POLISH DEFENCE AND SECURITY EQUIPMENT CATALOGUE 2024



The defense and security industry in Poland is one of the most dynamically developing sectors of the economy. Among the recipients of Polish cutting-edge technologies products there are such technological powers as the United States of America. This is due to the creativity of Polish inventors and qualified engineers, as well as the innovativeness, high technical and economic values of the offered solutions.

The Polish defense and security industry creates and produces modern, NATO-compatible, weapons systems. Poland has a large, robust, domestic defense and security sector that produces or provides upgrades to a wide variety of weapons systems, particularly ground systems such as tanks and other armored vehicles; Unmanned Aerial Systems (UAS); man-portable anti-aircraft systems; cybersecurity solutions (NDR – Network Detection and Response) etc. Poland also cooperates with the European, American and Asian defense sectors.

Polish Defence and Security Equipment Catalogue 2024

FOREWORD

The beginnings of the Polish arms industry date back to November 1918, when Poland, after 123 years of bondage, returned to the map of Europe as an independent state. The colonial policy of the partitioners and the enormous devastation of the First World War had turned large areas of the country into an economic desert. It was necessary to recreate the economy and industry practically from scratch.

In rebuilding the state, emphasis was placed on the comprehensive use of scientific and technical thought and the creative potential of scientists, constructors and technicians. Already in the 1930s, the factories producing ammunition and light weapons were joined by modern factories for small arms, anti-tank and anti-aircraft guns, as well as wheeled vehicles of various types and kinds, tanks and aircraft.

Polish arms manufacturers exported products to many countries around the world. The excellent 40mm anti-aircraft guns were purchased by the United Kingdom, and the innovative P-type aircraft of the State Aviation Works were of interest to many countries around the world. Thanks to them, the Polish Air Force was one of the world's first users of metal fighter monoplanes.

In 1936, the Polish government began the creation of the Central Industrial District, a modern design and production complex located at the fork of the Vistula and San rivers. Many of the enterprises built there continue the old traditions, such as "Łucznik" Weapons Factory in Radom, which produces small arms, or "Stalowa Wola" Steelworks, which by 1939 was to produce more than 600 modern guns of various calibres annually. The city of Stalowa Wola, which was built for the needs of the steelworks eighty years ago, is now home to the production of the M120 "Rak" self-propelled mortars, the "Borsuk" Fighting Vehicles or the ZSSW 30 remotely controlled turret system. "Stalowa Wola" Steelworks is also the manufacturer of the main product of the Polish arms industry – the 155 mm calibre "Krab" self-propelled howitzer.

The intensive development of Poland and its industry was interrupted by the Second World War. Our participation in the military struggle was also a notable contribution of Polish scientific and technological thought to the victory over the German Third Reich. Thousands of Allied soldiers were saved by the 'Polish mine detector', the battle against German submarines in the 'Battle of the Atlantic' was won by a Polish-designed tracking antenna, and the 20mm anti-aircraft gun Polsten was produced in more than 50,000 copies – these are only selected examples of Polish technical achievements during World War II. We are proud of the impact that Polish scientists had on the post-war intellectual and technical development of Europe and the world.

After 1945, Poland, not of its own will, found itself in the group of countries dependent on the Soviet Union, but despite the lack of sovereignty, Polish technical thought continued to develop, especially in the aviation and automotive industries.

Today, Polish industry is experiencing a renaissance – there are hundreds of companies offering technologically advanced products in the arms and civil security sectors. Polish contribution to innovation is appreciated by allies for its high-end capabilities, relevant in the new strategic context, reflecting lessons learned from the war in Ukraine. This year, Krakow DIANA Accelerator as part of the Defence Innovation Accelerator for the North Atlantic (DIANA NATO Accelerator) was created at the AGH University of Science and Technology in Krakow, which, by combining the competences of scientists, innovators and start-ups, allows for even more effective and faster technological development, which results in efficiency and increased implementation.

The Polish Armaments Group alone includes over 60 companies that design and manufacture equipment and technologies for the needs of national defence and security. Polish companies offer products and services in all major sectors: land, sea, air, space and in the key field today – cyberspace.

There is a dynamic development of companies related to the space industry in Poland. The leaders include Creotech – a leading manufacturer of satellite systems and components as well as advanced electronics, and ICEYE – the creator of the constellation of satellites, designed by Polish engineers, that provides the most up-to-date and reliable SAR imaging in the world – supporting Ukraine in its defence.

Polish equipment and armaments have proved their worth in many battles fought in Ukraine. The "Krab" howitzer is unrivalled among similar artillery systems. Portable anti-aircraft missile systems – "Piorun" – manufactured by ZM Mesko S.A. or circulating ammunition and FlyEye unmanned aerial vehicles have also confirmed their effectiveness in real operations in the Ukrainian theatre. The MSBS "Grot" carbines manufactured by the Weapons Factory in Radom enjoy great popularity and a very good reputation as well.

Polish industry is not only tradition, experience and generations of talented designers and scientists, such as Stanisław Ulam, co-creator of the hydrogen bomb. It is also innovation and flexibility consisting in quick adaptation to changing security conditions and methods of managing conflicts, combined with high quality of the offered products and price competitiveness.

In the catalogue you will find several dozen selected products divided into twelve categories. These range from space industry products to personal firearms. This publication is, on the one hand, an illustration of the potential of the Polish defence industry, and on the other hand, it is an inspiration and encouragement to learn about the wide offer of Polish manufacturers and to establish cooperation with Polish companies.

PRODUCTS



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Aurora Satellite Terminal

Thorium Space S.A. ► p. 223

The Aurora Satellite Terminal by Thorium Space is an advanced device designed for satellite communication. Here is a detailed description of this terminal:

Purpose and Applications:

Mobility and Versatility: The Aurora terminal is designed for use in various field conditions, both stationary and mobile. It can be deployed on land, sea, and in the air.

Integration with Various Networks: It is designed to work with different geostationary and low Earth orbit (LEO) satellites, providing global coverage and reliable connections.

Technical Specifications:

Advanced Phased Array Antenna Technology: The terminal is equipped with a phased array antenna that enables dynamic beam steering, ensuring high-quality connections even in challenging conditions.

High Throughput: Aurora offers high data throughput, crucial for transmitting large amounts of information, including HD video, data streaming, and other advanced applications.

Energy Efficiency: The terminal is designed to consume minimal power, which is important for long-term operations in remote locations.

Features and Capabilities:

Automatic Satellite Tracking: Aurora features automatic satellite tracking, providing stable and continuous connec-

tions without the need for manual intervention.

Security and Encryption: The terminal offers advanced security and encryption features, ensuring secure data transmission.

Ease of Installation and Use: The Aurora terminal is optimized for easy installation and operation, allowing for quick deployment and minimal training requirements.

Applications:

Humanitarian and Military Missions: Due to its reliability and mobility, Aurora is an ideal solution for humanitarian missions and military operations in harsh environments.

Emergency Communications: The terminal can be used in emergency situations where traditional communication methods are unavailable or insufficient.

Industrial and Commercial Use: Aurora is suitable for use in the oil and gas industry, maritime navigation, and transportation, where reliable communication is essential.

Summary

The Aurora satellite terminal by Thorium Space is a versatile and advanced satellite communication solution, offering high performance, reliability, and flexibility in various operational conditions. Its advanced technologies and features make it an ideal choice for a wide range of applications, from humanitarian missions to commercial and military use.



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Civil aviation CAO

Military Aviation Works No. 2 (WZL2) ► p. 210



Capabilities:

- Authorized Service Centre for Cirrus and Diamond aircraft types:
 - planned 50 hours and 100 hours maintenance, annual maintenance and special maintenance;
 - repairs of composite structures;
 - Garmin and Avidyne avionics system maintenance;
 - CAPS system component maintenance.
- renovation of paint coating /painting of aircraft;
- → Non-Destructive Testing (NDT);
- → professional aircraft cleaning;
- → filling of oxygen system;
- → filling of defrosting agent.

The Authorized Service Centres for Cirrus and Diamond

Wojskowe Zakłady Lotnicze Nr 2 S.A. (WZL2) is the Authorized Service Centre for Cirrus and Diamond aircraft types. ASC employees have been trained at the company's U. S. headquarters in Duluth and have received relevant certificates of competence: Certificate of Completion Caps Technician, Maintenance Excellence, Composites, Certificate of Training Garmain & Avidyne. WZL2 Service Centre has been equipped with a number of diagnostic devices for Cirrus aircraft, thanks to which it is possible to perform many specialist services and tests. The service is carried out after: 50 hours, 100 hours, one year, while other repairs are carried out in accordance with the approval or after consultation with the manufacturer and Civil Aviation Authority. It is also possible to buy parts and accessories at the Service Center.

CAO

Continuing airworthiness management is based on a certificate (PART M/G) issued by the Civil Aviation Authority (PART M/G) on the basis of relevant maintenance programs and contracts with aircraft operators.

Certificates:

- CAO is a certified Comprehensive Airworthiness Organization, certificate No. PL.CAO.0016
- → approval of the national organization NCAO, certificate PL.NCAO.0003

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Scope of the approval:

- → Cirrus SR20, SR22, SR22T,
- → Diamond DA20 (Continental or Rotax engine),
- → Diamond DA40 (Austro Engine, Technify or Lycoming engine),
- → Diamond DA42 (Austro Engine or Technify engine),
- → Diamond DA62,

- → Diamond DV20 (Rotax engine).
- → Sonex LL (Special Category),
- → Vans RV-8, RV-10,
- → Cessna 150, 152, 172, 182

For the above mentioned types, CAO may either extend the validity of the ARC or issue a new ARC.



