Polish Chamber of National Defence Manufacturers

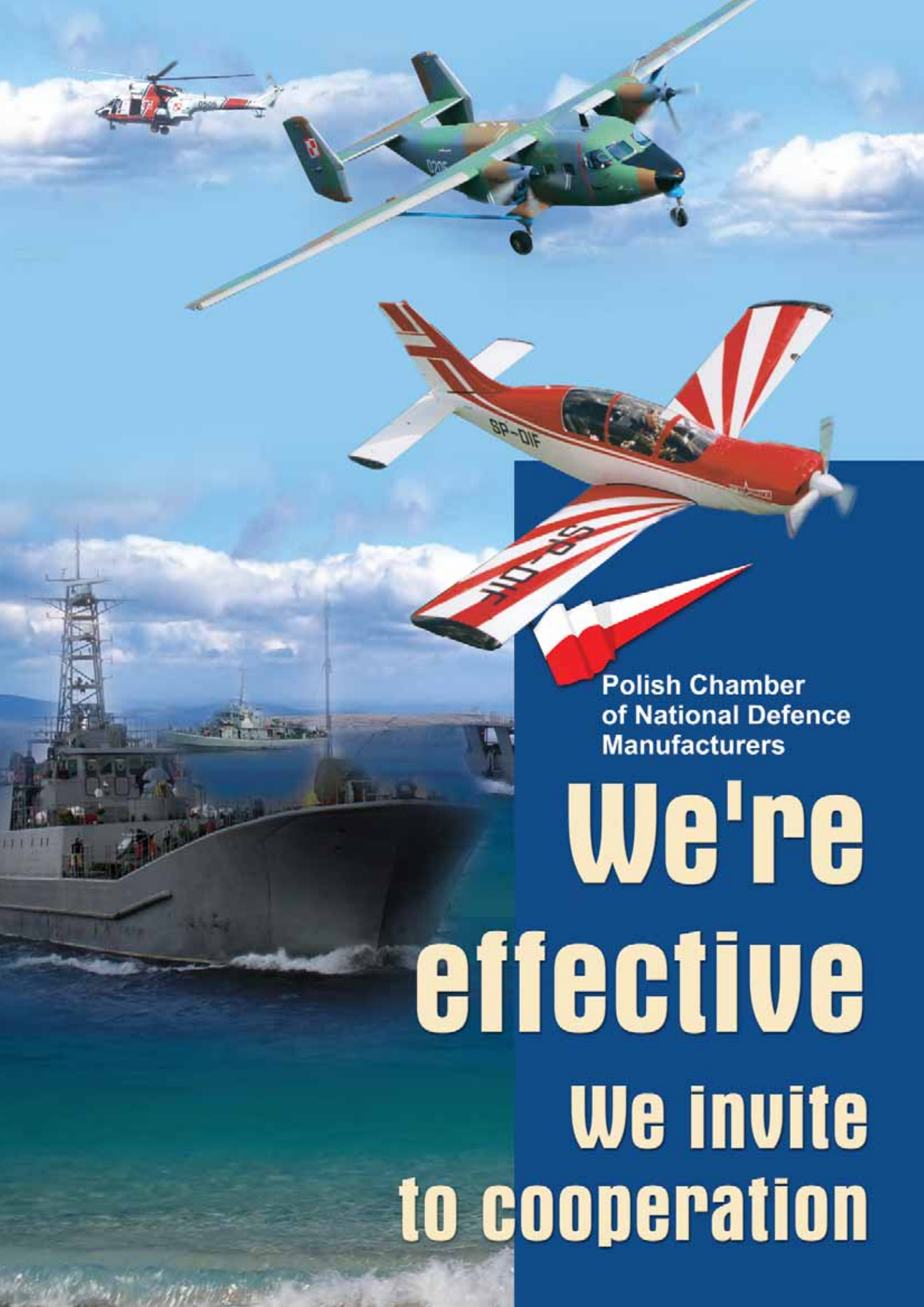
Polish Defence Industry

ISSN 1732-2103

No 4(19)/November 2006

INDO DEFENCE 2006 EXPO & FORUM

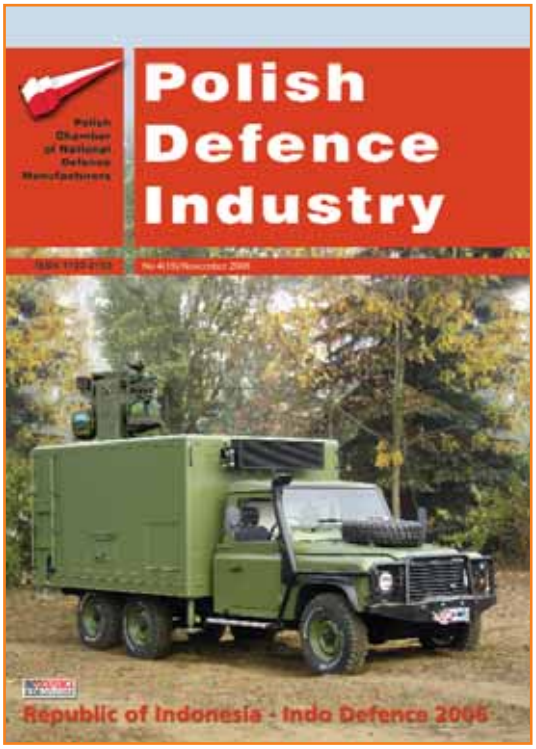
Republic of Indonesia - Indo Defence 2006



Polish Chamber
of National Defence
Manufacturers

We're effective

We invite to cooperation



PUBLISHER: POLISH CHAMBER OF NATIONAL DEFENCE MANUFACTURERS
POLSKA IZBA PRODUCENTÓW NA RZECZ OBRONNOŚCI KRAJU

EDITOR: GrzegorzCHUDEK, Sylwia GADKOWSKA, Izabela JANIAK, Jakub JAWORSKI, Katarzyna KOWALCZYK, Sławomir KUŁAKOWSKI, Jacek LICHTEROWICZ

PUBLISHER'S ADDRESS:
00-961 Warsaw, 22 Fort Wola Street, POLAND;
e-mail: chamber@defence-industry.pl,
tel./fax (+4822) 6344778, 6344779, 8368424
www.defence-industry.pl

DISTRIBUTION AND SUBSCRIPTION:
Sylwia GADKOWSKA

MARKETING AND ADVERTISEMENT:
Jacek LICHTEROWICZ

TRANSLATION:
Jakub JAWORSKI

FOTO:
Cover, 8,16, 17, 26-27CNPEP RADWAR, 4-5, 30 - PCNDM; 7 - PZL Mielec; 18-19 - PIT; 22 - AIRPOL; 24-25 - WZMot Nr5; 25 - OBR SM; 28-29 PIAP

DESIGN:
KNAP ART

PRINT:
KOZAK DRUK

ASTER

Short-Range Modular Air Defence System

The present-day battlefield is characterised by growing number of air armament. Role of combat helicopters and UAV is growing. UAVs are already able to carry different kinds of armament and it is expected that their potential will even grow in the future.
In the same time there is necessity to have air defence systems which will be transportable by air as a parts of rapid reaction forces. ASTER system was designed for easy, modular, complex, short range air defence.
Typical ASTER battery consists of:
- 3D multi-beam search radar (MMSR)
- battery command vehicle (BCV)
- POPRAD mobile missile launchers - up to 6 units
- Guns (e.g. ZUR 23-2 KG) - up to 6 units

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CONTENTS

UNION FOR ENTERPRISING PEOPLE COMPETITIVENESS PROGRAMME

Project part – financed by the European Union European Regional Development Fund

DEZAMET among the leaders

One of the biggest ammo producers, Norwegian Nammo company, will invest in Dezamet. Norwegians proposed joint R&D projects.

Cooperation project between Nammo and Dezamet is supported by Lockheed Matrin as a part of offset for F-16 planes. Factory from Nowa Dęba together with German Dynamit Nobel company, will produce new generation grenade launchers. Soon also technological exchange and cooperation with German potentate Rheinmetall will be possible.

Dezamet is one of the few producers in the world, which produce modern cassette ammo. Such ammo consists of several smaller charges, which being spread in the air blow up and thanks to this cover large area. It's just only one of dozen kinds of ammo invented and produced in Nowa Dęba. In the recent years, the company, has entered elite group of electronic fuses producers for so called intelligent ammo. Dezamet, which sells their products to the Polish Army, would like to deliver ammo to the European allies as well. Riffle grenades were bought by the French. The company has necessary NATO certificates, but it will be important player on the European market, only after finishing 40 mln PLN (13 mln USD) worth modernisation plan.

Dezamet, which might be considered as the "visit card" of the modernised defence industry company, came up to its position through very deep restructurisation. The factory established before the II World War, in 1939, as a part of Central Industrial District, had time only to produce several batches of fuses. Later it produced huge amount of ammo for the Korean war. In 1960s, except mortar grenades and artillery ammo, Dezamet produced also engines for the Polish motorbikes and irons. In 1980s, the company, had up to 5 000 workers.

Today Dezamet employs 550 people. The company concentrates on production for the military, and according to Ministry of Treasury, in years 2003-2004 was the fastest and the most effectively modernised factory in the whole defence industry. For 12 mln PLN (approx. 4 mln USD) installed the most modern machine tools, equipment for quality control and environment protection systems.

Świdnik's development

PZL Świdnik, well known of its helicopters, are becoming the biggest producer of aviation components in our part of Europe.

Farnborough 2006 exhibition confirmed strong position of Świdnik on the cooperation services market. Foreign partners appreciate the company mainly for versatility. Świdnik produces mechanical elements, hulls elements and composite details. Growing orders for composite elements forced company to enlarge , Composite Processing Center for over 30 mln USD. Factory, which sells value on 2005, exceeded 302 mln PLN (100 mln USD), has invested in modern galvanizery and still employs new workers. Since 2004, the company has employed 1200 mechanics and engineers.

Over half of income of PZL Świdnik comes from export of parts for Airbus, Eurocopter, GKN or repair facilities of the US Armed Forces. However the biggest cooperational partner is Italian-British Augusta Westland consortium. In the beginning, the company, produced for Augusta only parts for A-109 Power and A-119 Koala small helicopters. Italians, prompted by effects of the cooperation, in year 2000, ordered engineers from PZL designing hull for the newest medium size transport helicopter. AW-139 transports 15 airborne soldiers, transport loads for the Italian army, and also is being used for VIP transport. Currently Polish factory is the only producer of almost complete construction of that helicopter. With building this helicopter work 200 mechanics and money from Augusta make 1/4 of PZL Świdnik sales. Polish producer has also contracts for building new helicopters from the beginning. This year Świdnik will make two Falcon helicopters for the Iraqi army. For Mi-2 Kania helicopters will be delivered to the Polish Border Guard. Sea SAR units will receive specially equipped Anaconda helicopter. Polish Air Forces received one SW-4 small helicopter, but they announced that for training pilots they will need at least tens of these machines.

