, providing authenticated data by using the ARQ protocol, dynamic bandwidth allocation (number of TDMA channels) based on the reported requirements, transfer of motion in a multi hopping topologies network. Furthermore the device performs traffic management functions limiting the need of signal data transfer via radio network. The RNC-8201 radio network controller possess an integrated IP traffic manager function.

The **MRM-1201 (Multiband Radio Modem)** meets the requirements of STANAG 4691 Mobile Ad Hoc Relay Line-Of-

tation of new functions and waveforms. The module works in a self-organizing radio network. The RKL-8200 complies with Defence Norms/Directives i.a. NO-06-A101÷A108 and NO-06-A200. The basic version complies with the environmental requirements according to the NO-06-A103 standards for the S.2.1-0-II-A devices group (turbo propeller aircraft, installation in a no hermetical central zone, away from the engine and propellers).



Site IP Networking (MARLIN). The device executes VHF/UHF modem functions in accordance with STANAG 4691 ANNEX B Mobile Ad Hoc Relay Line-Of-Site IP Networking (MARLIN) and HF modem functions in accordance with STANAG 4539, STANAG 4415, STANAG 4285, STANAG 4529, MIL-STD-188-110C p.5.3, Appendix C, Appendix F. The device transmission rate is from 50 bps up to 153.6 kbps. The modem case is suitable for direct mounting on a 19" RACK.

The Command Tactical System – SCOT integrates subsystems like: countering air and surface (underwater) targets, combating asymmetric threats, technology surveillance, communication systems, as well as services provided by the integrated navigation system to ensure the safety of sailing, monitoring.

Search And Rescue Coordination And Support System SARCASS is designed to support air-sea rescue missions conducted by the SAR Coordination Centre, which is responsible for conducting and coordinating rescue operations in the Polish area of responsibility.

In cases of accidents at sea the SARCASS system provides support to efficient conduct of SAR operations. It integrates analytic programs, which are utilized during the rescue actions. It facilitates exchange of information between the operators and the system centre, and it also helps to prepare reports once an operation has been concluded.

Main Functions of the SARCASS:

- to fix DATUM – cooperation with SMHI,
- to assign means and resources to SAR OPS,
- to define search area,
- to define search patterns,
- to define search sub-areas and patterns,
- to cooperate with AIS; assigning resources in area of SAR OPS,
- cooperation with Lloyd's Register of Shipping in the area of identification and verification of ships,
- to generate automatically Situation Reports,
- to make sure cooperation is maintained between the MRCK (Maritime SAR Coordination Centre), PCK (Auxiliary Coordination Centre), COM MW (Maritime Operation Centre Polish Navy).

Taking into consideration the variety of protected sea areas and related to them different underwater targets, **KRYL Mk3** was built as a multi-sensor system. It is designed for monitoring of fairways to harbours, harbour basins, anchorages, drilling platforms, as well as handling terminals.

The parts of Mk3 are:

- DDS Sonar.
- Magnetic Linear Barrier.
- Monostatic Acoustic Barrier.
- TV and IR electro optical sensors.
- Supervision consoles and functioning consoles, both in automatic mode as served by operators.

KRYL Mk 3 is...

In Area of Security:

- Polish response to the European Council and European Parliament Directive No 725/2004 on enhancing ship and port security, as well as Directive No 2008/ 114/WE on enhancing port security.
- System for ships' protection at harbours and anchorages.
- System for seashore, harbour approaches and port facilities monitoring.