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CreoSky 6000 the solution for Space Situational Awareness, Surveillance and Tracking needs

Creotech Instruments S.A. ► p. 198

A dedicated solution tailored for Space Situational Awareness (SSA) and Space Surveillance and Tracking (SST) needs, combining a capable sCMOS camera with built-in SoC enabling initial data post-processing by implemented algorithms. The solution allows for stand-alone camera operations and enables user algorithms to be run on the built-in computing resources, enabling to tailor the solution to specific client-use cases.



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Design and production of aviation products

Military Aviation Works No. 2 (WZL2) ► p. 210

Blok 2E-ME on-board integrated control and warning system "EKRAN"

Advantages of the 2E ME block use:

- → full compatibility with the 2E-01 block;
- → the possibility of recording up to 500 messages in the internal memory of the 2E-ME block (twice as much as on LM-35P tape of the 2E-01 block);
- → the possibility of viewing recorded messages on the 2E ME block display; ergonomics and operating comfort;
- safe data archiving and documentation on a computer or printout; quick playback of check results on a computer and printout;
- → elimination of an expensive LM-35P tape use;
- → lack of necessity of periodical works performance (e.g. cleaning of print head needle, cleaning of a roller pressing a tape, adjustment of a supply spool clutch, etc. in the block 2E-01).

The 2E-ME unit is used for presentation of messages from the 1E block on a LED display and for recording them in the operational memory. There are three luminous guides on the 2E block (FAIL, TURN, MEMORY), two buttons for block menu operation and connection (DATA) which enables data readout from the internal memory.



IFF System Interface type CITB-29



Technical parameters:

- → power supply DC: nominal +27V;
- consumed power: max. 50W; →
- transmission type: Mil-Bus 1553B, ARINC 429, RS232;
- discreet inputs/outputs;
- → device readiness to start operation: < 2s;</p>
- → weight: < 2,5kg.</p>

Interface CITB-29 serves for integrating the IFF system of type e.g. AN/APX 125, DPX 7 with the existing systems on aircraft like: C-130, C-295, or MiG 29. It may also be applied on other kinds of aircraft equipped with a transponder or interrogator of the IFF system.

The interface enables to process and select data for modes: M1, M2, M3, M4, M5 Level 2, MC, and MS EHS of the IFF system. Interface CITB-29 for external communication utilizes interface MIL-Bus 1553B, ARINC429.

Interface CITB-29 complies with environmental conditions according to NO-06-A103, NO-06-A105 and NO-06-A107.



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PS-COM-01 Control Panel

The PS-COM-01 control panel is used for R-862 radio station control. The unit enables memorization of up to 100 frequency channels with ascribed names, operation with two frequencies (awaiting-edited and working), direct choice of frequency, frequency monitoring via the superior panel (slave mode), as well as cooperation of the radio station and MDP mission computer (ARINC 429).

The PS-COM-01 can be also used for control of a different type of a radio station equipped with the ARINC 429 interface. Interface CITB-29 complies with environmental conditions according to NO-06-A103, NO-06-A105 and NO-06-A107.





Technical data:

- → DC power supply: nominal +27V;
- → absorbed power: max. 10W;
- → display: alphanumeric LED [two-rowed, 8 characters in each row];
- number of symbols/characters simultaneously displayed on the screen: 16;
- → frequency range: 100,000÷149,975MHz with a step 25kHz; 220÷399,975MHz with a step 25kHz;
- → transmission type: 2D3A, ARINC-429, RS-485;
- → readiness to work: does not exceed 2s;
- → weight: does not exceed 1kg.

T- CITB-29 TESTER

TESTER T-CITB-29 serves for complex checks, periodic maintenance and troubleshooting of interface CITB-29 failures. The device has been located in a suitcase-shaped transport container Explorer Cases providing for its high portability.



The Tester is designed for MROs and aviation military units operating aircraft equipped with interface CITB-29.

TESTER T-CITB-29 provides for checking the following parameters:

- → co-operation with PS-CIT-01;
- ➤ co-operation with CIT AN/APX-125;
- co-operation with the navigation-targeting complex;
- → inputs/outputs ARINC 429;
- → data bus MIL-BUS-1553;
- → configuration inputs.

The TESTER T-CITB-29 device set involves the following:

- → device TESTER T-CITB-29;
- → operating manual;
- → power supply set;
- → harnesses for connection to interface CITB-29.

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Remote Control Unit for IFF System type PS-CIT-01

Remote Control Unit (RCU) PS-CIT-01 is used for control of IFF system type e.g. AN/APX 125 on MiG 29M aircraft, DPX 7 on MiG 29UBM aircraft. It can also be used on other aircraft equipped with a transponder, interrogator of IFF system. The PS-CIT-01 enables control and selection of data for the following modes: M1, M2, M3, M4, M5 Level 2, MC and MS EHS of IFF system and displaying settings for an interrogator operation mode for AN/APX 125 unit. For external communication, the PS-CIT-01 uses interface ARINC429 or RS485. Information is displayed on the 3ATI display with the resolution of 480x480 pixels. The PS-CIT-01 is adapted for operation on the NVIS mode. The remote control unit satisfies environmental conditions in accordance with NO-06-A103, NO-06-A105, NO-06-A107.



Technical parameters:

- → DC power supply: nominal +27V;
- → power input: max. 27W;
- → communication type: ARINC 429 2xOUT/1xIN RS485;
- → readiness to work: < 2s;</p>
- → weight: < 1kg.



T-PS-CIT-01 TESTER

T-PS-CIT-01 tester is used for comprehensive checking, periodical maintenance and fault location of PS-CIT-01 remote control unit. The tester is placed in the Explorer Cases which provides high mobility.



The T-PS-CIT-01 tester set consists of:

- → T-PS-CIT-01 tester;
- → operation manual;
- → wireless keyboard;
- connection harnesses.

The T-PS-CIT-01 tester provides checking of:

- → RS485 communication between PS-CIT-01 remote control unit and peripheral devices,
- → ARINC 429 communication between PS-CIT-01 remote control unit and peripheral devices;
- discrete input and output signals of PS-CIT-01 remote control unit;
- → keyboard and the remaining manual elements of PS-CIT-01 remote control unit;
- → backlight control systems of the PS-CIT-01 remote control unit display;
- → PS-CIT-01 remote control unit power supply.

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DragonFly opens up a new line of loitering munitions based on the unmanned aerial vehicle platform for military purposes, more and more willingly and increasingly often used by armies worldwide on modern battlefields. The system can be used independently or carried/transported by land units or special troops. DragonFly is an alternative to anti-tank ATGMs thanks to the ability to operate within a much larger radius, allowing the detection and observation of a potential target in a relatively high time comfort. The core of the DragonFly is the carrier of vertical take-off and landing warheads in the quadrocopter system, constituting a unique solution on a global scale. The use of small size loitering munitions, allowing for vertical take-off, landing and hovering in the air, opens up a new direction in conducting operations on the modern battlefield. The system's functionality makes it possible to be applied satisfactorily in combat missions carried out by Territorial Defence Forces or Special Forces.

System can be used by one solider/operator. After starting the system, operator searches for a target, indicates it and gives the command to attack. In ATTACK mode, LMS flies straight to the indicated target, continuing the mission even in case of losing communication with the GCP. Cancelling the attack procedure, changing the target or disarming the warhead is possible only if radio communication is maintained. Neutralization of the target can also be executed manually in any time using the explosion button on the GCP. This function can be useful for example, when LMS is located over or close to the target (in the field of destruction). This system does not rely on GPS and can be operated fully without GPS signal, which makes it resistant to jamming.

DRAGONFLY Loitering Ammunition System (LMS) Military Aviation Works No. 2 (WZL2) > p. 210

ADVANTAGES

- → The greatest advantage of the system is its mobility, which is achieved by its low weight, small dimensions and a very short time of system start-up.
- → The entire system is carried by one soldier in a specially designed backpack.
- → Remote system of warhead arming and disarming;
- → Resistance to interference during the attack phase;
- → Resistance to constant rainfall and dust;
- → Stand-alone system or carried or transported by subunit of land or special forces;
- → An alternative to anti-tank guided missiles providing a much larger radius of action;
- → Allows to detect and observe a potential target in relatively high time comfort;
- → The system was designed to carry out combat operations, both in open and urban areas.



POSSIBLE WARHEADS: cumulative GK-1 HEAT, thermobaric GTB-1 FAE, fragmentation GO-1 HE, training GO-1 HE-TP / GO-1 HE-TR



TECHNICAL DATA

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Rotor span	700 mm
Length with warhead	900 mm
Weight	5 kg
Range	10 km
Ceiling	500 m
Hovering flight time	20 minutes
Speed	$0 \div 120 \text{ km/h}$
Service	1 soldier
Temperature range from	-10 to 40°C



Flight modes:

- → ALT HOLD (NONGPS)
- → POS HOLD (GPS)
- → PATROL (GPS)
- → PATROL (NONGPS)
- → GRID (GPS)
- → ATTACK (GPS)
- → ATTACK (NONGPS)
- → RTL (GPS)

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DRONEHUB – Drone-in-a-box solution

Dronehub Sp. z o.o. ► p. 200

Product description:

Dronehub delivers cutting-edge drone-in-a-box solutions for various industrial needs, such as critical infrastructure monitoring, public safety, defence, and autonomous inspections. Our innovative UAV technology ensures drones are versatile, durable, and smart.

Features:

- → Compatibility: Our docks work with many drones, from multi-rotors to electric helicopters, ensuring flexibility.
- → Automated operation: Supports intelligent charging and optional battery swapping for uninterrupted use.
- → Durability and security: Built to endure extreme weather (-40°C to +50°C) and tamper-proof for reliable operation.
- Environment control: Includes climate management and fire safety systems for optimal performance.