The biggest expectation of Świdnik is connected to sales of the newest SW-4 helicopters, designed in 100% in PZL Świdnik, to the United Kingdom, Germany and Russia. The machine received good opinions during the Farnborough show. In the fall, helicopter will receive all necessary safety certificates. 5 people machines, thanks to average price (approx. 1 mln USD per piece) should have big chances in competition with Western ones. 30 helicopters are supposed to be bought by the Polish MoD for pilot training.

Conquering Malaysia

Rosomak (Wolverine) armoured fighting vehicles produced by Wojskowe Zakłady Mechaniczne from Siemianowice are tested by the Malaysian army.
Polish vehicle competes with Swiss Mowag (currently General Dynamics) Piranha III and Turkish Pars vehicles. After the jungle tests Wolverine received good opinions, which might mean growing chances for selling approx. 150 vehicles to Malaysia.

NATO investments in Poland

Two Polish consortiums and one Czech are fighting for the biggest in Poland orders of NATO. NATO would like to build twelve fuel bases worth over 400 mln PLN (approx. 133 mln USD).
That's the second approach of the Polish MoD to this tender. After the first one German (Tankbaum and Rohrtechnik) and Turkish (Yenigun) companies made a protest. According to NATO recommendation, Polish army modified requirements and opened envelopes with the offers once more. Tank installation technology has to fulfill exacting safety and security requirements. Big, underground tanks and fuel pumping installations in the land bases and on the airfields will be made using environment friendly technologies. Due to the formal reasons Turkish company has already dropped out, because it didn't pay the deposit. That left only Czechs and two Polish consortiums with Hydrobudowa 6 and PBG as leaders.
The newest tender is related to building first two fuel depots in the Malbork air base and in land forces base in Cybów. NATO decided that only the tender winner will be allowed to negotiate.
Building of fuel bases, modernisation of 7 air bases, 2 ports, and installation of 6 long range radar posts, and building NATO joint forces training center in Bydgoszcz are the most important NATO investments in the recent years. Since 1999, 59 tenders has been conducted, and a value of contracted work is approx. 1,2 bln PLN (400 mln USD). In summary, the Alliance, already accepted investment plans in Poland 2,3 bln PLN (800 mln USD) worth. Polish annual fee for NATO fund for building defence installations serving Allied armed forces, since 2006, amounts 93,2 mln PLN (approx. 31 mln USD).
NATO ends big construction works not only in Poland. Now, it's time for equipping the objects with electronic installations. Equipping Air Forces command posts and developing air space control system according to NATO plans will cost almost 100 mln PLN (33 mln USD). Investments in land based Navy communication and command system will be worth 89 mln USD (30 mln USD).

F-16 fighters engines from Rzeszów

WSK Rzeszów will produce plane engines (incl. engines for F-16) under the Pratt & Whitney brand.
Factory which belongs to US United Technology Company develops its own R&D center. This information was provided by Stephen FINGER, the new President of the Pratt & Whitney. American owners have invested in Rzeszów over 100 mln USD. 1300 technicians and engineers were employed. This year WSK plans to employ the next ones.
Assemble of F-100-PW-229 propulsion for all of the 48 Polish F-16 multirole planes will be done by the WSK from Rzeszów. Only two factories in the world assemble brand new F-100 engines. The first is the Pratt & Whitney factory in Middletown, Connecticut, and the second one is WSK Rzeszów. For the Polish factory it's very prestigious. On the W-58 section of the factory, where the engines are being produced, access has only limited number of people. On F-16 engines assembly work the team consists of around 20 people. Among them are experienced employees as well as young Rzeszów Technical University graduates, who completed courses in the USA. Majority of parts for the engines assembly is delivered from America, however Polish insert grow continuously. In Rzeszów whole piping system for the engine is made. WSK starts production of rotating parts - discs, which production needs especially high precision.
Monthly Rzeszów will assemble two engines. After tests in Wasaw they will be send to Forth Worth, Texas, where Lockheed Martin produces F-16 fighters. First 4 F-16 planes already landed in Poznań-Krzesiny airbase in the beginning of November.

COOPERATION

BETWEEN POLISH AND INDONESIAN DEFENCE INDUSTRY ON THE FIELD OF ARMAMENT

Indonesia was the first non-socialist block country to which Poland sold military equipment, after II World War. That happened in year 1959, and the equipment were NYSA radiolocation stations. After that the cooperation was very minor for almost 40 years. It was "reactivated" in year 2002, when the official delegation from Poland, led by Vice Minister of Economy - Mr. Andrzej SZARAWARSKI and Vice Minister of Defence - Mr. Janusz ZEMKE, came to Indonesia and conducted talks concerning cooperation of our defence industries. Next initiative was trade mission organised in April 2002 by the Polish Chamber of National Defence Manufacturers. One of the initiatives was seminar for the Indonesian Armed Forces and Police senior officers and representatives of the local companies. During this seminar Polish defence industry abilities were presented. The meeting gave the opportunity for establishing initial contacts between companies from our countries. Similar seminars were organised in Jakarta in August 2003, November 2004 as a part of the Polish defence industry trade mission, in 2005 as a part of the Polish Prime Minister Mr Marek BELKA visit to Indonesia, as well as in year 2006, during Polish Minister of Defence Mr Radosław SIKORSKI visit.

PZL SKYTRUCK for Indonesian policy

Other important event was visit of the President of Indonesia, H.E. Megawati SUKARNOPUTRI in Poland in April 2003 and Polish President Mr. Aleksander KWAŚNIEWSKI in Indonesia, in February 2004. During the first of the above mentioned visits, several Polish defence industry companies presented their offer for the Indonesian Armed Forces and for the Police as well. After that, during visit of President KWAŚNIEWSKI to Indonesia, the following agreements were signed:

- between Polish Aviation Factory from Mielec and Dirgantara Indonesian Aerospace concerning production of Skytruck planes in Indonesian factory, mostly for ASEAN countries civilian markets;
- between PZL Świdnik and Dirgantara Indonesian Aerospace; the Indonesian were interested mainly in co-production of SW-4 and Sokół (Hawk) helicopters;
- between Naval Shipyard Gdynia and Surabaya Shipyard; companies signed draft of the agreement with modernisation of Indonesian Navy ships;
- between BUMAR and PINDAD.

Brisk marketing on the Indonesian market has led to signing many contracts by the Polish companies already exceeding 150 mln USD. In November 2003 Polish Aviation Factory signed contract with Indonesian Police for deliveries of 4 PZL M28PI Skytruck planes in passenger-transport version. Two planes were delivered in October 2004 and the other two in December 2004.

After introducing program of floating units which are responsible for protecting borders and

Cenzin

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AVIATION AND RADIO-ELECTRONICS CAPITAL GROUP

We offer

- Polish medium and light, multi-purpose aircraft and helicopters in following versions:
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  - passenger - VIP
  - cargo
  - medical
  - agricultural and fire fighting
  - trainer
  - SAR and patrol
  - mountain rescue
  - police
  - armed
- Communication equipment and systems:
  - ELINT/COMINT/ECM systems
  - VHF/FM frequency hoping handheld, manpack and vehicle transceivers
  - Universal digital commiunication system used both at tacctical or strategic level of military instalations
  - High capacity line of sight (HCLOS) radio systems working in I,II+ and IV band
- Spare parts for aircraft and helicopters
- Overhaul and repair of aviation equipment (aircraft engines, gearboxes and starters)
- Airfield ground support equipment (for supporting of electrical, hydraulic and pneumatic systems)
- Pilot's equipment (helmets, oxygen masks, flying suits)
- Parachutes (personal parachutes, braking parachutes)
- Aircraft and helicopters modernization
- Inspection and service life extension of aircraft and helicopters armament systems
- Training of flying and ground personel
- Technical assistance and training of military specialists
- Individual equipment and armament for antiterrorist forces:
  - Bulletproof vests and helmets
  - Tactical vests
  - X-Ray scanners
  - Special ammunition

KOMBINAT PZL HYDRAL SPÓŁKA AKCYJNA · PZL Mielec · A·R·P · PZL Świdnik · RADMOR

AVIATION AND RADIO-ELECTRONICS CAPITAL GROUP
00-957 Warsaw
81/83 Czerniakowska Street
Phone/fax: +48 (0) 22 841 12 63, +48 (0) 22 841 12 66
e-mail: cenzin@cenzin.com.pl
http://www.gklr.com.pl

sea economic zones by Indonesia, Naval Shipyard Gdynia signed in 2005 contract for deliveries till 2007, five patrol ships for the Indonesian National Police.

Patrol boats will base on the N-935 patrol boat project. Units for Indonesia will be 1 meter longer, they will also receive slightly changed quarterdeck. Armament will consist of tree single 12,7 mm machine guns. One will be placed on the main deck bow, and the other two on midship on quarterdeck, right behind the mast. There is also ability to use other armament variants, including mounting 23 mm Wróbel system double barrel gun in the turret on the bow. Important element of the equipment is also 6 people hybrid inspection-boat, for which place is foreseen on the main deck stern, with ability of placing it on the water using small crane. Inside of the ship will be air conditioned.

Continuing successes of the Polish aerospace industry on the Indonesian market, PZL Świdnik realised significant contract for deliveries of 11 Mi-2 Plus helicopters for the Indonesian Police.

On July 4th, 2005 in Jakarta, during visit of the Polish Prime Minister Mr Marek BELKA, Indonesian Ministry of Defence signed contract with BUMAR for deliveries of the first upgraded air defence system, integrated by the CNPEP RADWAR (35 mln USD worth). 5 days earlier, Polish government, finished procedures of granting 29,75 mln USD credit for financing of 85% of this contract. This money is the part of 145 mln USD credit for Indonesia, mainly for purchasing Polish aircrafts and ships by the Indonesian Police and the Navy.

In years 2007-2008 ASTER Short-Range Modular Air Defence System will be introduced into the Indonesian Army. Its main goal is to give protection against air strike. Composition of system was designed with special care for high efficiency in fighting helicopters and light aircrafts.

ASTER system is basing on products which are offered for some time by CNPEP RADWAR, ZM Tarnów or ZM Mesko from Skarżysko Kamienna.