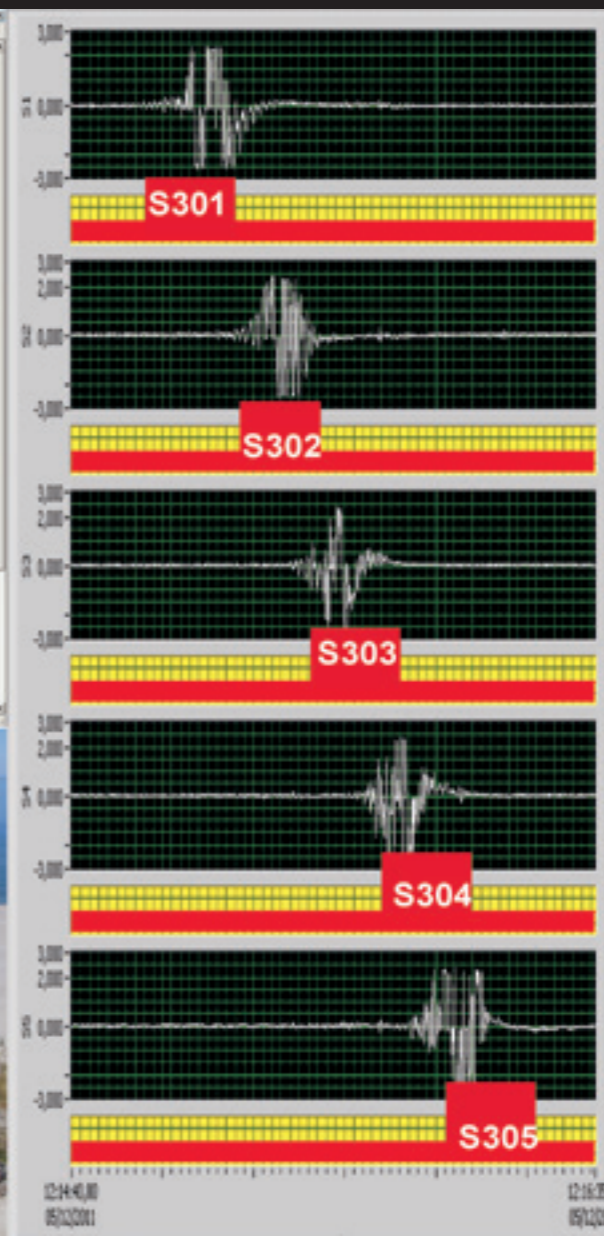
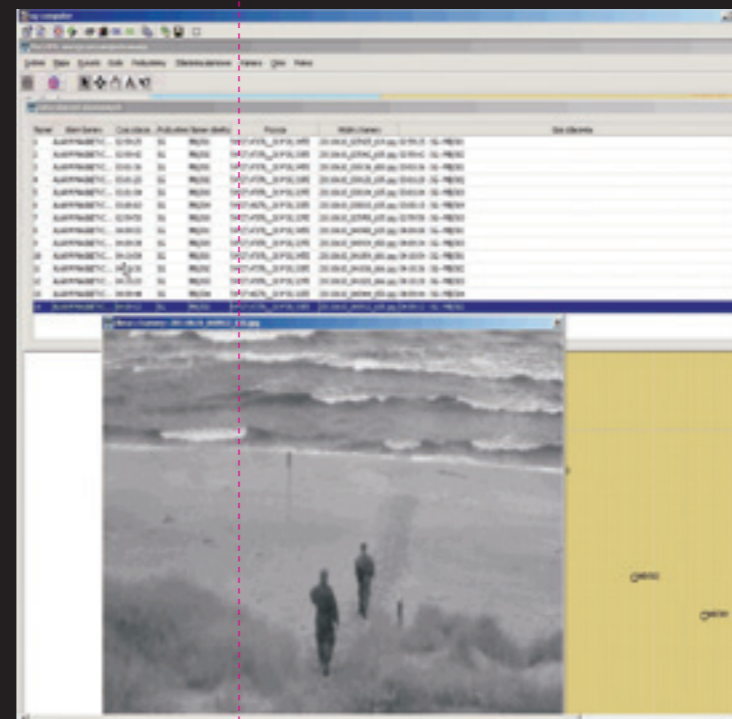
In Terms of Economy:

- System designed to improve the competitiveness level of a harbour and its adjacent infrastructure.
- System designed to create secure and economically attractive possibilities for harbour operations.

OBR CTM S.A. has developed the worldwide first and unique system to monitor under and above water situation in areas of critical maritime infrastructure – **the KRYL Mk3** system. It is an integrated, multi sensor system dedicated for marine, river and lake borders, critical sea structures and infrastructure monitoring. The system utilizes a unique sensors configuration complemented by external information sources. The solution is based on a combination of passive magnetic and active acoustic barriers and chosen, complementary sensors as cameras, infrared cameras, radars, passive acoustic antennas, sonars, etc.

The exceptional performance of the KRYL system is due to the use of: Diver Detection Sonar, Monostatic Acoustic Barrier and a unique Magnetic Barrier sensors technology. The chain of magnetic sensors detects any object that contains ferromagnetic materials. A special construction allows the installation at the sea bottom, sinking into mud or ground.