- → Secure communication: Features a secure protocol for safe data transfer and various connectivity options, including an off-the-grid solution.
- → AI-driven control: Offers AI cloud for automated control, mission planning, and data analysis, boosting operation efficiency.

Applications:

- → Critical infrastructure: Provides smart inspections, real-time monitoring, and integration with security systems for thorough management.
- → Public safety and defence: Supports essential safety measures, CBRNE protection, and off-the-grid operations for military use.
- → Autonomous inspections: Leads in autonomous long-range inspections, including AI-enhanced railway assessments.



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ESA ECSS Qualified Board Support Package for SAMRH71F20

N7 Space Sp. z o.o. ► p. 213

Technical highlights

- → Static memory allocation
- → Object-oriented design
- → No dependency on any external library
- → Used as a base for BSW tested in flight software
- → ESA ECSS qualification test suite and data pack Drivers supported
- → FPU Floating Point Unit
- → GMAC Ethernet
- → MCAN Controller Area Network
- → MPU Memory Protection Unit
- → NVIC Nested Vectored Interrupt Controller
- → PIO Parallel Input/Output Controller
- → PMC Power Management Controller
- → PWM Pulse Width Modulation Controller
- → RSTC Reset Controller
- → RSWDT Reinforced Safety Watchdog Timer
- → RTC Real-time Clock
- → RTT Real-time Timer
- → SCB System Control Block

- → SDRAMC SDRAM Controller
- → SPI Serial Peripheral Interface
- → SUPC Supply Controller
- → SYSTICK System timer
- → TIC Timer Counter
- → TWIHS Two-wire Interface
- → UART Universal Asynchronous Receiver Transmitter
- → WDT Watchdog Timer
- → XDMAC DMA Controller
- → HEFC Hardened Embedded Flash Controller
- → FLEXCOM Flexible Serial Communication Controller
- → FLEXRAMECC FlexRAM Memory and Embedded Hardened ECC Controller
- → HEFC Hardened Embedded Flash Controller
- → MATRIX Bus Matrix
- → SPW SpaceWire
- → TCMHECC TCM Hardened Error Correction Code

ESA ECSS Qualified Bootloader for SAMRH71F20

N7 Space Sp. z o.o. ► p. 213

Main features

- → Boot SW qualified for criticality C, free of charge update to criticality B version (2023)
- → Compliant to ECSS-E-ST-40C and ECSS-Q-ST-80C standards
- → Compliant to European Space Agency Flight Computer Initialization Sequence Generic Specification (SAVOIR) requirements Technical highlights
- → Model based PUS-C TC/TM stack developed using ASN.1/ACN modelling supported by ESA asn1scc compiler
- → Self-test of the critical CPU modules
- → Failure reporting through boot and death reports
- → Bare metal design (no RTOS used)
- → ESA ECSS qualification test suite and data pack TC/TM link
- → PUS-C TC/TM stack with data model defined in ASN.1

- → TC/TM link available on UART interface
- → Functionalities provided by PUS-C services: 1, 3, 5, 6, 17, 20
- → Delivered with ASN.1 source files and ICD generated by asn1scc compiler Self-test features
- → Initialization self-test performing following checks
- → Bootloader integrity
- → SRAM and SDRAM memory tests
- → Functionality of SPI, UART

Other

- → Configuration vector allowing to:
 - set default application software image header
 - disable/enable memory caches
 - disable self-testing
- Additional custom configuration and delta qualification possible

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FLYEYE mini Unmanned Aerial System





FlyEye is a mini Unmanned Air System (UAS), that is used for intelligence, reconnaissance, and surveillance of the battlefield, sensitive areas, national borders, natural disasters, or large public events. The reliability and usability of the FlyEye System, have been tested and proven during many field evaluations around the world, as well as during active service in combat zones with the Polish Armed Forces. The system has been subject to field evaluations during both day and night and in extreme environmental conditions such as high wind, high and low temperatures, increased humidity and altitude changes.

The FlyEye UAV is hand-launched, which allows it to be operated in tight spaces, such as urban areas or forest clearings and maximally simplifies logistics. Before the UAV lands, it rejects its battery and payload container. Then the UAV glides towards the operator-specified landing location. Not only does this ensures effective protection of the most expensive part of the system, i.e. the observation head, but it also facilitates control over the UAV in the last stage of the flight, helping to minimize its speed.

The observation head with two cameras (visible light and IR) attached under the fuselage provides significantly better observation options and a function for rapid switching between the two video feeds. The whole system is operated by only two operators and can be securely stowed in two backpacks.

This UAV's ease of assembly and disassembly, modular design and launch readiness, which can achieved in 15 minutes, makes it usable in almost any terrain conditions, even for small squads.



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Giez/WarbleFly Loitering Ammunition System

Military Institute of Armament Technology ► p. 211

Airframe loitering ammunition system for precision target strike. The system consists of a transport tray – a UAV launcher, an aerial platform with a warhead, a ground C2 station and a tracking antenna. The system is characterized by ease of operation, short time to prepare the platform for launch, and the ability to operate the system by one soldier.







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The system is equipped with GX-4 warheads specially designed for this purpose by WITU /mass of about 1.6 kg/. The GX-4 warheads family consists of:

- → GO-4 HE /high explosive/ warhead used to strike personnel, unarmoured vehicles and machine gun nests. The lethal radius – 30 m
- → GK-4 HEAT shaped charge warhead a warhead used to destroy medium and lightly armoured vehicles and MBT. Armor penetration capability – min. 350 mm RHA
- → GTB-4 FAE thermobaric warhead a warhead used to destroy unarmoured vehicles, anti-personnel (including hidden) and bunkers and shelters. Range of effective striking – 20 m
- → GO-1 HE-TR training warhead a non-explosive training warhead used for operator training

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FEATURES & BENEFITS

- → Range up to 15 km
- → Operating on Strip SAR mode
- → Antenna with gimbal stabilization
- → Onboard real-time SAR processor
- → Ground base post-processing station
- → Linear polarization
- → FMCW radar (LPI low probability interception)



Radar solution developed and offered in partnership with XY-Sensing.

HUSSAR Portable X-Band Radar

SpaceForest Sp. z o.o. ► p. 219 XY-Sensing Sp. z o.o. ► p. 226

HUSSAR portable X-band radar (SAR), which can be attached to an unmanned aircraft, allows terrain scanning and motion detection using electromagnetic waves with a resolution of up to 15 cm.

The radar can be used for surveillance of security areas, for example by border guards, police and firefighters, to detect and track suspicious and unauthorized drones and vehicles, but also in surveying, mapping and land monitoring.



TECHNICAL SPECIFICATION

Parameter	min	typical	max	unit
Frequency range	9		11	GHz
Antenna polarization		V/V		
Range (radar to target)	150		15000	m
Max altitude			5000	m
Finest range resolution		30	15	cm
Finest range cross-resolution			30	cm
Elevation angle of the beam			65	o
Supply voltage	2536		52	V
Supply power			180	W
Antenna stabilization in azimuth (mechanical)	-20		20	o
Weight			10	kg
Temperature range	-10		50	°C
Dimension (LxWxH)		120 x 20 x 20		cm

Specifications subject to change without notice.

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HUUVER – a hybrid drone capable of moving both on land and in the air

Dronehub Sp. z o.o. ► p. 200

HUUVER is a revolutionary drone combining aerial and terrestrial capabilities, developed by a seven-partner EU consortium led by Dronehub. It represents the apex of UAV-UGV (Unmanned Aerial Vehicle – Unmanned Ground Vehicle) technology, offering unmatched versatility to operate across various terrains. Capable of flying, sitting, driving, climbing, and executing vertical takeoffs and landings, HUUVER addresses the limitations of current UAV models, making it ideal for diverse professional missions including search and rescue and patrol tasks. Its unique ability to navigate difficult ground areas enhances its usefulness and operational scope.

Incorporating the Galileo navigation system, HUUVER ensures high accuracy and reliability for critical missions through precise navigation and authentication services. Its operational framework is supported by a sophisticated server application that streamlines mission planning and management, improving mission control and efficiency. Additionally, a mobile device tool simplifies mission launch



and control, highlighting HUUVER's focus on user-friendly design for professional drone operators.

HUUVER is a cutting-edge solution in UAV-UGV technology, tailored for a broad spectrum of applications. It stands out for its robustness, versatility, and precision, ready to meet the future challenges of professional drone operations.

HYDROGEN PEROXIDE (H2O2) HTP

Jakusz Sp. z o.o. ► p. 206

HTP grade with a concentration of up to 98% is ideal for customers who value ease of use and concern for the environment. Hydrogen peroxide is very simple to store – just containers at room temperature. The whole process of handling from storage through application does not require specialized equipment and restrictive safety measures that generate significant costs. Plastic protective clothing is enough for handling. Hydrogen peroxide decomposes into water and oxygen, so it is friendly for the environment and personnel. It is the second strongest oxidant after liquid oxygen.





Intended use

Hydrogen Peroxide HTP is ideal for rocket industry. It is the only substance which has itself the features of being both a propellant and an oxidizer. Due to this property it can be used as an oxidizer for satellite correction engines or as a propellant for gas generators used in auxiliary power units (APU).

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HyperSat a reliable, multi-mission microsatellite platform

Creotech Instruments S.A. ► p. 198

HyperSat is a family of versatile microsatellite platforms developed in Poland by Creotech Instruments S.A, which can be easily integrated with a variety of payloads and launched to Low Earth Orbit.

Two configurations of ITAR-free platforms are available:



Eagle

60 to 80 kg total satellite mass, optimised for ca. 1m resolution Earth Observation reconnaissance payloads, but adaptable to a variety of other payloads.

Kestrel

15 to 25 kg total satellite mass, optimised for ca. 4m resolution Earth Observation reconnaissance payloads, equipped with laser-based intersatellite links, capable of operating as swarms in close proximity formations.