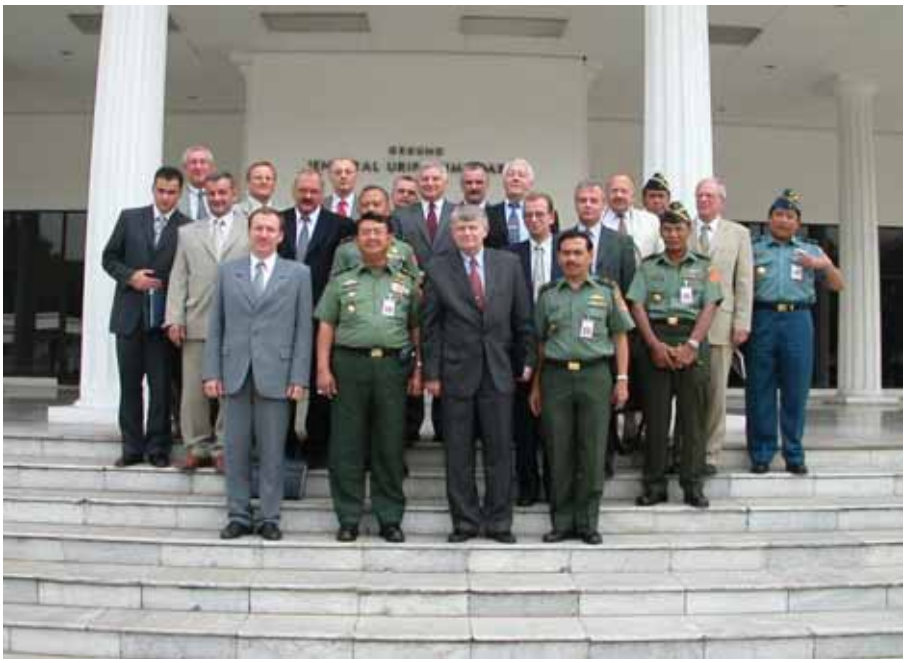
ASTER system consists of: S-Band light 3D MMSR radar with 40 km range, highly jamming resistant (the radar is development of initial detection radar for the LOARA self-propelled air defence system); two WD-95 battery commanders vehicles basing on modified (by the Polish companies) Land Rover Defender 110 chassis, which allow for commanding artillery-missile ZUR-23-2KG Jodek-G sets with double short range missile launcher produced by ZM Tarnów and 2 self-propelled POPRAD mobile missile launchers (on the same chassis as WD-95 vehicles) produced by CNPEP RADWAR.

As a part of the contract 4 POPRADs and 14 ZUR-23-2KGs, at least 76 GROM ground-to-air missiles, 23 cal. BZT ammo, and the newest FADST sub caliber ammo produced by ZM Mesko will be delivered.

There are also big chances for sales of two TRL-1235 air control radars produced by Telecommunication Research Institute (export version TRL-1230/N-12M).

There is a lot of opportunities for cooperation between Poland and Indonesia in the defence branch e.g. in naval industry, aerospace or electronics. We have experience in landing troops ships, logistic ships as well as mine destroyers, which might be very helpful for Indonesia with its dozen thousand square miles territory.

In year 2005, during visit of Polish Prime Minister Mr Marek BELKA to Indonesia, Polish Chamber of National Defence Manufacturers signed Memorandum of Understanding with KADIN (Indonesian Chamber of Commerce) having, among the others, all Indonesian defence industry companies as members. ■



Members of the Polish Defence Industry Mission to Indonesia right after meeting in MOD, August 2003

MILITARY MECHANICAL WORKS JOINT-STOCK COMPANY

Military Mechanical Works Joint-Stock Company in Siemianowice Slaskie has over 50 years of experience in repair, modernisation and production of special goods for the army.

COMPANY'S OFFER INCLUDES:

PRODUCTION OF:

- Infantry Fighting Vehicle ,,ROSOMAK" 8x8,
- technological devices,
- special equipment,
- spare parts,

OVERHAUL REPAIR OF:

- tracked and wheeled combat and special purpose vehicles like:
  - tanks of T-55 and T-72 type,
  - WZT-1 and WZT-2 technical support vehicles,
- diesel engines from 100-1000 HP power range,
- power transmission system

MODERNISATION OF:

- armoured recconnaissance vehicle BRDM-2 to the following versions:
  - BRDM-2M96i as a basic version,
  - BRDM-2M96iK ,,JACKAL" - forseen for operations in hot climate,
  - Zbik B - recconnaissance version,
  - Zbik A - command-recconnaissance version.

Military Mechanical Works Joint-Stock Company obtained the following certificates:
- ISO 9001, ISO 14001 and AQAP 2110,
- Internal Control System of Rotation,
- NATO Commercial And Government Entity Code (NCAGE) 0291H.

41-100 Siemianowice Slaskie
Powstancow 5/7 Street
POLAND
tel.: + 48 32 228 57 51
fax: + 48 32 228 12 52
e-mail: wzms@wzms.pl
Web Site: www.wzms.pl

NAVAL SHIPYARD GDYNIA S.A.

RELIABLE PARTNER FOR NAVIES

The Naval Shipyard Gdynia S.A. established in 1922 operates as joint stock company owned by the Polish Government. Currently the Shipyard employs a workforce of about 1450 persons.

NS-935 type fast patrol craft for Indonesia pictured during the dock trials. Please note the hull shaped for speed and the wheelhouse with good round visibility.

PRODUCTION FOR NAVIES

Naval Shipyard Gdynia S.A. specialises in construction of various types of naval vessels up to 100 m length, including landing ships (LST), landing craft (LCU) and patrol craft, and also regularly carries out repairs of naval vessels from frigates to submarines for the Polish Navy and Coast Guard services. Numerous small ASW vessels, patrol craft and auxiliaries were constructed and joined the Navy and Coast Guard. Currently a new corvette for Polish Navy is under construction.

One of the more important recent programmes in hand for Polish Navy is the reconfiguration and modernisation of three large type 660M (Orkan class) fast attack craft armed with new very capable SSM giving them a real punch. These vessels are being provided with new combat management system and new sensor outfit.

Significant number of the very successful 1300 t medium landing ships, were built at Naval Shipyard Gdynia S.A. for Indian and Middle East Navies in four batches of four ships. Currently some of them are being reengined for further fifteen years of service, this being the proof of the user satisfaction.

In the eighties and nineties seventeen GRP–hulled minesweepers were built for the Polish Navy, their characteristics being compatible with international standards for mine countermeasure vessels (MCMV). Recently three older Polish large minesweepers were fully converted into type 206FM minehunters.

RECENT EXPORT SALES OF NAVAL VESSELS

Recently Naval Shipyard Gdynia S.A. has delivered to Yemeni Navy one type NS-722 medium landing ship and three type NS-717 fast landing craft, developed from the earlier service–proven NSG ship designs.

INDONESIAN CONNECTION

Contacts between Naval Shipyard Gdynia S.A. and Indonesian partners can be traced back to the early sixties of the past century when cooperation was established with Indonesian Navy.

Currently our Yard has under construction a series of five NS-935 type fast patrol craft for Indonesian National Police. These ships wholly designed by the Yard's Design Office are to be completed by the end of the year 2006. The delivery to Indonesia is scheduled for the early 2007. These vessels fully comply with Indonesian National Police requirements for law enforcement duties on coastal waters having adequate seakeeping qualities, speed range and endurance.

CURRENT OFFER

Naval Shipyard Gdynia S.A. can offer construction and delivery of military and paramilitary vessels designed at Yard's own Design Office and specially tailored to the specific needs of each customer:

- NS-935 type patrol craft (198 t, 36.4 m, 25 kn)
- NS-940 type fast patrol boat (227 t, 42.1 m, 30 kn)
- NS-955 type patrol vessel (403 t, 55.4 m, 28 kn)
- NS-958 type patrol vessel with helicopter landing deck (405 t, 57.5 m 28 kn),
- NS-723 type medium landing ships (1410 t, 88.7 m, 17 kn, military lift: 5 MBT and 111 troops),
- NS-717 type fast utility landing craft (240 t, 40.1 m, 16 kn, military lift: 1 MBT or 2 other vehicles and up to 30 troops).

All our in-house designs were developed with the use of know–how accumulated over the years due to the close contacts with customer Navies operating in tropical or subtropical environment.

Profile view of the NS-935 type fast patrol craft. Note the fast inspection boats stowed at the stern of the vessel.

COMMERCIAL SHIPPING

Besides military our Yard also serves commercial customers. During past decade over 700 commercial ships were repaired, modernised or converted. In recent years Shipyard delivered container ships, product tankers, bulk carriers, offshore standby-rescue vessels, small ferries, fuel barges and fishing trawlers.

MAIN FACILITIES

Naval Shipyard Gdynia S.A. facilities include 2500 t mechanical lift dock and 12 stands, allowing construction and repair of ships of up to 105 m length. The Yard has also an 8000 t floating dock for vessels up to 20000 dwt. Shipyard facilities also include armament and electronics workshops. A specialised Design Office staffed by experienced personnel forms another important asset for the NSG S.A.

NAVAL SHIPYARD GDYNIA S.A.
(Stocznia Marynarki Wojennej S.A.),
81-127 GDYNIA,
ul. ŚMIDOWICZA 48, POLAND,
Phone.: 0048 58 625-01-48, 625-43-61,
Fax: 0048 58 625-01-47,
e-mail: commercial@navship.pl,
website: www.navship.pl

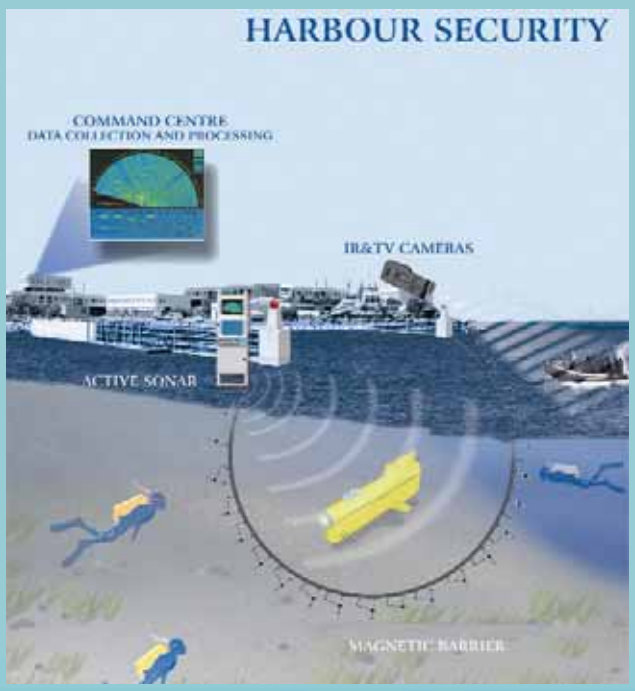
NS-722 type medium landing ship built and delivered to Yemeni Navy. The ship is shown during trials

CTM
- Polish R&D Marine Technology Centre

OBR Centrum Techniki Morskiej (CTM) was established in 1982 as a state owned organization. Since that time it has performed successfully its basic task that is development and implementation of modern solutions in weapon and equipment systems for the Polish Navy. The company is situated in Gdynia, Poland.