The system efficiently detects and traces surface, underwater and land objects by receiving signals from complementary sensors. All indicated objects are verified and analysed (automated or manual mode are available) to avoid "false alarms" problems (FAP). Additional information from other systems e.g. AIS or VTS may be utilized to keep the probability of FAP on the lowermost level. In a "stand by" mode the system is fully passive. Active sensors are switched on when alarm is generated by the "quiet" magnetic sensor. This makes our solution undetectable. It is designed to be operational 24 hours, 7 days a week with minimal maintenance requirements.



Maritime Infrastructure Protection Systems

OBR CTM S.A. developed a solution for the protection of underwater maritime infrastructure and coastal objects – **KRYL Mk3** – a system for monitoring of under and above water situation in regions of critical maritime infrastructure. The tasks of the system are detection and localization of underwater objects, alarming after their detection and data transmission about detected targets to the command system.

Underwater Weapon Systems

SHL-101T Mine Countermeasure Sonar

SHL-101T is a triple frequency wideband and very high resolution hull mounted MCM sonar. It performs detection and classification of ground, moored and stealth mines in very shallow, brown and blue waters and in areas of strong layering or high clutter density. The SHL-101T sonar has outstanding detection and classification performances due to state-of-the-art processing hardware and software application. It is equipped with highly integrated, low noise, front-end electronics and modern acoustic transducers manufactured by Thales Underwater Systems from France. Usage of FM signals enables pulse compression leading to signal-to-noise ratio and range resolution improvement. This feature significantly improves detection and classification performance against stealthy mines in environmentally adverse and noise limited conditions.

TOCZKI – Fired Charges For Sea Mines Disposal

The remotely wireless fired charges system has been developed for disposal of sea mines. **Charges type A and B** are transported and positioned by ROV. **Charge type C** is transported and positioned by divers. All types of charges are equipped with universal acoustic fuses. The fuses are equipped with a multilevel safety system. The system is equipped with an easy operated test unit, which permits to test all parameters of the fuse.

Safety devices:

- mechanical,
- hydrostatic pressure,
- programming activation delay,
- complex armament code,
- programmed neutralisation,
- low level of magnetic field,
- galvanic isolation of receiver and fuse.

PROMIENICA – Influence Magneto-Acoustic Sweep

Promienica Sweep is designed to fight sea mines utilizing influence fuses set off by acoustic and magnetic fields. It simulates the ships' physical fields precisely.



Testing and product certification – Research Laboratories

The Centre is also involved in testing and certification of products in the following laboratories:

- **Electromagnetic Compatibility Laboratory.**
- **Vibroacoustics, Shock Resistance and Magnetic Fields Laboratory.**

Scope of accreditation of the Electromagnetic Compatibility Laboratory includes:

- Electromagnetic compatibility testing compliance with European Directive EMC 2004/108/EC.
- Electromagnetic compatibility testing compliance with Polish Defence Standards.
- Testing into attenuation of electromagnetic fields for stationary and mobile shielding.
- Testing electric and electronic equipment compliance with European Directive LVD 2006/95/EC (low-voltage LVD).
- Evaluating exposition of workers to electromagnetic fields.
- Climate-focused tests.
- Distribution of electrochemical potential in metal structures measurements in electrolytic environment.

Scope of accreditation of the Vibroacoustics, Shock Resistance and Magnetic Fields Laboratory includes:

- Testing of resistance, strength and total resistance to sinusoidal vibration.
- Testing of machine resistance to single mechanical shock.
- Testing of machine resistance to repeated mechanical shocks.
- Testing to resonance frequency occurrence in mechanical construction.
- Measurements of magnetic field of mechanisms and technical devices.





Air Force Institute
of Technology

FLYING LABORATORY

AFIT HAS EQUIPPED A MACHINE WHICH NOW
CAN TEST DIFFERENT TYPES OF DEVICES
DURING FLIGHT

IN THE PAST, NEW DEVICES AND EQUIPMENT BUILT SPECIFICALLY FOR AVIATION WERE TESTED ON THE TARGET CONSTRUCTIONS, OR IN THE CASE OF THE AIR FORCE INSTITUTE OF TECHNOLOGY PRODUCTS – ON BOARD HELICOPTERS AND AIR FORCE JETS. THIS WAS PROBLEMATIC, BECAUSE THE FLIGHT TIME OF A MILITARY AIRCRAFT COSTS TENS OF THOUSANDS OF ZLOTYS. THUS, IN THE SECOND HALF OF THE LAST DECADE, AFIT CAME UP WITH AN IDEA OF CREATING A MACHINE THAT WOULD BE LIGHTWEIGHT AND CHEAP IN OPERATION, CREATED SPECIFICALLY FOR CONDUCTING VARIOUS TESTS ON THE FLIGHT.