Other possible payloads include: SAR, SIGINT, PNT, COMM, and more. All HyperSat platforms are customised to fit specific client mission requirements, and include encrypted S-band / X-band communication links.

All platforms are delivered with optional secure ground segment as a service or as a deployable system set up at customer's chosen site.

Full ownership of the spacecraft can be transferred to the end-user. Support from Creotech Instruments available throughout the entire delivery timeline: from requirements specification to ongoing support during nominal mission operations (if required).

HyperSat family of microsatellite platforms won the main award in the Military Reconnaissance Equipment category at the 2023 International Defence Industry Exhibition.



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HyperSat Eagle HR EO a 1-2m GSD high resolution Earth Observation microsatellite

Creotech Instruments S.A. ► p. 198

HyperSat Eagle HR EO enables high-resolution (<2m GSD) Earth Observation in the visible and near infrared parts of the spectrum. Eagle HR EO is constructed and manufactured to the highest quality standards, adhering to tailored ECSS requirements. The first in-orbit demonstration satellite has been flight-qualified and is scheduled for launch in July 2024.

Key features of HyperSat Eagle HR EO:

- → A high-resolution (1-2m GSD) VIS + NIR Earth Observation capability.
- → High pointing accuracy (APE < 0.11°, AKE < 0.014° and RPE < 0.005°) ensures precise data collection during missions.
- → Implemented CCSDS/PUS communication standards enable easy connectivity with S- and X-band ground stations and ground systems.
- → Fast communication (up to 1 Mbps in S-band, 50Mbps in X-band) and AES-128 encryption ensure comms security.
- Redundancy implemented by design increases resiliency and extends the mission lifetime to 5 years.
- Compatibility with major established launch systems enables swift delivery to orbit.
- → Optional chemical or electrical propulsion systems allow complex orbit manoeuvring.
- → Satellite registration, launch and mission operations are optional services provided by Creotech to ensure mission success.
- → HyperSat Eagle is an ITAR-free product.





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ICEYE'S Latest Generation Satellite

ICEYE Polska Sp. z o.o. ► p. 204



For governments and commercial clients, ICEYE really has changed what is possible from Synthetic Aperture Radar (SAR) Earth observation. Our New Space approach has made it possible for clients to purchase one or more of the latest generation of ICEYE SAR satellites. We are the only organization in the world to offer high-precision SAR satellites for direct purchase. We also offer full launch services, training and support, plus access to additional data from our own constellation.

Designed for Flexibility

The design of our unique satellite and antenna lets you take a wide range of operational approaches. By mechanically manoeuvring the satellite and electronically steering the radar beam, you can quickly and easily scan large areas in low resolution and zoom in at high resolution when needed. This enables unprecedented operational capability.

Powerful and Affordable

Until now, SAR satellite missions have used large and expensive platforms carrying massive payloads. Our novel SAR system is a miniaturized, active phased array sensor mounted on a small satellite platform, enabling the frequent imaging of any AOI and making our SAR satellites powerful and affordable by design.

Operational, Proven, Trusted

We've launched over 30 satellites since 2018 with 10+ more planned for 2024 and beyond. As the only New Space company with the proven ability to design, build and supply new-era SAR Earth observation satellites, we are already trusted by governments and organizations across the globe. If you are interested in procuring ICEYE satellites, please get in contact and we would be happy to provide a tailored solution to meet your requirements.

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ICEYE SAR imaging modes: Up to 25 cm Resolution. Up to 84.000 km² Scene size. ICEYE's unique Antenna is an electronically steered phased array that can be controlled to enable a range of imaging modes for demanding operational needs. Location: English Channel

Imaging mode	Strip	Spot	Spot Fine	Dwell	Dwell Fine	SLEA	Scan
Nominal swath width x length [km]	30 x 50	5 × 5		5×5		15 x 15	100 x 100
Slant resolution(azimuth x range) [m]	3 x 0.5-2.5	0.25 x 0.5	0.1 x 0.25	0.05 × 0.5	0.05 x 0.25	0.5 x 0.5	N/A
Ground resolution [m]	3	1	0.5	1	0.5	1	15
Nominal collection duration [sec]	10	10	15	25	25	10	15
Azimuth looks	1 to 2	4	5	20	10	2	1
Maximum image length [km]	840		5	5	5	15	840

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Dwell Mode CSI (Colorized Subaperture Image) emphasizing man-made objects using various colors



A comparison between two ICEYE images (SLEA and Dwell) of an erupting volcano in Iceland

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Water level raster of Ukrainian Kakhovka Dam destruction, based on ICEYE imagery (Flood Solution)



More satellites, more coverage

Very precise change detection. Utilizing change detection techniques, it's possible to Identify highly accurate ground change every 24 hours, including such as movement of a vehicle along a track or lava flow during a volcano eruption. Each image in a stack has the exact same geometry, radiance and phase, which enables millimeter-level change detection.

Scan mode

Monitor vast sea areas. Enhance your maritime domain awareness

- → Particularly effective for maritime use cases
- → Empowering persistent visibility into large sea areas
- → Coast-to-coast coverage of key maritime routes



Scan Mode enables large-area monitoring, even up to 84,000 sq. km per acquisition, as depicted

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M28 05 aircraft

Polskie Zakłady Lotnicze Sp. z o.o. (PZL Mielec) ► p. 215

Twin turbo-prop M28 05 airplane is designed - by outstanding Polish engineers - specifically for short takeoff and landing (STOL) missions. The multi-purpose utility aircraft has the shortest takeoff, the widest mission range, and the largest payload capacity in its class. Available in commercial (M28 05) and military versions (M28B Bryza).

Powerful PT6A-65B turboprop engines, high lift wing, thrust reversing propellers and low-pressure tires allow the aircraft to operate from any type of runway, including highelevation airfields.



Depending on the mission, the aircraft is available in the following configurations: passenger, cargo, combi, VIP, parachuting, medical evacuation, maritime patrol (MPA), search and rescue (SAR). The floor construction and the attachment system allows the following equipment to be installed interchangeably: passenger seats, paratroop equipment, medical equipment, cargo and special equipment operator stations.

The lower part of the fuselage accommodates joints for attaching the under fuselage luggage pod. Cargo loading



The radio navigation equipment allows for both VFR and IFR flights, day and night. A state-of-the art navigation systems, advanced inertial platforms, weather radar, modified de-icing system make the M28 operable in all conditions.

The M28 airplane has received many type-certificates including and European Aviation Safety Agency (EASA) and the U.S. Federal Aviation Administration (FAA).



More than 100 M28 aircraft currently operate worlwide in both commercial and military configurations including 38 in the Polish Air Force (M28B Bryza) and Polish Border Guard.



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MADDOS Multi-sensor Automatic Dron Detection & Observation System AP-FLYER > p. 195

Features of the MADDOS system:

- → All-in-one solution
- → Combat-proven system
- → Effective against FPV drones and loitering munition
- → $360^{\circ} \times 90^{\circ}$ protection coverage
- → Extremely high detection range
- → Detection of all UAV classes
- → Scalable for large areas and borders
- → Location of drone swarms and operators

Software

- → Data fusion and correlation
- → C2 software based on standard NATO symbology
- → Sensor management from one application
- → Unified air picture

System configurations:

- → stationary
- → man-portable
- → mobile mounted on vehicles

Detection systems:

- → Passive RF sensor detection of the communication signal between the drone and the operator with target 3D location
- → 4D Radar detection of flying objects with classification to distinguish UAVs from birds
- → EOIR cameras two-sensor optoelectronic on P&T unit for target confirmation and tracking

Neutralization systems:

- Multi-band jammers interfere with the drone operator communication signal and the UAV navigation system
- → GNSS Spoofing manipulation of the UAV's GNSS receiver to force the drone to fly in the selected direction
- → ToC (Take over Control) a system for detecting and taking control of drones and forcing them to land
- → Kamikaze drone Hard-kill solution autonomous drone kinetically engaging enemy drones
- → FCS Orion integrated detection and hard-kill solution based on 23mm anti-aircraft cannon



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MADDOS VTOL Vertical take-off and landing UAV

AP-FLYER ► p. 195

- → VTOL vertical take-off and landing
- → High endurance up to 10h of flight
- → Suitable for every mission scenario
- → Modular design fast field assembly
- → Fully automatic operation

- → Day and night operative
- → Long range data link up to 150km (LoS)
- → Operations in GNSS denied environment



VTOL 600h

- → Propulsion: Hybrid
- → Wingspan: 6m
- → MTOW: 110kg
- → Payload: 20kg
- → Flight time up to 10h+
- → Cruise speed: 115 km/h
- → Ready to fly in less than 60min
- → Used for long-endurance and long-range ISR missions
- Multiple payload options EOIR cameras, SAR radar, NADIR cameras, integration of users payload
- → Communication range – up to 150km (LoS)
- → Redundant flight controller meeting Aviation and MIL-STD standards
- Anti-jamming capabilities operational under EW conditions





VTOL 350e

- → Propulsion: Electric
- → Wingspan: 3.5m
- → MTOW: 22.5kg
- → Payload: 2kg
- → Flight time up to 3h
- → Cruise speed: 72 km/h
- → Ready to fly in 15 min
- → Used for rapid, mid-range ISR missions
- → Silent operation
- Communication range up to 40km (LoS)
 Flight controller meeting Aviation
- and MIL-STD standards
- → Anti-jamming capabilities operational under EW conditions



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Maintenance of C-130 Hercules

Military Aviation Works No. 2 (WZL2) ► p. 210

Capabilities:

- → Programmed Depot Maintenance (PDM);
- → HSC and ISO periodic maintenance;
- Development of technical bulletins and preparation of ordered bulletins;
- → Upgrade of aircraft systems on site: replacement of airframe elements, replacement of aircraft system elements;
- → Removal of paint coating and painting of aircraft;
- → Checks and adjustments;
- NDI (non-destructive inspections) of airframe structures and elements;
- → Components repair;
- Design, production and operation of airport and hangar equipment;
- → Supply of spare parts and materials;
- Implementation of other tasks required and stipulated by the contract.