CTM has subsidizing as well almost 25 years of experience in conducting research on modern technical solutions in the wide spectrum of naval technology. The staff is over 220 of personnel, 70% of which R&D personnel, designers and engineers (including 20 with postgraduate degrees).

Harbour Protection System KRYL



CTM has at its disposal vast laboratory resources equipped with installations that are in many cases unique. The staff and laboratory potential enabled establishing Research and Product Certification Body, both certified by the Polish Accreditation Centre.

Principal areas of activity are:

C3I and Combat Management System

The Polish Navy Automated Combat Management System is developed as an integrated and open concept. It is being built of objects destined for various platforms (headquarters, warships, aircrafts etc.)

Available system features:

- data collection and information processing from co-functioning objects, sensors, surveillance subsystems;
- management and decision process support;
- subsystems control and management (armament, communication etc.).

Developed, on request of the Polish Naval Forces: coastal system comprises integrated array of the decision level objects (the Polish Navy Headquarters) and tactical (flotillas, the Naval Air-Brigade). The mentioned objects, tied-up within a naval extensive cable and radio (HF, VHF/UHF) network, have been in service for several years.

In 2001, the System was expanded with KRYL sub–system capable of underwater situation monitoring at the areas close to harbour entries and selected seaways, crucial from the operating point of view. The sub-system performs a significant role as an element of anti-diversion and anti-terrorist protection.

The first ship system PSTROKOSZ for the MCM vessel was installed in 1996. Until today five different types of vessels are equipped with the aforementioned.

Presently, development of a modern underwater armament steering and control system is being performed upon the order of the Ministry of Defence.

An example of works conducted in armament area systems is currently development of a modern, digital guns control sub-system. The first implementation of the sub-system shall be destined for AK-176 and AK-630 guns (made by former USSR), presently in use by the Polish Naval Forces.

Communication Systems

Dynamic development of HF radio communication destined at the assurance of high reliability and integration of cable networks with radio systems has been observed in recent years.

CTM being the leader among manufacturers of solutions aimed at the defense sector offers the HF radio communication system based on

HF NODES using the transmission protocol ARQ (Auto Repeat reQuest).

Underwater Weapon System

Development of underwater weapon system is among the most important aspects of CTM activities. Its role is determined by importance of such systems in the nowadays naval applications. Systems being delivered for the Polish Navy use in–house conceptual designs together with selected elements of modern high technology solutions developed by renowned world manufacturers.

The area of our activity encompasses three principal research, design and development directions: mine countermeasure systems, sea mines and fuses, harbour intrusion protection.

Among the examples is the newest generation magneto-acoustic influence sweep PROMIENICA destined for precise simulation of time-spatial ships' fields distributions.

The utmost attention and importance was focused upon depth charges used against the sea mines. The system performing such aims was developed and comprises: remotely fired depth charges TOCZEK with the application of a coded hydro-acoustic signals, underwater vehicle UKWIAL (ROV) equipped with minehunting sensors and TOCZEK depth charges deployment system.

Being conscious of high effectiveness of sea mines applications it's only prudent to utilize the in-house expertise for their design. In this field CTM develop and manufacture: bottom mines, influence fuses for moored mines and programmable fuses for depth charges.

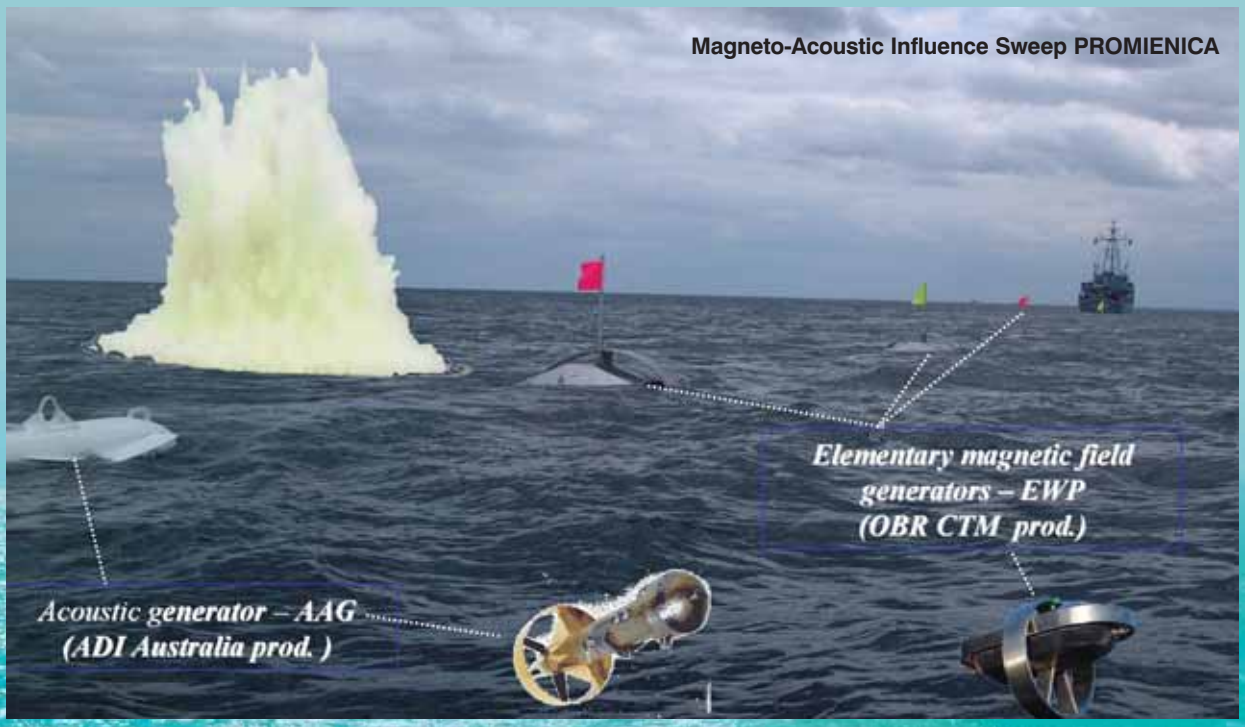
CTM is the supplier of the sonar systems for surface ships and harbour protection systems with 20 years of experience in the field of sonar systems. Developed and manufactured by CTM SHL-100AM sonars are installed on mineswe epers and mine hunters of the Polish Navy. The ASS - Active Stationary Sonar ensures effective protection of the port entries and naval bases from sabotage and terrorist attacks. It detects tracks and records intruders such as mini–subs, AUVs, swimmers and divers. The ASS sonar is a subsystem of the Harbour Protection System "KRYL".

TOCZEK Depth Charges Deployment System

The latest design is SHL-101/T sonar system. It is up-to-date, passive and active, wideband and high–resolution hull mounted sonar. The sonar performs detection, localization and classification of bottom and moored mines including stealthy and low target strength mines. SHL–101/T is designed for transmission and reception of acoustics signals at three different frequencies: LF – Low Frequency, HF – High Frequency and VHF – Very High Frequency.

The sonar system design is based on naval requirements equipped with highly integrated, low–noise, front–end electronics and modern wideband acoustic transducers manufactured by Thales Underwater Systems (France).

CTM offers to prospective domestic and international clients its own research and production potential in aforementioned activity areas. Different forms of cooperation, starting from prepared systems and solutions delivery through know–how transfers to scientific collaboration, are possible. ■



Magneto-Acoustic Influence Sweep PROMIENICA

A way to fame

DD 9620T Vehicle Terminal for TROP Batllefield Management System

In 1997 WB ELECTRONICS company has been establish by three friends: Piotr Wojciechowski, Adam Bartosiewicz and Krzysztof Wysocki. From 43 employees only 3 are working in the administration, the rest of them are engineers, constructors, and software specialists. Company's capital is people and knowledge. Innovation is a source of success.

40 people working team, have a very big innovation potential. The main recipient of WB ELECTRONICS products is the Polish Army. Company is specialising in the automatisation of battlefield.

The main products are TOPAZ Fire Command Control System for self-propelled howitzers, and FONET digital internal communication system. The newest product is TROP battlefield management system, which passed practical test in Iraq.

FONET Military Internal Communication System

In Poland WB ELECTRONICS doesn't have any rivals. Two other companies which operate on the electronic market TRANSBIT from Warsaw and DGT from Gdańsk, have a complementary offer and those three companies don't compete between themselves.

DGT specialises in the telecommunications devices, and Transbit specialises in radiolines.

On the world market, company must compete with such big companies as Marconi, Thales, British Aerospace, General Dynamics.

In some research studies company has better results then rivals. In 2001, the Polish Army has started implementation of FONET and TOPAZ a year later. Similar system to TOPAZ has only one other army in Europe. The main rivals on the electronic market have been late with similar system for few years.

FONET system has been bought by the Swedish Army. For Polish companies it is the best reference, because Sweden has one of the most modern armies. Polish offer was better than offers of, such a big and well known companies as Thales, General Dynamics and Ericsson. ■

HUTA STALOWA WOLA S.A. - MILITARY PRODUCTION CENTER
Poland, 37-450 Stalowa Wola, ul. Kwiatkowskiego 1, tel.: (48-15) 843 73 40, fax: (48-15) 843 49 84, e-mail: mk-cpw@hsw.pl
www.cpw.hsw.pl

ASTER

Short-Range Modular Air Defence System

3D multi beam search radar (MMSR)

The present-day battlefield is characterised by growing number of air armament. Role of combat helicopters and UAV is growing. UAVs are already able to carry different kinds of armament and it is expected that their potential will even grow in the future.
In the same time there is necessity to have air defence systems which will be transportable by air as a parts of rapid reaction forces.

ASTER system was designed for easy, modular, complex, short range air defence.