The idea of the Flying Laboratory was not associated with the need to test a particular product created by AFIT. On the contrary, from the very beginning, its creators have laid emphasis on the fact that it was to be a universal design, configuration of which could be changed without interfer-

ing with its structure. The aim was to create a machine which could be built over and on which different devices could be tested – both placed inside the cabin or fuselage, as well as on the exterior.

The idea of creating a special, dedicated new structure for the lab was rejected – it was much cheaper and easier to adapt the existing structures available on the market. Because of the need for changes in the structure of the acquired machine, all aircrafts made of composite were quickly rejected (interference in the composite structure is dangerous), and the requirement to have adequate “stock” of weight caused the rejection of all ultralight designs. The first considered base plane for the laboratory was a Polish construction – including M-26 Spark that belonged to PZL Mielec. Unfortunately, the prices and cost of operation of national aircrafts, especially when combined with the projected costs of their remodeling, exceeded the funds allocated for this

project in 2007. Finally, the project manager, an experienced test pilot from AFIT began to seek a foreign design and, after performing a detailed analysis, stumbled upon LSA class American planes (up to 600 kg) produced for aviation enthusiasts by Sonex Aircraft – it turned out that they meet 21 of 23 specific criteria. It turned out that the machines offered to customers at a price of 15-20 thousand dollars in the form of kits are made of laser-cut aluminum and with the materials used, they weight only 522 kg and have a considerable reserve capacity, especially when mounted on the strongest of the three engines: 120 horsepower six-cylinder Jabiru 3300. There is more than 70 kg available for the advanced avionics, as well as measuring devices. What is more, Sonex can be adapted to the needs of AFIT without significant changes in its top speed and drag. This was important because of the tested equipment – with speeds exceeding 250 km/h tests can be carried out at speeds appropriate for most modern drones – and precisely this type of equipment is, and will be

created in the coming years in the largest quantities. During the trial before buying the aircraft it turned out that the Sonex has higher efficiency in the air than that recorded on paper. It can even land with a side wind of 10 m/s.

ADAPTATION

AFIT team decided to use Garmin digital avionics (pilot-navigation indicator Garmin G600 and GNS 530 as a GPS receiver). Such equipment is essential when conducting a number of studies under tougher conditions than those provided for amateur aircraft. For example, flight at high altitude (up to 5000 m), or study of air pollution and greenhouse effect over the cities conducted by Warsaw University of Technology provide flights at the base of the clouds, where the concentration of substances that interest the scholars is the largest.

The airframe structure was strengthened and affixed with three underslings – two under the wings (up to 45 kg for each) and one under the fuselage (up to 30 kg, usually it contains a mounted observation head). A typical beam of TS-11 Iskra was used as wing underslinging points.

Interestingly, the trays attached to the beam that contain the test equipment were installed in four-gib S-5K unguided missile launchers. It turned out that its pipes are perfect for attaching different types of sensors and detectors. The plane equipped with trays makes an impression of being armed – for some time, AFIT even considered testing newly designed rocket weaponry on it. Aircraft cabin, normally designed to transport two people, can accommodate a pilot and a test equipment specialist. It is also possible to remove the right chair and put additional research equipment in its place.

In this case, the researcher can sit in the ground car station, which is an integral part of the system constituting the laboratory. He can communicate with the aircraft using additional bandwidth. The van can accommodate the technician, the flight manager and people responsible for the test equipment. Readings from 30 (standard) to 40 measured parameters of the tested devices are sent to the ground station. Some devices perform the measurement with sampling rate as high as 60 times per second. An interesting option is to mount a camera and transmit images associated with a map of the area from it in real-time – the perfect way to explore situations, e.g. during a natural disaster. The ground car station differs from the ordinary car – it has a transparent plastic dome that allows for observation of the environment. The position was created as a kind of ground-based mobile control tower, which, combined with a trailer to transport the complex plane with an additional power generator, allows the user to create a makeshift command post and direct flights from anywhere, as long as it is located next to an area suitable for takeoffs and landings. Car station has a wireless telephone, Internet, and wireless connectivity with air traffic services. This makes it possible to send a flight plan or pick up meteorological messages. Flight Director may also deploy a meteorological station, making it possible to control the weather situation and provide the conditions for landing.