Experience

We provide Polish and international customers with comprehensive and affordable versatile aviation solutions based on the highest qualifications and the commitment of employees. Credibility, responsibility, security and awareness of the importance of services for national defence are the company's main aspirations. We have the necessary personnel, equipment and infrastructure to perform repairs, periodic and depot maintenance of C-130E and C-130H aircraft. Since 2010 our company has been executing C-130 maintenance contracts.

Contracts for the PDM (Programmed Depot Maintenance) have been implemented since 2015 as ongoing support in the field of maintenance, through repairs, improvements, delivery of technical material resources as well as development and implementation of technical bulletins.

In January 2016, a new hangar was commissioned for use. It consists of two parts: an aircraft hangar that can accommodate two C-130 aircraft and a paint shop.





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Maintenance of F-16

Military Aviation Works No. 2 (WZL2) ► p. 210



Capabilities:

- Overhaul of landing gear LRUs (undercarriage struts, angle struts, shock absorbers, wheel axles);
- Overhaul of hydraulics (tanks, actuators, valves);
- Overhaul of electrical equipment (converters, control blocks, voltage regulators);
- → Overhaul of avionics (displays, armament control blocks, radio stations);
- Paint coat removal using Plastic Media Blasting (PMB);
- → Ground Support Equipment (GSE) design and production;
- → Airframe painting;
- → Alternate Mission Equipment (AME) painting;
- NDI (non-destructive inspections) of airframe structure.

We provide Polish and international customers with comprehensive and affordable versatile aviation solutions based on the highest qualifications and the commitment of employees. Credibility, responsibility, security and awareness of the importance of services for national defence are the company's main aspirations.

We have the necessary personnel, equipment and infrastructure to perform repairs, periodic and depot maintenance of F-16 aircraft. Within the scope of F-16 maintenance, we perform selective removal of paint coating by the PMB (Plastic Media Blasting) method. Additionally, we repaint aircraft in the Have Glass II system. It is a special coating enabling reduction of effective reflecting surface (Radar Cross Section).



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Experience

Maintenance, repair and overhaul (MRO), Aircraft Painting

- Capabilities:
 → line maintenance approval for Embraer ERJ 170/190, Base;
- → base maintenance approval for ERJ 170/190;
- components repair and overhaul (brakes, wheels, batteries, composites, sheet metal);
- → line/base maintenance (Part 145) including: paintshop, engineering, workshops, demo flight assistance, aircraft weighting, engine/APU removal & installation;
- comprehensive aircraft parking and storage services for approx. 20 aircraft;
- → maintenance of components (oxygen and fire protection systems; overhaul and repair of wheels, batteries)
- → aircraft painting;
- → mechanical or chemical paint stripping;
- surface preparation, paint and anti-corrosive coat spreading;
- → application of all types of painting systems High Solid / Base Coat Clear Coat/ VIP Finishes;
- → Application of decorative films.



Modern hangars

Wojskowe Zakłady Lotnicze Nr 2 S.A. (WZL2) possesses a hangar with two halls with areas of 3,600 m² and 3,700 m², where two planes ICAO code C (f.e. A320 or B737) or ICAO code D (f.e. Boeing 767 or Airbus A310) can be accommodated. One hall is dedicated to the maintenance services for civilian passenger and transport aircraft and second hall is a modern painting shop. After completing maintenance service, we can offer paint the aircraft. The paint shop is equipped with state-of-the-art heating, humidification, ventilation, and lighting systems and much more. The second is separate hangar with 2 slots for maintenance type C for Embraer 170/190 aircraft.





Military Aviation Works No. 2 (WZL2) ► p. 210

Certificates

In accordance with the EASA PART-145 WZL2 offers line, base and workshop aircraft maintenance. The company assists in the preparation of documentation, analyzing defects, and solving technical problems. WZL2 provides maintenance for aircraft ERJ 170/190.



The most modern painting shop in Europe:

- → All types of painting system application (high solid, base coat, clear coat, etc.);
- Environmental protection (waste water cleaning, air filters);
- Electrostatic painting system (extremely reduced amount of dust and waste of paint);
- LED lightning system providing neutral temperature of light (day light).

WZL2 paints whole aircraft or their parts such as fuselages, wings, cabin interior and some aircraft components. The process starts with status verification (incoming inspection). The highly skilled technicians use the latest industrial tools, equipment and consumables. The paint shop allows removing aircraft-paint by surface sanding or chemical stripping and application of a new layer. Logo design and aircraft sticker application can be carried out at the paint.

Painting processes are top and environment friendly. The paint shop uses the latest technology dedicated to repainting process – for example BaseCoat/ClearCoat and chromate free materials that comply with REACH EU regulations. However, the painting of an aircraft is more than just colour and first impressions. It also protects and preserves the aircraft's value.

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Mobile DRONEHUB

Dronehub Sp. z o.o. ► p. 200

The Mobile DRONEHUB revolutionizes drone operations by enhancing efficiency in surveillance, reconnaissance, and more. Its cutting-edge docking station, mounted on a car truck, facilitates autonomous drone deployment anywhere, adapting to diverse terrains without the need of an operator. The system features a self-leveling landing pad with a 6DOF layout for consistent, flat landings, and employs AI for object recognition and mission execution based on real-time data. Drones autonomously return to the docking station for battery swaps or maintenance, programmed for tasks like surveillance and payload delivery, increasing operation efficiency and safety while reducing manpower. Ideal for military, search and rescue, environmental monitoring, and infrastructure inspection, this technology streamlines operations across various sectors, ensuring rapid, autonomous task completion and significant operational advancements.

Applications:

- → Military and defence for conducting reconnaissance missions in hostile territories without exposing personnel to danger.
- → Search and rescue in disaster-stricken areas where quick and wide-area surveillance can save lives.
- → Environmental monitoring for tracking changes in ecosystems, wildlife populations, or detecting illegal activities in protected areas.
- → Infrastructure inspection enabling efficient inspection of hard-to-reach structures like bridges, power lines, and wind turbines.



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MOBILE JAMMERS

AP-FLYER ► p. 195



Handheld jammer (Handheld-8 Drone C-UAS)

- → Range: over 1.5 km
- → Frequency bands: up to 8 (433 MHz, 868 MHz, 915 MHz, 1.2GHz, 1.5GHz, 2.4 GHz, 5.8 GHz)
- → Weight: <7 kg
- → Operating time on single battery: do 45 min
- → Features: digital display, inbuilt compass, optical scope, active cooling, IP65
- → Safety: Radiation hazard certificate

Manpack jammer (Manpack-8 Drone C-UAS)

- → Range: over 2.5 km
- → Frequency bands: up to 8 (433 MHz, 868 MHz, 915 MHz, 1.2GHz, 1.5GHz, 2.4 GHz, 5.8 GHz)
- → Weight: <18 kg

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- → Operating time on single battery: up to 60min
- → Operating time from AC source: unlimited
- → Features: digital display, optical scope, active cooling, IP55
- Safety: Radiation hazard certificate

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Rasel Autonomous Tracking and Data Transmission System





CONTROL AND COMMUNICATION

Using the control and communication application, the system operator communicates with the central unit software on board of flying vehicle. This enables reading the telemetry data received by the tracking station or sending commands to the vehicle.

The control and communication application also allows for displaying the status of the rocket's subsystems, storing the data (including telemetry), and presenting altitude and attitude of the vehicle on the map. The tracking station also allows for monitoring of current angular positions of the antenna platform for triangulation. The fully autonomous tracking and data transmission system is used to allow for reliable, long-distance communication with a rocket or other flying vehicle. The system consists of 2 subsystems:

- → The first subsystem based on a one-way transmission is used for tracking a vehicle and thus maximizing the range of communication. Two main components of this subsystem are: a radio beacon on-board the vehicle and a four-antenna tracking station on the ground.
- → The second subsystem allows a bi-directional data exchange between the vehicle and the ground station. It consists of a radio transceiver on-board the vehicle, directional communication antenna on the ground, and dedicated software for receiving, storing and visualising data.

The "flying" part of the system (on-board the vehicle) can be equipped with an Inertial Measuring Unit (IMU) and/or GPS module and then – together with the ground station software – becomes a tool for monitoring the state of the vehicle.

The ground station antennas system can be rotated vertically and horizontally, to allow for a half-sphere coverage of the system, i.e. to allow tracking within 360 degrees in horizontal plane and 180 degrees in vertical plane.

The entire system allows for continuous tracking the vehicle parameters. The position of the vehicle is on-line displayed on the map in a dedicated control and communication application.



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TECHNICAL SPECIFICATION

Parameter	Value
Tracking antenna gain	13 dBi
Operating frequencies	869 MHz, 1.8 GHz, others on demand
Tracking distance	125 km
Max power consumption	2kW@220VAC
PC communication interface	Ethernet
Max scan angles	Azimuth ±360°; Elevation ±90°
Max. radial velocity	180°/s

Features & benefits

- Possibility to track objects in the entire celestial hemisphere
- → Wide dynamic range of receivers and transmitters, allowing to maximize the tracking and communication range
- Small, rigid, robust deployable construction
- → Modular, configurable design

Specifications subject to change without notice.