Typical ASTER battery consists of:
- 3D multi-beam search radar (MMSR)
- battery command vehicle (BCV)
- POPRAD mobile missile launchers - up to 6 units
- Guns (e.g. ZUR 23-2 KG) - up to 6 units

SYSTEM ELEMENTS

MMSR is a 3D multi-beam search radar designed for detection and pointing at targets in medium and short range (up to 40 km) air defence systems. MMSR has quite strong average power of transmitter, which secures big enough coverage and high resistance in case of jamming. MMSR might be place on any chassis fulfilling specific mechanical requirements.
Antenna in working position is hydraulically lifted up to 3,5 m above the surrounding terrain level and is folded for transport. 4 hydraulic jacks are used for leveling and stablising vehicle during using MMSR. The vehicle is equipped with land navigation system, which combines counting navigation basing on precise gyroscope,

ZUR-23-2 KG Antiaircraft and Missile system

and data from the GPS receiver. Thanks to that position of the radar is updated in real time and its orientation is possible right after arrival to the new place.
Radar uses mobile power plant, placed on trailer towed by the vehicle. Operator station is placed inside the cab and consist laptop and additional control panels. Operator has the ability to observe tracks of the targets and indicators of the equipment status. He could also have access to settings for checking or changing some parameters. Control panels on his left side are for raising the antenna and for communication equipment control.

POPRAD is designed for destroying air targets on small and medium altitude using guided missiles. The set is prepared for cooperation as a part of automatic air defence control system, which delivers data (using digital link) on the targets which have to be destroyed. High dynamic parameters of tracking head propulsion allow destruction of fast maneuvering targets. Thermal camera (FLIR) is used for tracking air targets. FLIR allows for fighting targets day and night. The set is equipped with IFF (identification friend or foe) device, which minimises possibility of friendly fire and rises autonomy of using POPRAD in the battlefield. Small size and weight assures easy transportation of the equipment for long distances in different ways.

Parameters of the set:
- Altitude of effective engagement of targets: 10 to 3500 m
- Range of effective engagement of targets: 500 to 5500 m
- Number of missiles on board: 8 (4 + 4 reserve)
- Crew: 2 (commander/operator and driver)

ZUR-23-2 KG it's a very deep modernisation of well known ZU-23-2 system. All electrical drives were modified, and the whole station is controlled using joystick. The joystick is also used for conducting fire, thanks to electric triggers. Old opto-mechanical sight was replaced by modern CKE-2 telemetric sight. Old Striela-2M missiles were replaced with new GROM missiles with 5,5 km range. In combination with new sub-caliber ammo for the guns, we receive modern and effective short-range air defence weapon. Since year 2002, modernised gun under the name ZUR-23-2KG JODEK-G is being in use by the Polish army.

ZGS-158 Opto-electronic Tracking Head is a typical head with flexible mounting options for sensors and other devices. Producer underlines fact that the client can choose which equipment should be place on the head: FLIR camera, CCD camera, laser range finder, IFF interrogator, etc.

POPRAD mobile missile launchers

PIT Telecommunications Research Institute

ul. Poligonowa 30; 01-450 Warszawa, Poland

phone: +4822 48652 225; fax: +4822 4865 218

www.pit.edu.pl

P.I.T. Radars

for Sea Security

The protection of the national sea interest became a complex issue nowadays. As far as the high seas activities remain the domain of the great global actors, even small countries are vividly interested in protection of their sea borders, and particularly of their Exclusive Economic Zones. The protection missions are entrusted usually to the services of Navy, Coastal Board and Customs which cooperate with each other to the level which depend on organizational solution specific to the country.

Irrespective of the type of the national service being involved in the sea border protection, the awareness of the littoral situation is crucial factor.

In Poland, the Telecommunications Research Institute (P.I.T.) is an important supplier of the radar technology and command&control systems. The product line includes a variety of military radars, mainly the big air defense long-range and medium-range radars, air defense C2 systems and Electronic Warfare systems.

This paper gives a short description of technical solutions delivered by P.I.T for the systems of recognition focused at the sea military and civilian security.

Nowadays the most effective means of recognition that the Polish Navy posses es is a number of Bryza 1RM maritime patrol airplanes, which have been manufactured and extensively upgraded by PZL Ltd, Mielec, Poland. The Navy version of the airplane is outfitted with a number of sensors and systems, the most important of them being the ARS-400 Airborne Radar, which has been designed and delivered by P.I.T., Warsaw.

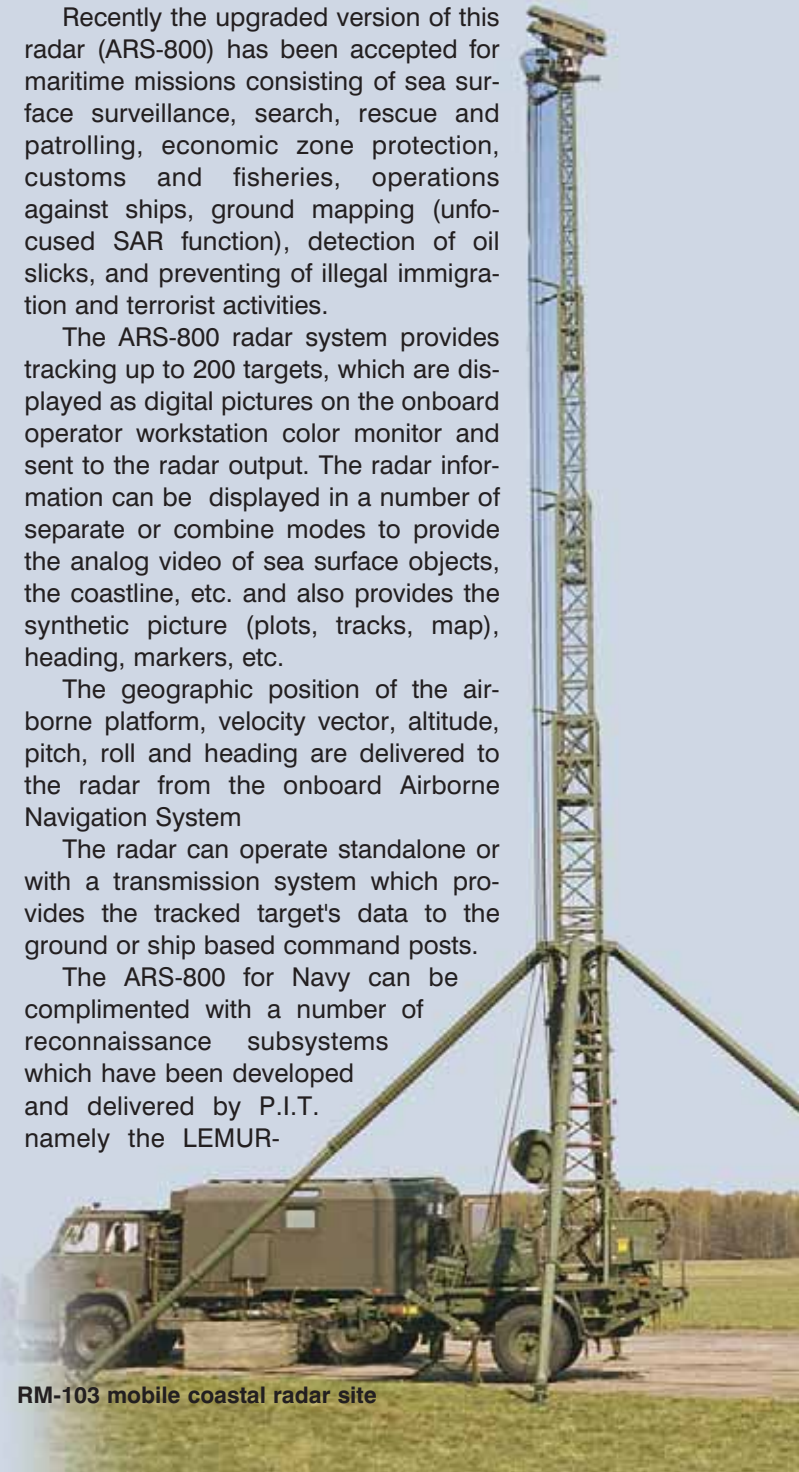
Recently the upgraded version of this radar (ARS-800) has been accepted for maritime missions consisting of sea surface surveillance, search, rescue and patrolling, economic zone protection, customs and fisheries, operations against ships, ground mapping (unfocused SAR function), detection of oil slicks, and preventing of illegal immigration and terrorist activities.

The ARS-800 radar system provides tracking up to 200 targets, which are displayed as digital pictures on the onboard operator workstation color monitor and sent to the radar output. The radar information can be displayed in a number of separate or combine modes to provide the analog video of sea surface objects, the coastline, etc. and also provides the synthetic picture (plots, tracks, map), heading, markers, etc.

The geographic position of the airborne platform, velocity vector, altitude, pitch, roll and heading are delivered to the radar from the onboard Airborne Navigation System

The radar can operate standalone or with a transmission system which provides the tracked target's data to the ground or ship based command posts.

The ARS-800 for Navy can be complimented with a number of reconnaissance subsystems which have been developed and delivered by P.I.T. namely the LEMUR-



RM-103 mobile coastal radar site

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10 radar warning receiver and antisubmarine recognition means (sonobuoys and hydromagnetic system). Together, one can form a complete naval reconnaissance system integrated onboard this relatively small and inexpensive aircraft , thus providing the same functionality as that found on greater aircrafts.

Although the ARS-400/ARS-800 radar is chiefly Navy oriented, due to its multi-function nature, it can also be employed extensively by the Border Guard.

The CRM-10x is another quiet coastal radar family of sensors, which have been developed by P.I.T., currently in service in Polish Navy. The radars are suitable for use in integrated information systems.

The X-band CRM-10x are frequency modulated continuous wave (FMCW) radars. They are designed to detect and to track up to 40 sea surface targets and to transmit the data automatically to command systems. It can be used to monitor all types of sea coast activities, including the eventual fraud traffic, illegal immigration and the search and rescue missions.

The technology used by the CRM-10x solution provides a unique Low Probability of Intercept feature: the radar is virtually invisible for the radar warning receivers (RWR). While typical pulse coastal radars can be detected by RWRs from 50

2.X-Band antenna of the ARS-800 MPA radar

km, the FMCW CRM-10x radar won't be detected until distances are so short as 800 m.

Radar can be installed in the adapted cabin of an all-terrain truck by mounting an antenna on top of a mast deployed up to 22 m. Together they form the mobile RM-103 coastal radar post. The post is highly mobile and can be operated from behind the line of trees along the sea shore.

The FMCW technology is used also by the CRM-20x Navy Navigation Radar as well as by the RPW-10 Battlefield Radar (both offered by P.I.T.).

The conventional pulse radar technology for civilian coast protection is represented by two types of magnetron pulse radars. The radars are of similar design, the only being the antenna design and signal processing.