BULL'S-EYE

Flying Laboratory has been developed under the Purpose Project co-financed by the Ministry of and Higher Education. Project budget was PLN 3.1 million of which 30 per cent constituted a financial contribution of AFIT. The plane cost PLN 650 thousand. The price included the airframe (USD 20 thousand), engine (USD 14.5 thousand), avionics (USD 32 thousand). Since the granting of funds for the design, choice of aircraft, its reconstruction with the participation of PZL Mielec (strength calculations, changes design), WZL-2 (construction work) and AFIT until the certification for flight, 3.5 years have passed. Registration took place in December 2011 and from the beginning it appeared that there are numerous parties willing to test the equipment in the flying laboratory. In 2013, the laboratory had 50 hours of research flights reserved, and there will be more next year.

It is possible that if this trend continues, a second copy of the Sonex will have to be purchased. "The process of building the test equipment and performing the necessary checks on the ground is time-consuming. It must be implemented in accordance with the existing regulations by a certified aviation organization. During this process, the plane is out of service" – says Przemysław Mądrzycki, Head of AFIT Training Systems Department. In the near future, the projects implemented through the Flying Laboratory will include testing and building a database for the spectroscope designed in the Space Research Center of the Polish Academy of Sciences as part of Applied Research Program. Based on the analysis of the spectrum of the reflected sunlight it will determine the chemical composition of the soil. For this purpose, the flying laboratory will be flying over the slag heaps of the former uranium mine near Wałbrzych. Another project is the examination of agricultural land for the purposes of the agricultural department of the University of Adam Mickiewicz University in Poznan. The laboratory will also take part in an international program funded by the European Union aimed at developing sensors to detect various targets under the crowns of trees. There has also been an ongoing discussion regarding the patrolling of levees for the Warsaw Agricultural University. It is likely that there will also be a project of creating an unmanned aircraft based on the Sonex as soon as the aviation law allows it, for the purpose of implementation of the tasks of the civil services. ■



COMPARISON OF PERFORMANCE OF THE STANDARD AIRCRAFT AND THE FLYING LABORATORY

PARAMETER	SONEX (JABIRU 3300 ENGINE)	SONEX LL (WITH THREE UNDERSLINGING POINTS)
THE MAXIMUM SPEED OF VNE DIVE	317 km / h	317 km / h
MAXIMUM LEVEL FLIGHT SPEED	286 km / h	272 km / h
CRUISING SPEED (0.75 MCP)	274 km / h	240 km / h
ECONOMICAL CRUISING SPEED	240 km / h	210 km / h
RANGE	660 km	600 km
FLIGHT DURATION	2 h 53 min	2 h 35 min
LOAD FACTOR	+4.4 / -2.2 \ [+6 / -3]	+4 / -2
PAYLOAD	up to 245 kg	> 155 ÷ 245 kg
RESEARCH EQUIPMENT LOAD CAPACITY	0 kg	100 ÷ 190 kg
RATE OF CLIMB	7 ÷ 8 m / s	> 6 m / s
SPEED RANGE (MIN-MAX)	> 4.3	> 3.5

source: AFIT



PYROTECHNIC AMBULANCE



PYROTECHNIC AMBULANCES ARE USED IN AIRPORTS IN WARSAW, GDAŃSK, KATOWICE AND RZESZÓW. FOR THE AIRLINE AND PASSENGER, THE PRESENCE OF A AMBULANCE MEANS LESS WASTED TIME IN CASE OF EVACUATION WHEN SOMEONE LEAVES THE LUGGAGE; AND IT HAPPENS SEVERAL TIMES A MONTH. NOW, BORDER GUARDS MAY IMMEDIATELY MOVE INTO ACTION AND SEE IF THE LUGGAGE CONSTITUTES A DANGER. IN THE PAST, THEY SOMETIMES HAD TO GET SPECIAL EQUIPMENT FROM A REMOTE BASE AND LOAD IT TO AN STANDARD CAR.