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Scanway's Optical Payload (SOP)

Scanway S.A. ► p. 218



As part of SOP, Scanway is developing a product series of Earth observation telescopes, mainly designed for small satellites (nano- and microsatellites). The company's past projects and activities have resulted in telescopes dedicated to working with 3U, 6U platforms and microsatellites up to about 70 kg. The apertures of the optical elements used are up to 200 mm, which makes it possible to achieve resolutions of more than a meter from standard orbits (e.g., in low Earth orbit). Thanks to the use of modern materials and an innovative approach to design, the telescopes of the SOP line have athermal properties that maintain high imaging quality parameters during on-orbit operation. The scalability and modularity of the structure exemplify the optimum price combined with the best technical performance. Scanway offers support at each of the stages of optical payload delivery: design, manufacturing, testing, integration and operation of the telescope in orbit. Imaging obtained with SOP telescopes has many applications such as monitoring natural disasters, studying climate change, supporting agriculture and urban development, object classification, and military applications.

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Spacecraft Health Scanner (SHS)

Scanway S.A. ► p. 218

SHS was developed as a combination of Scanway's experience in developing proprietary vision systems for quality control in the manufacturing industry on Earth and familiarity with designing components dedicated to space. It is a relatively simple vision system that relies on cameras and other sensors for its operation and has the ability to analyze changes or processes using machine learning and AI-based vision algorithms. Applications of vision systems in space: self-diagnosis of space vehicle modules and objects approaching the vehicles, observation of space vehicle processes while operating in space, control of production and service processes in space, possible applications to SSA. When SHS is applied to space infrastructure, it allows to conduct self-diagnosis of the satellite based on the acquired images. The cameras can collect data from both the exterior and interior of the vehicle, and their range of applications includes, for example, assessment of the degradation of photovoltaic panels, verification of the operation of mechanisms, verification of the operation of AOCS systems, or thermographic analysis of electronic components. Analysis of images captured from the cameras is carried out in specially designed electronics using FPGAs and artificial intelligence algorithms.



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SPECTRE-2

Spectre Solutions Sp. z o.o. ► p. 220

SPECTRE-2 is a flexible VTOL drone that can handle any challenge. It can serve various functions, such as infrastructure monitoring, medical supplies delivery, or other missions. SPECTRE-2 is a perfect solution for these activities.

SPECTRE-2 is a hybrid drone that benefits from fixed-wing and rotary-wing features: it can take off, land vertically without needing a runway, and fly at high speed and long distances. It can also hover in the air and switch between three flight modes: automatic, semi-automatic, and manual. It can be controlled remotely or fly autonomously, using cutting-edge communication standards: RC/GSM/LTE/5G/SAT.





SPECTRE-2 is developed by the most experienced aviation experts, using the highest technology and standards. It is equipped with multi-level security systems, ensuring its operations' safety and payload. It can carry a customizable payload of up to 6 kg, and the drop system can deliver it safely on a parachute. The drone has an ample cargo space of 45 litres and can transport various medical supplies.

SPECTRE-2 is the best possible option for the most demanding needs. It has a maximum take-off weight of 32 kg and can reach a speed of up to 140 km/h. Depending on the order specifications, it can have a range of up to 700 km and a flight time of up to 6.5 hours. It can operate at a maximum ceiling of 1000m and adjust to terrain and weather conditions.



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Thorium Space chipsets are advanced integrated circuits designed for use in satellite communication and space systems. Here's a more detailed description of these chipsets:

High Performance:

Processing Power: Thorium Space chipsets are designed with high processing capabilities to efficiently handle complex communication protocols and data processing requirements, even under demanding operational conditions.

Signal Processing: Equipped with advanced signal processing units, these chipsets enhance the quality and speed of data transmission, crucial for real-time communication and high-bandwidth applications.

Energy Efficiency:

Low Power Consumption: A key feature of Thorium Space chipsets is their low power consumption, vital for the long-term operation of satellite systems. This efficiency helps extend the lifespan of satellites and reduces operational costs.

Optimized for Space Conditions: The chipsets are designed to perform optimally under the harsh conditions of space, including extreme temperatures and radiation exposure, ensuring reliable functionality throughout the mission.

Miniaturization:

Compact Design: Thorium Space focuses on miniaturizing their chipsets, allowing for reduced size and weight of the overall satellite payload. This compact design is essential for maximizing the available space on satellites and reducing launch costs.

Integration: The small size of these chipsets enables easy integration with other satellite components, contributing to more streamlined and efficient satellite designs.

Advanced Communication Capabilities:

Broadband Connectivity: The chipsets support highspeed broadband connectivity, enabling seamless communication for various applications, including internet services, data transfer, and video streaming.

Thorium Space Chipsets

Thorium Space S.A. ► p. 223

Versatile Frequency Bands:

Thorium Space chipsets are designed to operate across multiple frequency bands, including Ku-band, Ka-band, and others, providing flexibility for different satellite communication systems.

Security Features:

Data Encryption: To ensure secure communication, the chipsets come with built-in data encryption features. This protects sensitive information from interception and unauthorized access, crucial for both commercial and military applications.

Resilience Against Interference: The chipsets are equipped with technologies to resist signal interference and jamming, maintaining reliable communication links even in contested environments.

Custom Solutions:

Tailored Designs: Thorium Space offers customized chipset solutions to meet specific needs of different clients and applications. This includes specialized designs for particular mission requirements or unique operational environments.

Scalability: The chipsets can be scaled according to the size and complexity of the satellite systems, making them suitable for a wide range of satellites, from small CubeSats to large geostationary satellites.

Summary

Thorium Space chipsets are characterized by high performance, energy efficiency, compact design, advanced communication capabilities, and robust security features. These integrated circuits are integral to the development of modern satellite communication systems, providing reliable and efficient solutions for various space missions and applications.



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WARMATE Loitering Munition System WB GROUP ► p. 224

The combat unmanned aerial vehicle (CUAV) is a multi-role system performing multiple tasks depending on a type of the head installed. The system is characterized by a light structure and the ability to perform various types of missions. WARMATE is successfully used by Polish and foreign armed forces and can be the key element on the battlefield.



The WARMATE can be used as a self-contained system, which can be transported or carried by land or special forces units. The system design permits its installation on vehicles (cars, APCs) and integration of the Ground Control Station and the Ground Data Terminal with onboard vehicle systems. The WARMATE constitutes a good alternative for anti-tank guided missiles with its capability to operate in a significantly larger radius, allowing comfortable detection and observation of the potential target in a relatively large time span. The WARMATE in combat configuration is an expendable solution. In the observation configuration the UAV can be recovered and reused. The WARMATE is a fully autonomous solution allowing real-time operation of airborne warfare, using the video feed received from its surveillance subsystem. In addition it has the capability of swarm attack mode. The UAV is equipped with control modules ensuring full automation of the majority of flight phases and supporting the operator during targeting. The operator has full control and bears full responsibility for switching it to the armed mode in order to execute a combat task.



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AIR AND MISSILE DEFENCE



ANTI-AIRCRAFT MISSILE SYSTEM POPRAD



Self-propelled Surface-to-Air Missile System POPRAD is designed to detect, recognize and destroy airborne targets at close distances and low altitudes, with the use of shortrange anti-aircraft missiles. It has very short into-action time as well as evacuation time below 30 sec.

- → 4 PIORUN missiles
- → Highly mobile solution, with short deployment and evacuation time
- → Integrable onto a various platforms wheeled and tracked, naval units
- → Highly precise optoelectronic integrated tracking/ targeting sensor
- → Effective combat against fast, manoeuvring targets
- → Allowing operation at night, and during the day



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Air and missile defence Air an

BYSTRA MOBILE 3D SHORT RANGE RADAR



3D Mobile radar is a multi-functional and multi-purpose radar for the SHORAD systems used to protect tactical combat units from airborne threats with versatile capabilities and various applications. It detects and tracks typical airborne targets, such as combat aircraft and helicopters (also hovering), missiles and UAVs, as well as mortar projectiles. High accuracy of tracked objects position.

- → Instrumental range: 80 km
- Ability to detect threats with low-RCS →
- Autonomous operation or as a sensor within a air defence C2 network

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- Features spoofing and decoy systems, diminishing → the risk of being detected by the enemy
- Resistance to passive countermeasures, or active jamming, enhancing the resilience to ARMs
- Detection of active mortar sites, defining their position and point of impact for the fired mortar bombs.



AIR AND MISSILE DEFENCE

CABLE HARNESSES

Wojskowe Zakłady Uzbrojenia S.A. (WZU S.A.) ► p. 226



Cable Harnesses - WZU S.A. specializes in the design and manufacture (production) of highly specialized electric cable harnesses, also including fiber optic wires, intended for military (army) equipment and vehicles. Cable harnesses are a part of advanced military technology, designed with the use of, but limited to, specialized software HARNWARE, which controls construction process of harnesses from electrical and mechanical perspective. Cable harnesses of our production feature high reliability in everyday use in combat conditions. Cable harnesses we manufacture may use wide range of connectors for industrial and military applications.



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Air and missile defence Air an

CKE-1T thermal target sight for anti-aircraft gun and missile system

Przedsiębiorstwo PREXER Sp. z o.o. ► p. 216

The CKE-1T thermal imaging sight is designed to conduct combat operations in day and night conditions, especially in all conditions of limited visibility. CKE-1T has a thermal imaging module allowing detection and engagement of the target at night.

CKE-1T target sight can be used in 23 mm anti-aircraft sets, e.g. ZU-23-2K (ZUR-23-2KG), while combating air targets.

Sight is equipped with a programmable thermal imaging module adaptable to working conditions.