The MSR-100 is designed to detect oil slicks on the sea surface. The fan-shaped radar beam scans the sea surface and produces the image representation of the back-scattered radar echoes. Detecting of oil slicks is achieved through analysing the reflectivity of the sea surface. The reflectivity coefficient of the water is reduced by the oil slicks what can be detected by analysis of the energy level of the radar echo. The radar has all-weather capabilities and is able to produce the day-and-night images of the sea surface .

Radars of this type are in service on a Baltic sea oil platform and help contribute to protect the environmental parameters. This is particularly important in the Baltic Sea because of its closed nature very sensitive sea biology.

Another pulse radar, the ROW-100, is a dedicated automated radar post for coastal protection systems, with special signal processing.

Proven Navy solutions, civilian maritime solutions and over 50-years' experience in the development of radar technology, allow P.I.T. technologies to be used all over the world. (ad)

1.Bryza 1R Bis Maritime patrol aircraft

INSTYTUT TECHNICZNY WOJSK LOTNICZYCH

AIR FORCE INSTITUTE OF TECHNOLOGY

ul. Księcia Bolesława 6, 01-494 Warszawa, skr. poczt. 96

tel. (48 22) 685 20 01, tel./fax 836 44 71, 685 22 99

e-mail: poczta@itwl.pl Internet: www.itwl.pl

THE STATIONARY TERRAIN-SURVEILLANCE SYSTEM

Thorough knowledge and rich experience of the staff of the Instytut Techniczny Wojsk Lotniczych (Air Force Institute of Technology), the technical documentation at hand - all these enable design, development and delivery of both stationary and mobile **Terrain-Surveillance Systems** to systematically observe objects and areas located in different climatic regions. The systems have been intended to provide protection to special--purpose facilities, military units, and areas where special (covert) military/transport (e.g. convoy) operations are performed. Protection can be provided regardless of the time of the day, weather conditions, etc., depending on the system's items/equipment available. This protection means taking suitable counteractions to significantly increase the level of safety of the performed operations.

At the Institute's command there is a large staff of highly educated/skilled engineers well prepared to implement advanced technologies that include, e.g.:

- software/hardware integration of complex surveillance pods, laser range finders, laser target illuminators, GPS receivers;
- integration and activation of transmission systems to facilitate real-time data (including imagery data) exchange between airborne and ground-based command-and-control stations;
- the building of interactive communication interfaces to facilitate:
  - location of detected objects against the terrain map/sketch;
  - description of the object's attitude/fix by means of geographic, artillery, and polar co-ordinates (azimuth, elevation, distance);
  - characterisation of recognised objects (e.g. a group of people or a single man, a vehicle type, etc.);
- integration of the Terrain-Surveillance System with communication and command-and-control systems.

All these capabilities mean that the Terrain-Surveillance System can be tailored, on the one hand, to specific terrain and climatic conditions in the protected region, and on the other hand, to different User's needs and funding capabilities.

Instytut Techniczny Wojsk Lotniczych (Air Force Institute of Technology) has been granted :

- Certificate of the Quality-Management System, showing that requirements of the NATO AQAP-2110 and PN-ISO 9001 standardisation documents have been met,
- NATO Commercial And Government Entity code (NCAGE) 0481H.

INSTYTUT TECHNICZNY WOJSK LOTNICZYCH

World trade mark

Suburban of Legionowo, small town, near Warsaw, established at the beginning of the XX century, by Marshall Piłsudski for his faithful soldiers. Two medium size buildings. One made over from old canteen and second build lately. From outside, nothing show that this is a complex of the biggest parachute producer in Poland. Producer which successfully exports own products all over the world.

Włodzimierz Budzyński parachute branch knows as nobody else. For 27 years he was a constructor and technical director in state owned company Awiotex. In the 1989 he decided to open his own business.

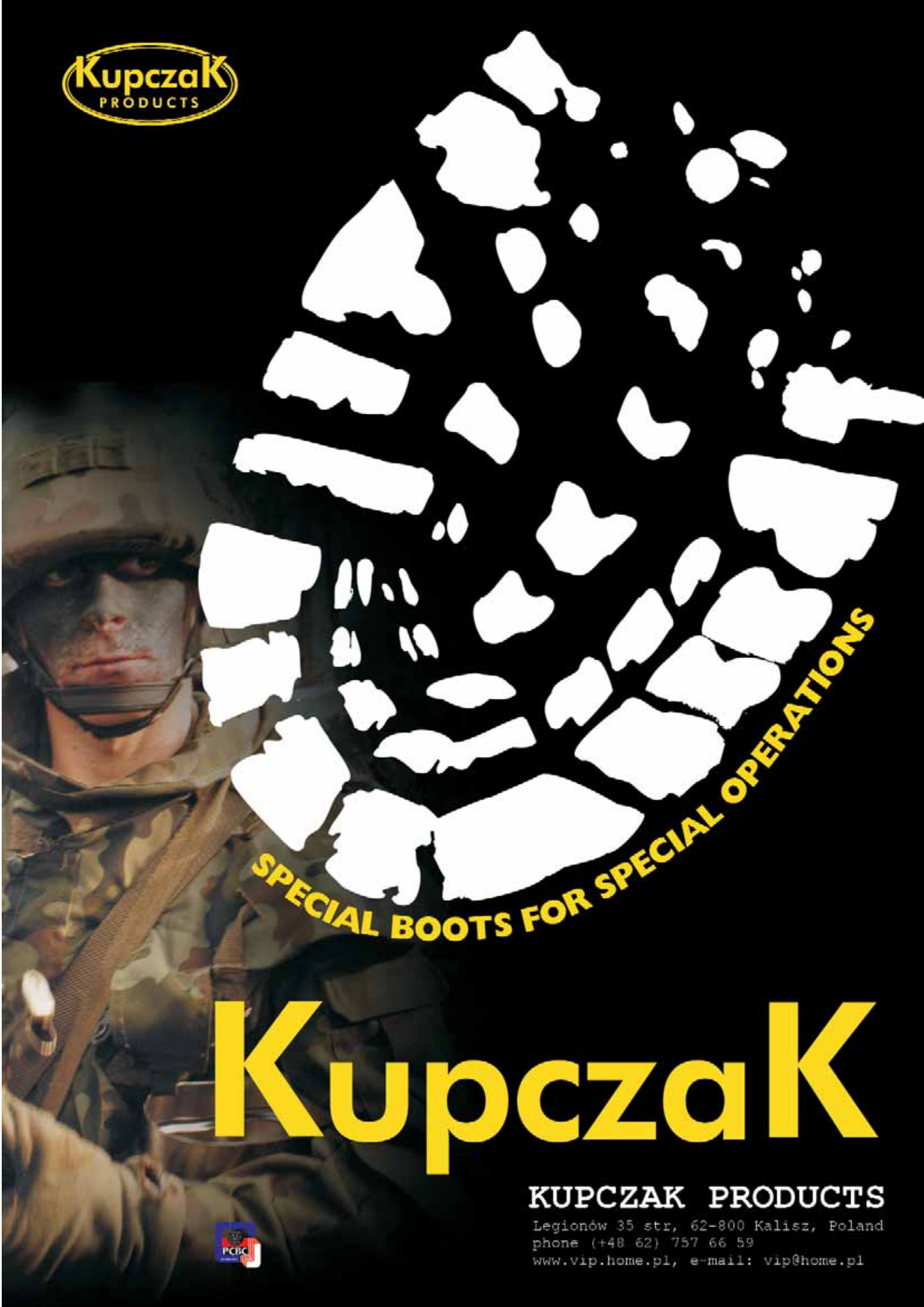
Air-Pol produces mainly for the army, landing and rescue parachutes, specialist parachutes for the planes, bombs and cargo. Company produces also congestion suits for flights on the high altitude (over 11.000 meters). All products base on the innovatory solutions. In Poland the company delivers their products to all airborne units. Air-Pol produces also parachutes for civilian market, mostly for gliders. It's quite expensive sport. Price of one parachute is from 4.000 to 50.000 PLN.

Production for home market is only 20 % of all company's production abilities. The rest of production is exported. Air-Pol's parachutes are in use by the U.S. Navy, many Arabic countries armed forces, Indian Army. On their rescue parachutes jumps almost half of the world.■

DEDAL troop parachute

AD-2000 troop parachute

SH-29 braking parachute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PCBC

IRBIS Armoured Personal Carrier front view

IRBIS

- THE SNOW LEOPARD

The muster of Lynx from Poznan grows constantly - in the nature it is a natural thing. In 2005, Wojskowe Zakłady Motoryzacyjne Nr. 5 (Military Motorisation Works No. 5 - WZM 5) prepared a premiere of IRBIS, 6x6 APC. Will the APC named snow panther repeat success of its older brothers?

Military Motorisation Works No. 5 from Poznan, since year 2000, consequently has been realising Lynx wheeled armoured vehicles development program, which was initialized by idea of deep modernization of SKOT wheeled armoured vehicles. In frame of this programme, co-financed by Ministry of Defence since 2002 and Scientific Research Committee, already were built: wheeled armoured vehicle in base-armoured version, wheeled armoured vehicles with different armament, command vehicles, mortar carrier and medevac vehicle. All of them, similarly to SKOT were in 8x8 version. In 2005 the family was supplemented by lighter 6x6 vehicle. Market analysis show that there is still demand for such version. Many countries shows interest in obtaining 6x6 vehicles. Some are interested only in such vehicles. However 6x6 vehicles are less number on the market than 8x8, it means that there is still a gap to fill. Smaller vehicles are better for reconnaissance or patrol (eg. in expeditionary missions), or as carriers of some kinds of armament. Also the Polish Army has showed interest in such vehicles, ordering among 690 pcs. of new wheeled armoured vehicles also 32 pcs. 6x6 vehicles, which will conduct reconnaissance missions within units equipped with ROSOMAKs (Wolverines). However even very basic analysis shows that in the Army similar size to the Polish one, even predicting its further reduction, needs for 6x6 vehicles will be even bigger.

Successor is necessary for BRDM-2 vehicles, which are doing majority of tasks related to military and chemical reconnaissance. They are used also as armament carriers and - in expeditionary missions - as patrol vehicles. Where the small, fast and agile vehicle is irreplaceable, modernised Wildcats (BRDM-2) might be still used for several years, however for the other tasks, the bigger vehicle would be optimal. The problem appears when more number of scouts need to be transported or when installing of specialised equipment such as expanded communication and data processing means, radiolocation station or optoelectronic head is necessary.

Consultations conducted by WZM 5 among scouts and chemists shows that their proposal meets a big interest. Also experiences gained during missions in Balkans, Afghanistan and Iraq shows that our soldiers need completely armoured patrol vehicle, which will be much better in some situations than Scorpio, HMMWV or Wildcat/Jackal, and in which not always bigger 8x8 vehicle would be better. Void transportation by C-130 Hercules class plane is also important. As the practice shows, for majority of 8x8 APCs, with weight exceeding 16,5-17 tons it is problematic because of weight and dimensions.