TECHNICAL CHARACTERISTICS OF THE VEHICLE

TYPE	PYROTECHNIC AMBULANCE	
MODEL	IVECO DAILY 70C17 4 x 2	
PERMISSIBLE MASS	7 000 kg	
DRIVE	4 x 2	
CABIN	3-person cabin	
ENGINE	4-cylinder diesel, straight, 16-valve	
	Max. power	170 KM
	Torque 400	400 Nm
	Engine capacity	2998 cm ³

TECHNICAL CHARACTERISTICS OF SPECIALIZED HOUSING

TYPE	<ul style="list-style-type: none"> ■ Container housing, made of stainless steel – frame made from sealed stainless steel profiles, welded, glued aluminum plating, insulation inside the walls. ■ The floor is covered with non-slip carpet (non-slip anodized aluminum plate), reinforced at the back, in the space reserved for the transport of two pyrotechnic robots weighing 60 and 200 kg with 4 fixing elements for each robot. ■ Reinforced roof with a window (skylight), can be opened to mount robot antenna for the duration of the work. Roof of the container equipped with a boarding ladder and railing, covered with non-slip floor fitted with a ladder fixing system. ■ Container housing equipped with a window in front on the left side (in direction of travel) and door with steps and handrails for easy entry into the container in front of the container on the right. ■ Container housing equipped with lamps illuminating the space surrounding the housing and work area around the vehicle at a distance of 1.5 m (minimum of 5 lx at a distance of 5m) switched on and off from inside the cabin of the vehicle.
INTERIOR OF THE HOUSING	<ul style="list-style-type: none"> ■ Separated front part of the container for a desktop to control pyrotechnic robots with rotating seat for the operator with protection from shifting during transport of the seating and desktop. ■ Desktop post to work with a computer with a dedicated space for mounting a computer system with monitor and printer. ■ In the middle of the back part of the container – separated space for transporting a pyrotechnic robot weighing around 200 kg with anchor points. ■ 2 fluorescent tubes placed and attached inside the container.

SPECIALIZED HOUSING EQUIPMENT

LIFT	On the back wall of the container there is a hydraulic lift with a capacity of 350 kg. Elevator control is carried out through remote control or manually. The maximum slope of the lift in the down position does not exceed 30°. The loading lift is used for loading and unloading pyrotechnic robots and special equipment.
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The vehicle has thermal and acoustic insulation. The antenna is installed on the roof, so the radio can control various devices – including the pyrotechnic robot. Part of the car carrier is designed to transport specialized equipment – such as anti-explosion suits or X-ray.

HAZARDOUS MATERIAL DISPOSAL SET

Container VERA shrapnel-resistant, vented container for transporting explosive materials and devices:

- resistance to an equivalent of 5 kg of TNT;
- loading window and ejected loading conveyor allow loading the object with maximum dimensions 70/50/90 cm (width / height / length) and weight of up to 50 kg;
- drives provide opening and closing of the loading window cover and ejecting and retracting of the loading conveyor;
- cable and battery power supply for the drives (provided equipment for battery charging);
- loading window cover and loading conveyor drive control – wired (25 m) and wireless (80 m);
- construction of a loading conveyor protects against accidental falling of the transported item;
- the arm enables placement of a heavy object on the loading conveyor using a hook-rope set;
- emergency manual loading window lid opening;
- OIB conformity declaration.

VERA container was produced by Jakusz Systemy Zabezpieczeń Bankowych, Bogdan Jakusz z Kościerzyny enterprise.





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AUTO-HIT S.A. was established in 1995 as a completely private company engaged in the sales and servicing of vehicles. In 2000 the company began delivery of transport vehicles to the Polish Army. The year 2003 brought a widening of the area of operation with the production of equipment for transporting main battle tanks and other tracked military equipment. Growing demand for our products has led to the relocation of production to a new plant in Makow Mazowiecki (the north-central part of Poland).

AUTO-HIT SA's commercial offer includes:

- A family of semitrailers for the transport of tanks and other tracked and wheeled vehicles with the carrying capacity of 30-70 tons;
- A family of universal transport trailers with a capacity up to 11 tons;
- Tractors for semitrailers with the emergency vehicle option (based on the IVECO chassis);
- Off-road medical vehicles for transporting up to 4 wounded;
- Logistic transport vehicles with payload of 0.8 to 13 tons;
- Vehicles for transporting 6-9 people;
- Mobile observation stations.