Range of entered distances:

CKE-IT

640x480, optional 1024x768 or 1280x1024

→	by means of the manual switch	2÷30 hm
→	using the footswitch	programmable
-	automatically	2÷24 hm

Maximum target detection in limited visibility conditions:

- → Helicopter (4x6m) 5800 m
- SUV car (2x4m) 3800 m 1350 m
- Single soldier (1,5x0,7m) 2950 m
- → Standard NATO target (2,3x2,3m)





8÷12 µm

< 50 mK

2x, 4x

17°

13°

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AIR AND MISSILE DEFENCE

Thermal imaging module parameters:

- → Spectrum range
- → Thermal sensitivity NEDT
- → Digital optical zoom
- → Matrix
- → Horizontal viewing angle
- → Vertical viewing angle

DJ-25 Jammer Unmanned Aerial Vehicle (UAV) jammer system



J-25 Jammer is a system that enables the neutralization of enemy objects, such as commercial civilian drones used for reconnaissance purposes and engaging targets using dropped Improvised Explosives or mortar shells, at a distance of up to 2,500 meters.

The DJ-25 system is equipped with precise GPS, telemetry and radio communication jammers. Operating broadband at frequencies e.g. 2.4 GHz, 5.8 GHz and the GSM 850/900 MHz band.

The DJ-25 has been adapted to the technical realities of the most popular, potential air targets.

Basic technical parameters:

range	2500 m
output power for one channel	up to 100W (52 dBm)
operating temperature range	from -30 up to +60°C
angle of the jamming beam	20-40°
system weight	approx. 15 kg
power supply	12V or 24V
	range output power for one channel operating temperature range angle of the jamming beam system weight power supply



Air and missile defence Air an

ELECTRO OPTICAL SYSTEMS

Wojskowe Zakłady Uzbrojenia S.A. (WZU S.A.) ► p. 226

Optoelectronic Head is a new generation device integrating passive optoelectronic sensors operating in the bands from visible to thermal as a means for detection, recognition, identification, and observation, and following integration onto the platform for specification of angular coordinates of remote targets in the visible spectrum and in the infrared. It may operate in various weather conditions, both during the day with sunlight or artificial lighting as well as in the conditions of limited visibility. Optoelectronic Head operates in a set of devices which enable manual and automatic guidance of the head optical axis on the target under observation. The laser range finder, as a component of the equipment, enables identification of range to the target from 100m to 30.000m.

Capabilities

- passive detection identification thermovideo recognition, no detection of own position,
- control over the airspace,
- eye-safe laser range finding,
- → data on the target range and azimuth,
- positioning, determination of co-ordinates,
- potential adjustment to any platform.

Purpose

The optoelectronic head may be adjusted to any fire control platform of anti-aircraft systems, in particular, for the following air defence systems:

- → 2K12 KUB (SA-6),
- → 9A33BM2 OSA (SA-8),
- → 2K11 KRUG (SA-4),
- → an example of a different type of platform - Combat Field Reconnaissance System integrated onto a HUMVEE platform.

Advantages of Application

- Replacement of the sight used so far enabling the systems to thermally detect the target and to improve detection range.
- → Limited radar radiation and improved radio electronic camouflage.
- Upgrade and improvement of missile weapons which are a significant potential in use by Land Forces, Air Force, Air Defence and Navy of the Republic of Poland





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AIR AND MISSILE DEFENCE

PILICA Anti-Aircraft Missile and Artillery Systems



The PILICA anti-aircraft missile and artillery system is a very short-range air defence system (V-SHORAD). The PSR-A PILICA has been developed as a result of the evolution of the design of the 23 mm double-barrelled anti-aircraft gun, utilising the competences that Zakłady Mechaniczne "TARNÓW" S.A. acquired while upgrading earlier versions of the 23 mm anti-aircraft gun. The use of new technologies has improved the fire efficiency and enabled the gun to work within the system. The system is designed to shield a single surface object and marching columns against very short-range air attacks. PSR-A PILICA has an integrated system for detection, identification, combat management, and combating air and ground targets, it automatically detects, recognises, and identifies means of air attack and distributes tasks to the Fire Units of the system. Due to the design solutions used, the PSR-A PILICA is suitable for loading, unloading, and transport by land (road and rail), water and air (aircraft class: C-295M CASA or C-130 HERCULES). The system is constantly being developed, as exemplified by the work on the Pilica + configuration integrated with MBDA CAMM missile launchers.

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- → Effectively neutralizes targets in radius of 6 km up to 4,5 km altitude
- → Dual armament system: ZU-23-2 23 mm twin cannon, 2 thermal homing PIORUN missiles
- → Fully digital operation with emergency manual operation possibility
- → Fire control system integrated with Observation-Tracking Head coupled with electric drives ensure precise aiming
- → Capability to operate the Unit from remote control panel
- → Ability to work within an external C2 system

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Air and missile defence Air an

PIORUN Portable Anti-Aircraft Missile System MESKO S.A. ► p. 209







The PIORUN is designed to combat helicopters, aircraft, unmanned aerial vehicles, and winged missiles. The missile has a fuse equipped with a proximity sensor, allowing it to strike a target if it passes close by. Additional daylight and thermal imaging sights were also used, allowing the operator to use the system effectively both during the day and at night. The system has a starting mechanism that allows the operator to select, among others: pursuit-collision mode, type of target, weather conditions, it performs IFF, communicates with optical and thermal imaging sights, and has the possibility of using an authorisation key.

The Piorun has proven its high effectiveness under combat conditions and its user base continues to expand.

- → Proximity and impact fuze
- → Two-band IR homing head
- → Effective against self-protection systems
- → Extensively battle-proven against jets and helicopters
- Very effective against low-flying objects and UAVs



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Repairs, Modernizations, Modifications, Integration, Maintenance at the Depot Level

Wojskowe Zakłady Uzbrojenia S.A. (WZU S.A.) ► p. 226

Repairs of military technical equipment performed by Wojskowe Zakłady Uzbrojenia S.A. guarantee full restoration of operational efficiency in compliance with the demands of operational readiness.

In the course of overhaul, not only will technical efficiency of the equipment be restored, but also all the technical and operational parameters of the new equipment, including operational reliability.

Moreover, Wojskowe Zakłady Uzbrojenia S.A. performs overhaul of missile systems supporting equipment such as:

- equipment for fuel distribution, oxidiser and air,
- → control and measuring stations,
- → training simulators,
- transporters and transporting and loading equipment,
- → surface-to-air anti-aircraft missiles,
- → electrical power supply sources.



Modernizations include OSA combat vehicles, WEGA, KRUG and KUB missile systems and cover all major systems and subsystems of mentioned missile sets. They have been developed based on our own design solutions and carried out in accordance with WZU S.A. documentation. Modernizations increase quality by replacing a number of unreliable units with our own solutions and removing operational inconveniences. The use of latest technical solutions improves tactical and technical parameters of the sets, which correlate with performance of devices used on the modern battlefield and have a significant impact on increasing their reliability.





Rockets S-5KO, S-5MO

Zakłady Sprzętu Precyzyjnego NIEWIADÓW Sp. z o.o. 🕨 p. 229

Unguided rockets designed to be fired from aircraft launchers at armoured vehicles, hides and buildings. The nosecone, after tearing, creates an additional area of effect in the form of a large number of shrapnels.



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UST-2 Training Device for PIORUN MANPADS

ROSOMAK S.A. ► p. 217

WB GROUP ► p. 224

DESIGNATION:

The UST-2 trainer is designed for practical learning and improving the firing skills of PIORUN missiles as part of the PIORUN training activities for operators of PIORUN MANPADS in the scope of pre-firing activities, aiming and tracking targets, solving and carrying out firing missions when facing changing tactical conditions. UST-2 PIORUN allows for evaluation of the training of operators in the given range.

ALLOWS FOR:

Training of operators as well as the crews of mobile anti-air sets equipped with PIORUN MANPADS:

- → up to four operators at a time under the direct supervision of the instructor;
- → in all terrain conditions with a use of real air targets (airplanes, helicopters, UAV - also while the thermal disturbances is present) or air target imitators that emit heat radiation at both low and high temperature;
- → indoors using a VR simulator

TERMS OF USE:

- → temperature range for work and storage: from -20°C to +50°C;
- → relative air humidity: maximum 95% at a temperature of +40 ° C
- → precipitation: rain with an intensity of max. 5 mm / min.;
- → atmospheric residue: frost and dew - deposition is allowed;
- → solar radiation: it is recommended to protect against direct lighting of the monitor;
- → single shocks: maximum acceleration amplitude 98m/s2;
- → shocks and transport vibrations: not stronger than those occurring during transport on dirt roads with a vehicle on a wheeled chassis at a speed of up to 40 km / h.

DESIGN SOLUTION:

UST-2 has four essential elements:

1) Central Unit JC-2 (instructor station) – computer system equipped with a package of interfaces and software that enables the following:

- current view of the work of up to 4 operators at the same time,
- → inputting the parameters of the firing task,
- → automatic calculation of each firing attempt,
- → creating and maintaining a database containing the results of individual operators,
- → video recording of "firing" attempts in the form of measurement data files and video clips.

2) RST- 2 Training Missile PIORUN with a built-in Observation System (UO), which is a training equivalent of PIORUN missile in the launcher, it recreates the dimensions and mass parameters of the product as well as mechanical and electronic interfaces.

3) The Training Missile Mechanism, which is a training equivalent of the PIORUN's combat Starting Set, recreates the dimensions and weight parameters of the combat Starting Set as well as mechanical and electronic interfaces.

4) Power Block BZ-2, which is a part of a set of power supplies to power the Central Unit JC-2 and RST- 2 Training Missile PIORUN.