Constructors from Poznań in 2004 started concept works on vehicle, which was designated in that year as Lynx 6x6. It appeared that designing such vehicle is not that easy. It's not only matter of "cutting" the hull before the last axis. Such variant was also initially considered, but measures of driving system kinematics quickly showed big differences

IRBIS Armoured Personal Carrier

in weight on each axis, arising of tensions in hull etc. Such vehicle wasn't be able to drive properly, apart of it many exploitation problems would arise. In relation with it designers decided to completely reconstruct carriage system, with using majority of systems from the other versions. Second and third axis were moved in such way to make a distance between them equal and in the same time received favourable axis load distribution.

Thanks to that the rolling resistance decreased, which in consequence leads to better traction and longer vitality of mechanisms including tires. The vehicle has also ability to float in all versions in whole range of maximal weight, even despite loosing of floatation reserve. For 6x6 vehicles it's not that easy, because loss of draught is bigger than loss of weight, and that's why floatation reserve is reduced in significant extent. However thanks to high floatation reserve of Lynx 8x8 (in the heaviest version exceeds 25%), in the shorter APC it's still in secure range. Despite introduced changes, unification level of IRBIS and Lynx is quite big and reach 80%.

IRBIS demonstrator was created using elements of SKOT, however serial vehicles will be produced from the beginning as completely new vehicle. IRBIS will be also test field for some solution which might be used in other vehicles of the family. The most visible is hydraulically foldable back ramp closing the crew section. It doesn't need to be used each time (it is necessary to turn off the engine when using the ramp), because there are single doors, opening to the side, built in the ramp. The vehicle is fully prepared for installing of new power pack modification with IVECO Motors Cursor 10, 315kW/430hp engine. APC with low hull typical for combat versions has ceiling prepared for quick installing station for different types of armament. Initially it is prepared for installing unmanned RCWS-30 Rafael turret or remotely controlled stations of Rafael RCWS-12,7 or ZSMU-127 KOBUZ made by OBR SM from Tarnów. Change of the armament might be done in the field conditions. Ceiling of shorter, in this case, crew compartment, also needed some modification. Configuration of hatches was changed. Currently there are two hatches opened to the sides, just next to the back edge. It might be also single hatch. In the walls of crew compartment also standard shooting holes appeared for conducting shooting from the insides. Currently there is one hole in each side in other configuration it might be two holes.

IRBIS demonstrator will be completed in base version of military reconnaissance. It will have set of communication equipment basing on VHF and HF radios, FONET internal communication system made by WB Electronics and place for scouts. It will be armed with ZSMU-127 KOBUZ remotely controlled module made by OBR SM Tarnów. Of course there is ability to place the equipment according to buyers requirements including installation of advanced technical observation devices.

IRBIS might be considered as a carrier for different types of armament, also being supplement for BRDM-2 vehicles. It might be used for construction of self-propelled tank destroyer with Spike anti-tank guided missile, or as a part of light anti-aircraft defence system - as a carrier of MMSR radiolocation station, electro optical head or POPRAD missile system. Works on 6x6 IRBIS APC were financed of WZM 5 own funds.

IRBIS base technical data (base version)

Weight - 11,0 tons
Crew - 8 people

Dimensions
Length - 6,43 m
Width - 2,50 m
Hight - 2,37 m
Track of axes - 1,725 m
Clearance - 0,4 m
Propulsion
Quickly exchangable propulsion (time of Exchange - 20 minutes)
Driver configuration - 6x6
Engine 6-cylinder IVECO Motors Cursor 8 259 kW/352 hp diesel engine or Cursor 10 315 kW/430 hp diesel engine
Max speed - 100 kph
Max floating speed - 10 kph
Range - 600 km

Fighting the obstacles
Elevation - 60 %
Trenches - 1,5 m
Vertical walls - 0,4 m

IRBIS Armoured Personal Carrier - rear view

LOARA fright for Air Forces

Mirosław Wróblewski

First of the series Anti-Aircraft Artillery System LOARA (PZA LOARA) was officially handed over to Polish Armed Forces. Despite very good opinion of the army about LOARA, till 2009 to Land Forces will be delivered at most 4 more sets. Contract for its deliveries will be negotiated during the nearest months. Parallel would be conducted talks regarding continuation of development of the missile version of LOARA (PZR LOARA).

Receiving 2 prizes by LOARA - Grand Prix and Defender - during MSPO Exhibition in Kielce, Poland, wasn't only courtesy in 50th Anniversary of WZR RADWAR (producer of LOARA). Over 10 years of R&D works being part of the LOARA programme went to inventing world level weapon system.

During ceremony of handing over the first set, the MoD informed that R&D phase of LOARA programme cost 78 mln PLN, qualification trials and development - 236 mln PLN. For inventing such unique system those costs aren't very high, especially if we're having in mind using many technologies and equipment invented during this programme in many Polish-made anti-aircraft systems. And of course if we compare it with costs of similar programmes in other countries.

PZA LOARA is intended for destroying planes, helicopters (introduced special algorithms for effective detection and destruction of helicopters in hover), UAVs and cruise missiles flying on very low, low and medium attitudes. Starting automated tracking of the new object is possible in 4 seconds since detection (4 turns of 3-D radar). Detection and identification of object is possible also when vehicle is on the move. In the same time, the system is able to track 64 targets.Data about the targets might be send by radio inside automated system. LOARA has also terminals (made in RADWAR) of REGA system. It allowed to turn off (if needed) tracking radar and change to completely passive mode, during which on board systems are powered from the batteries, which allowed to reduce thermal echo of the vehicle. Tracking radar allows to follow targets in range of 300m to 30km from the vehicle. System is also fully prepared to fight light armoured ground and sea targets.

Required firing precision in all weather conditions, day and night forced designing such complicated and heavy system. LOARA in battle configuration weight about 45,5 tons (the turret itself weight over 13 tons).

The vehicle has high manoeuvrability together with stability in difficult terrain thanks to using tracked chassis. Road speed of PZA LOARA is 60 kph and off-road speed is 15 kph. Full fuel tanks allow to drive 500 km or 6 working hours of power generator (LOARA is powered by 850 hp engine made by PZL WOLA from Warsaw). New dynamic propulsion for turrets, propulsion of gun,

tracking head and special fire control software especially designed during this project, allow for quick and precise targeting. In current form 35mm KDA guns delivered by HSW are using two kinds of ammo produced by ZM MESKO: classical TP-T and sub-calibre FAPDS-T. In ammo storage of the vehicle could be transported 460 cartridges. 35mm ammo was designed by ZM MESKO. In year 2005 were delivered several thousands of such ammo. Designing of ammo with programmable fuse (AHEAD class) is currently ongoing.

Except fighting vehicle, LOARA system consist of 2 supporting vehicles: loading and transport vehicle (STZ) and training-mobile workshop vehicle (RWR-T). Both on STAR 1466 6x6 chassis.Loading and transport vehicle (STZ) is used mainly for ammo transportation in conditions during which fast loading/unloading is required.

Basic tactical-technical data of PZA LOARA

Crew - 3
(driver-electro-mechanic, commander, gunner)
Combat weight - ca. 45 300 kg
Shell length - 6,67 m
Width - 3,47 m
Clearance - 0,47 m
Max. road speed - 60 kph
Range - 500 km
Abilities for passing obstacles:
Height of the walls - 0,8m
Depth of ford
(without additional preparations) -1,2 m
Width of trenches - 2,8 m

Mobile Maintenance and Training Workship

On the STZ's platform, which is secured by two hydraulically opened two-pieces sides, are two ammo storage for 210 pcs 35mm cartridges (in belts) each. On the platform spare parts, food, water in tanks, equipment for conducting repairs in the field of fighting vehicles might also be transported. Vehicle has also hydraulic crane (700 kg lifting capacity) with arm 7,5m length. Loading capacity is 5 tons. Also up to 8,5 tones trailer might be towed.

Vehicle is able to transport also different kinds of ammo and equipment. It fulfils European Agreement for Dangerous Products Transportation by Road (ADR) and might be used for transportation of different explosives, poisons and flammables.

Training-mobile workshop vehicle (RWR-T) secures logistic support for 12 fighting vehicles PZA LOARA and in the same time training for two LOARA's crews. Additionally secures emergency power supply from towed power generator. RWR-T also transports spare parts for fighting vehicles. It has control-measurement equipment, tools and materials necessary for PZA LOARA maintenance. Training of the fighting vehicles' crews, using training systems, is conducted in front, so called operational, section of the RWR-T.

Training system is able to imitate combat situation and work of each LOARA's systems. It generates and displays virtual views of each sensors and shows co-ordinates of imitated target. Training using working turrets and guns is also possible. STZ and RWR-T vehicles are equipped with radiostations and GPS receivers. ■

Battlefield Maintenance Vehicle

EXPERT

Robot for Neutralizing and Supporting Tasks

EXPERT during searching for explosives under the car

The major applications of the pyrotechnical robot include combating hazards from terrorist explosive charges and other hazardous materials. Such a robot, replacing humans in areas endangered by bomb explosion (or, e.g., a chemically contaminated area) may i.a. carry out a remote inspection of the jeopardised facility, identify a dangerous charge, move the dangerous charge into an indicated location, negotiate with terrorists.

EXPERT, as a worldwide unique robot, has been designed especially for operating in any means of transport, e.g. aircrafts, buses, railway coaches, ships and small and confines premises.
Parameters of the robot have been selected so as to ensure its full scope of operation in means of communication, particularly inside aircrafts.

Basic features of EXPERT robot

EXPERT during searching for explosives in the airplane

* Velocity of mobile platform (2 km/h) allows quick displacement in relatively, e.g. extensive safety zone around an aircraft.
* Fluent velocity control of all of the drives from 0 to maximum speed ensures high precision of operation. There is a possibility of the reduction of maximal velocity thus allowing precision of performed operations (after pushing an appropriate button, the maximum velocity reduces itself to 20%).
* Special manipulating driving system reduces recoil effect when firing the pyrotechnical disrupter or in case of explosion of the load placed in the gripping device or its vicinity.
* The manipulator is equipped with:
  - manipulator arm extreme position sensors,
  - position sensors in main manipulator's degrees of freedom,
  - gripping force sensor,
  - sockets for fixing of so-called 'whiskers' on the gripper's master jaw (for visual estimation of distance),
  - an omni directional microphone.
* The length and wide spacing of the jaws of the gripping device have been selected so as to enable the gripping device to reach e.g. the interior of the locker for hand luggage in an aircraft and to get any suspicious load.
* During the external power supply (by cable) the batteries are automatically recharged.
* The robot is powered by batteries installed inside the mobile platform or through a cable

plugged into the 230V power network.