Evacuation kit designed and manufactured by AUTO-HIT (tractor unit based on IVECO chassis and low chassis semitrailers Atlas 30) received the DEFENDER award at the XIV International Defence Industry Exhibition in Kielce in 2006. In our semitrailers we use components of renowned manufacturers worldwide. We also our own technical solutions. New products, or their elements, are subject to detailed research in military institutions before the serial production begins. Our unique solution is a system of mechanical change of the king-pin height. This system allows the user to tow the semitrailers using tractor units of different height. It facilitates the operation of military units and has a beneficial effect on the cost of the transport system.

We have our own design department, with experienced staff of engineers, which allows us to efficiently prepare vehicles that are optimally adapted to the specific requirements of the customer. The construction of our semitrailers and trailers is prepared to the planned transport tasks in every detail. This also applies to the car chassis indicated by the customer, which we adapt and equip for the tasks that need to be performed by the tractor unit.

Such products are manufactured using modern equipment and using the latest global technologies in our factory in Makow Mazowiecki.



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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.



OBR CTM S.A.

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OBR CTM S.A. does research, development, design and experimental work to develop and implement modern solutions in the field of naval technologies as well as other technologies related to national security and defence. The centre is involved in executing NATO and EU programs, including the 7th Framework Programme – the area of security. It also offers its capabilities in testing and certification of products.

Our capabilities are based on modern laboratory facilities, our research and design achievements, long time experience of the science and engineering personnel, broad collaboration with domestic and abroad R & D and industrial centres.

Our development strategy is to constantly improve our capabilities and research potential in order to ensure significant participation of CTM in execution of R & D programs for:

- the Polish Navy,
- other branches of the Polish Armed Forces,
- the services and agencies responsible for our country's security,
- NATO, EDA and EU.

The organization has managed to implement the Integrated Quality Management System compliant, among others, with ISO 9001:2008 and AQAP 2110:2009 Standards. The Research Laboratory and Product Certification Body based in CTM S.A. are both accredited with the Polish Research and Certification Centre. They render services in the field of research and certification of products, particularly those related to naval technologies. The scope of the European Directive is applied is in compliance with the Decision of Minister of Infrastructure No. 5 / the AV / the KE / 08 an granting authorisation.

Key areas of activity are:

- Command, Control and Communication Systems.
- Underwater Weapon Systems.
- Maritime Infrastructure Protection Systems.
- Testing and Product Certification.



Air Force Institute
of Technology

AIR FORCE INSTITUTE OF TECHNOLOGY

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The Air Force Institute of Technology is a research institute supervised by the Minister of National Defence. The Institute's mission is to support the aviation technology in the field of scientific research.

The contribution of the Institute in the development of the Polish Air Force results mainly from the activities in the field of reliability and flight safety in a broad sense. The significant achievements, valued both in the country and abroad, include hundreds of scientific-research, experimental and construction studies which have been applied by the Polish Air Force

The institute conducts the following innovation activities

- The design and integration of airborne systems
- Systems for logistics
- Reliability and safety
- Unmanned aircrafts
- Training systems, including e-learning
- Aircraft armament
- Airport and road infrastructure
- Substitute fuels, working liquids and lubricants
- The use of bio-components in oil and lubricant products for the air industry

AFIT provides a wide variety of complex ground and in-flight tests, including aircraft and helicopters certificate tests. It also tests pilot's individual equipment, airborne high-altitude and rescue systems, airborne and ground systems to transmit or display flight parameters, and it designs and develops of flight-test dedicated measuring and recording systems.

It also provides certification tests of aeronautical products introduced into service with the Polish Air Force, including air armament, as well as simulation tests based on models of aircraft flight dynamics. AFIT additionally develops and tests aerial rocket targets used for air defence forces training.

AFIT can upgrade weapon systems for aircraft, as well as develop new designs of air weapons and aerial targets (bombs, airborne rocket launchers and bomb fuses), and new ground-based and flying testing systems for air forces. It also tests air weapons after warranty periods guaranteed by deliverers/OEMs to extend service-life, upgrades the on-board attack avionics systems for aircraft and helicopters. Aircraft simulation, training and modeling.



**POJAZDY SPECJALISTYCZNE
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Vehicle bearing the Szczesniak 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 Szczesniak 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 Szczesniak 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.



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).

BALT MILITARY EXPO

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„Maritime Technologies for Defense and Security”
NATCON 2014



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DEFENCE INDUSTRY

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- your reliable business partner**