* The working time of the batteries is between 4 and 8 hours (depending on the type of work performed).
* Foldable operator's post designed in form of a suitcase, resistant to mechanical damage.
* Operator's post is equipped with a color LCD screen showing pictures from cameras and an additional LCD screen showing a graphic interpretation of the current manipulator arm configuration and data from the robot's sensors.
* Control cable, used interchangeably with radio transmission, is light and resistant.
* The robot can cooperate with a variety of additional devices, both offered by PIAP and those pointed by a customer.

Unique features of EXPERT robot

* The construction combines two contradictory needs: small mobile platform enables manoeuvres in tight places and simultaneously the manipulator has big range and load.
* Front caterpillars (remote control of tilt angle) ensure stability of the structure during surmounting high obstacles and stairs.
* Foldable lateral stabilizers enable solid lock of the mobile platform, what allows safe lifting of considerable loads and precise operation of the robot manipulator even during maximum lateral reach of its arm. Stabilizers can be dismounted what makes the mobile platform 8 cm thinner.
* Range of the manipulator with the gripping device amounts to 3 meters. Exceptionally long reach of the upper arm allows inspection of space both at the level of overhead lockers for passenger luggage and under passenger seats.
* EXPERT is equipped with 6 cameras. Four color cameras are placed on the gripper, in back and front of the robot and on the manipulator (the main camera which may be turned completely around by 360° and 90° up and down). Additionally two color cameras are placed on the sides of the front caterpillars, what enables the inspection of, e.g. place under seats.
* Control system of robot enables to control of its all drives at the same time.
* Auto diagnosis system constantly checks if there are any faults and shows special warnings on an supplementary LCD screen.

* Most of the robot's and manipulator's cables are routed inside the structure, thus reducing the risk of damage.

EXPERT SMR-100
Mobile robot

Within the short period of its first presentation (September, 2003) the antiterrorist robot EXPERT for neutralizing and supporting tasks has already won numerous awards:

* February, 2006: Award from Ministry of Education and Science for International Invention.
* November, 2005: Special Award from the Ministry of Extraordinary Situations of Russia.
* November, 2005: Gold Medal at the World Exhibition on Innovation, Research and New Technologies, Brussels EUREKA 2005.
* June, 2005: Nomination at the 8th edition of the Award in Economy from the President of the Republic of Poland in "Invention in the Field of Product or Technology " category.
* August, 2004: DEFENDER Award - award at the 12th International Defence Industry Exhibition.
* June, 2004: Award of the Police Chief Commanding Officer for the best product useful to the Police, presented at the BALT-MILITARY-EXPO 2004 and the Rescue and Safety Exhibition SAFETY 2004.
* June, 2004: Amber Medallion at the BALT-MILITARY-EXPO 2004 and the Rescue and Safety Exhibition SAFETY SAFETY 2004.
* June, 2004: Gold Medal at the International Poznań Fair.
* May, 2004: 2nd degree award at the 45th edition of the "Master of Technology - Warsaw 2004" Competition of the Metropolitan Board of the Polish Federation of Engineering Associations and the editors of the "Rzeczpospolita" weekly.
* November, 2003: winner of the 7th edition of the "Polish Product of the Future" competition, category: "Product of the Future". ■

PCNDM stand for the INDODEFENCE 2004 exhibition

EFFECTIVE PARTNER

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

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

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

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

The Chamber is the initiator of the military-industrial co-operation among Visegrad Group. Its part were two editions of Forum of Defence Industries of Poland and Czech Republic (1999 and 2001), 1st Forum of Defence Industries of the Visegrad Group (2001) in Warsaw, 2nd and 3rd Forum (2002-2004) in Trencin, Slovakia.

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

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

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

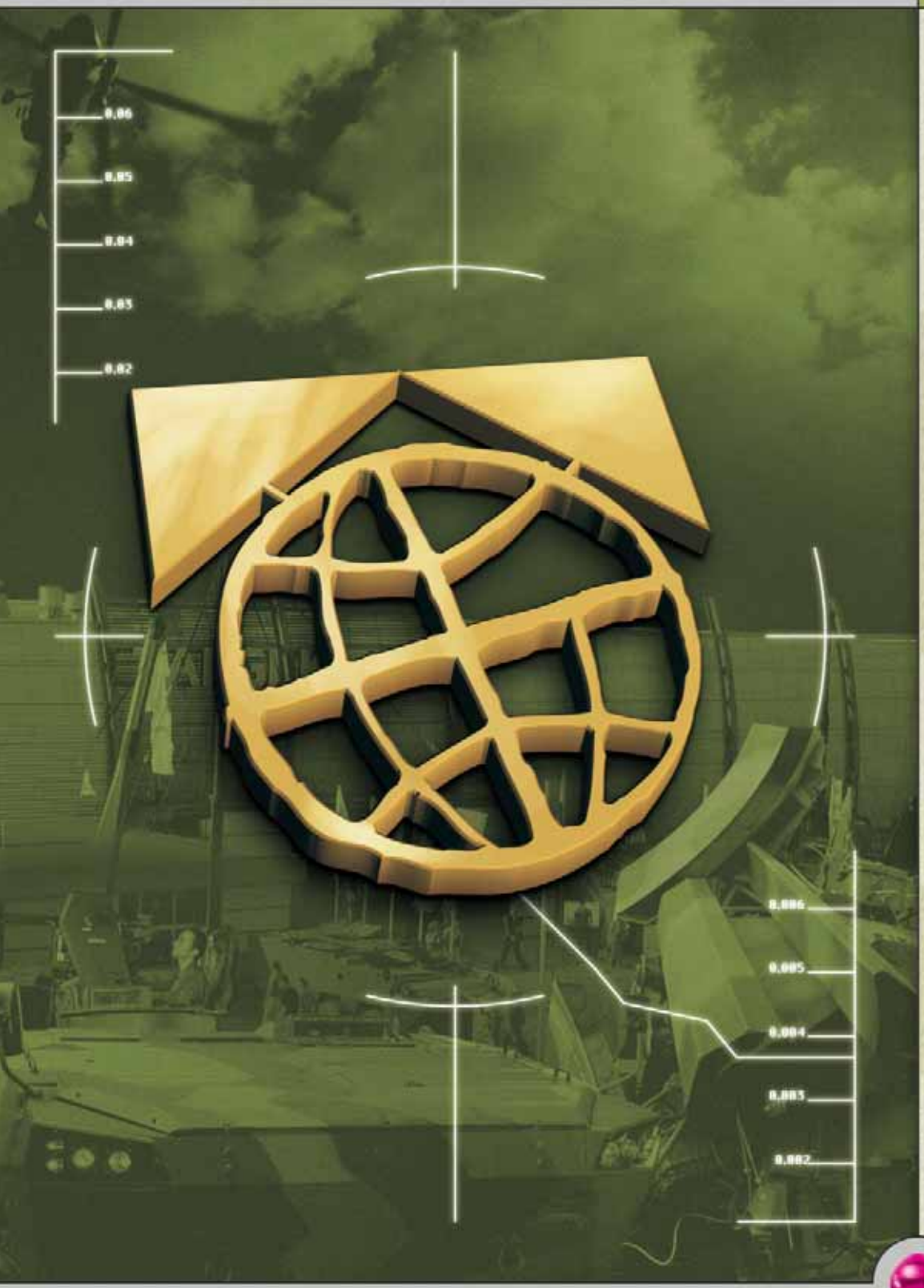
Since August 22nd, 2005 the Chamber initiate Internal Control System according to law about turnover of the products, technologies and services important for national security and also for keeping international peace and security and received ISO 9001:2001 and IQNet certificate (No. PL-JW-172/1/2005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

MSPO

15th International Defence Industry Exhibition

September 3-6, 2007

Kielce - Poland



National Exhibition
of USA
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Exhibition recommended by Polish Trade Fair Consultant

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Kielce Trade Fairs Ltd. ul. Zakładowa 1
25-672 Kielce, Poland
MSPO Project Director: **Ms. Katarzyna Prostak**
tel. +4841 365 12 98, fax +4841 365 12 79
e-mail: mspo@targikielce.pl; prostak.k@targikielce.pl

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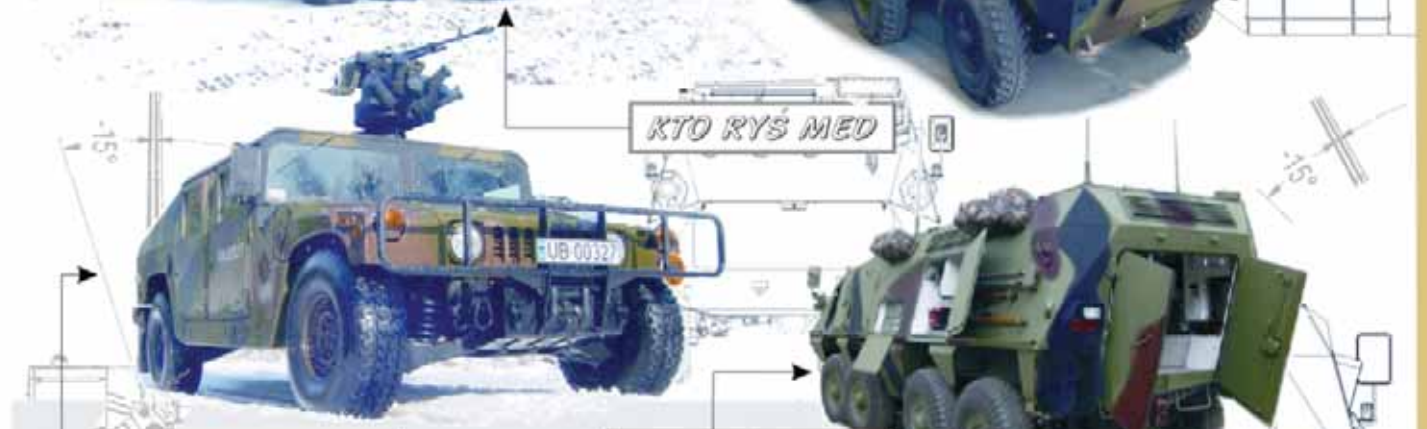

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ul. Dąbrowskiego 262/280, 60-406 Poznań tel. (+48 61) 857-61-10 fax. (+48 61) 847-47-46 http://www.wzm.pl e-mail: wzm@wzm.pl