TACTICAL AND TECHNICAL DATA FOR RST-2:

field of view GST-2	1,0°÷1,5°
observation system field of view	9,0°±1,0°
maximum angular velocity of target tracking	≥ 12 °/s
time to obtain readiness for data registration	$\leq 60 \text{ s}$
time to obtain readiness for tracking the target	$\leq 5 s$
number of stored simulation shots data	
from recording cycles	≥ 150
maximum standby time for data recording	$\geq 2h$
battery capacity of the Power System Block	6,8Ah

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ARMOURED VEHICLES AND ARTILLERY SYSTEMS





122 mm Ammunition with HE-462 Projectile and Reduced Charge for D-30/2S1

Zakłady Sprzętu Precyzyjnego NIEWIADÓW Sp. z o.o. ► p. 229

The product is designed for shooting with 122 mm 2S1 and D30 howitzers in order to destroy enemy manpower in open space or field fortifications and for clearing the way through minefields and defensive fortifications, fighting artillery and destroying lightly armoured vehicles and weapons.

152 mm Ammunition with HE-540 Projectile and Full or Reduced Charge for D20/2S3

Zakłady Sprzętu Precyzyjnego NIEWIADÓW Sp. z o.o. ► p. 229

Designed to destroy manpower in open space or shelters, demolish bunkers and field fortifications, fight artillery and destroy armoured vehicles. It can also be used to clear the way in minefields and defensive fortifications.



155 mm Artillery High-Explosive Base-Bleed Round with Extended Range

Zakłady Sprzętu Precyzyjnego NIEWIADÓW Sp. z o.o. > p. 229

The 155 mm HE ER BB rounds are designed to partially or completely destroy targets or temporarily slow down the advance of enemy forces, thus limiting their combat effectiveness. The 155 mm HE ER BB rounds primarily allow for the destruction of stationary targets, places with a high concentration of troops, field shelters, lightly armoured targets, weapon systems, military equipment, transport equipment, etc.

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BAOBAB-K SCATTERED MINE LAYING VEHICLE

Huta Stalowa Wola S.A. ► p. 204

BAOBAB-K Scattered Mine Laying Vehicle enables deployment of minefields of various sizes, laying density and self-destruction time. The minefield laying process has been fully automated: both rotation and movement of platforms with launchers (mine throwers) is carried out automatically by using a control station, which allows quick transition from transport to combat mode (and vice versa). In automatic mode, the computer calculates the speed of the vehicle, launcher settings and adjusts the frequency of launching mines while driving to ensure the correct parameters of the minefield.





User can choose automatic or manual mode of control system. In the automatic mode, the computer calculates launcher's settings and retains launching frequency during vehicle travel to ensure correct parameters of the mine-field. BAOBAB features 6 mine throwers (barrel packages), a single mine cassette is loaded with 5 mines, in a total one vehicle carries up to 600 mines and setting up a mine field with a length of 1,200 m to 1,800 m. Laying time is less than 22 minutes.



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BORSUK Amphibious Infantry Fighting Vehicle

Huta Stalowa Wola S.A. ► p. 204

New, amphibious infantry fighting vehicle codename "Borsuk" ("Badger") is able to cross wide water obstacles, has high manoeuvrability and can be used in various terrain and weather conditions. Constructed to address the challenges of the contemporary battlefield. Designed in close cooperation with users, with a high level of modular ballistic and mine protection to ensure crew safety resulting in a highly ergonomic vehicle providing comfort and safety for the troops. Modular construction allows to provide a single platform for multiple purposes.



The amphibious IFV "Borsuk" is a project co-financed by the National Centre for Research and Development under the National Defence and Security programme.



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BÓBR A modern 4x4 amphibious armoured vehicle AMZ KUTNO S.A. ► p. 194



A modern 4x4 amphibious armoured vehicle, designed and built entirely by AMZ-KUTNO S.A. It is a modular platform adapted to a variety of body and destination variants, with further upgrade potential, meeting the highest quality and safety standards.

The chassis of the BÓBR 3 ("Beaver") vehicle under the LOTR program underwent a series of traction, environmental and functional tests, as well as was tested for bullet and mines resistance. All tests were completed with positive results.

The BÓBR 3 was designed according to the highest military standards, taking into account the maintenance of interoperability within NATO.

Advantages of the vehicle:

- → The vehicle is approved for operation on public roads.
- → Ballistic protection is realized in a modular way with the possibility of replacing panels with different levels of protection.
- → The technical solutions used in the vehicle make it possible to overcome water obstacles without preparation.

Alternative versions::

- → Artillery Reconnaissance Vehicle,
- → Command Vehicle,
- → Chemical Reconnaissance Vehicle,
- → Tank Destroyer,
- → Amphibious carrier for short-range air defence systems,
- → Vehicle-carrier for strike drones / radio-electronic warfare means.

Technical Data:

- → Engine: 6-cylinder 7.2 L engine and 326 horsepower
- → Water propulsion: hydraulically powered thrusters
- → Transmission: automatic
- → Armouring: Level I and III according to STANAG 4569
- → GVW: 16 tons
- → V-max: 90 km/h
- → V-max float: 8 km/h
- → Number of seats: 5

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ARMOURED VEHICLES AND ARTILLERY SYSTEMS

obision and artillary systems. Armoured ushis

Directional Spool Valves for Extreme Environmental Conditions

PONAR Wadowice S.A. ► p. 215

Our offer includes special versions of our proprietary spool valves that can be used in extreme environmental conditions, such as low/high temperatures, high humidity or dustiness, salt and sea fog.

For temperatures from -40°C to +50°C ... SO536

Products tested and compliant with defence standards:

- → NO-06-A101 ÷ NO-060A108.
- → IN VERSION UP TO + 90°C TROPIK, ... SO7

The elements of the products in the TROPIK version are galvanized or painted with phthalic enamel, tropical cyclorubber enamel, EMSGT... electromagnets are made of DNE winding wire in accordance with PN/EN-60317-0-1.

In Marine Version

Bodies and covers of products in marine versions are painted with ALBA LUX special alkyd enamel, while other elements are made of stainless steel.





Zakłady Sprzętu Precyzyjnego NIEWIADÓW Sp. z o.o. ► p. 229

GAk-81

The 81 mm GAk-81 smokescreen grenades are designed for firing from an OBRA, 902A, ERB-type launcher with the task of creating a smokescreen capable of preventing locating and distance measurement using laser rangefinders as well as conducting reconnaissance and fire control using thermovision means. The smokescreen serves to protect individual objects, tanks, combat vehicles, artillery positions.

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Heated observation devices OPO-120F, OPO-125F, OPO-130F

The OPO-120F, OPO-125F, OPO-130F heated observation devices are new generation periscopes with a wide angle of vision of both horizontal and vertical planes, in which classic glass prisms are replaced with prisms made of organic glass.



Przedsiębiorstwo PREXER Sp. z o.o. ► p. 216

The observation devices are equipped with heated windows with laser filters that absorbs the laser light within a wavelength of 800-1200 nm.

They are designed for installation on light tanks, combat infantry cars, wheeled armoured vehicles and similar.

Optical parameters of OPO-130F:

- → Observation angle in a vertical plane 45°
- → Viewing angle in the horizontal plane 160°
- → Periscoposity [P] 130 mm
- → Absorbed laser light wavelength 800÷1200 nm
- → Optical density (1064 nm) D≥5

Dimensions and weight of OPO-130F:

• Overall height	217 mm
• The dimensions of the upper part of the periscope	365x133 mm
• The dimensions of the lower part of the periscope	262x74 mm
• Mass	5,5 kg

Heavy wheeled recovery vehicle

SZCZĘŚNIAK Pojazdy Specjalne Sp. z o.o. ► p. 220

Heavy wheeled recovery vehicle KWZT-3 on Tatra T 815-7M3C4.371 8x8.1R chassis was designed for quick and efficient recovery of armoured vehicles in a tactical environment. The vehicle maximizes resources, minimizes and reduces recovery time. The vehicle has HMF 8520-OK2 hydraulic crane with a lifting capacity of 17 320 kg (at 4,4 m) and 9 500 kg (at 8,1 m), towing arm with a lifting capacity of 14 000 kg, hydraulic winches with a pulling capacity of 2 000 kg and a hydraulic blade.

-



The vehicle will not only optimize recovery operations, but with its integrated crane, it can perform maintenance missions. It is specifically engineered to address the Army's rapid recovery needs where self-recovery and like-vehicle recovery are not feasible and was designed to recover heavy armoured vehicles such as the MRAP, Pandur, etc. The vehicle enables to overturn vehicles, perform slope recovery and access vehicles stuck in water, mud, sand and snow. Lift and tow operations are supported by independent Tatra suspension and a specially designed non-twisting chassis frame. The vehicle can also tow a high mobility recovery trailer for evacuation of completely immobilized vehicles.

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Hydraulic System for Anti-Aircraft Defence Vehicles

Within the scope of the project PONAR Wadowice manufactured a hydraulic drive for lifting and bolting of the head unit, consisting of: → a powering unit/hydraulic power pack

- → a block of hydraulic valves
- → hydraulic cylinders as actuators.

The application uses electrical connections made in accordance with the DEUTSCH standard (high IP) and slide valves equipped with levers for manual override of the device.





PONAR Wadowice S.A. ► p. 215

Hydropneumatic Suspension for Tracked Vehicles

PONAR Wadowice S.A. ► p. 215

A vehicle suspension systems for heavy loads, hydropneumatic rocker arms are elements acting as a damper in the suspension of the chassis. One rocker is mounted on one wheel assembly. In the hydro-pneumatic suspension system, a gas spring is used to support the weight of the vehicle. A hydraulic and pneumatic mechanism is built into the rocker body to provide a twisting force around the axis of rotation. The air spring provides non-linear resistance to suspension deflection.

The vehicle clearance is regulated by the gas volume in the gas spring. The proper damping characteristics of the rocker arm movement are achieved through the appropriate design of the shock absorber. The design of the rocker arm allows it to be used in vehicles of various weights.



The shock absorber provides resistance to the rotational movement of the axle rocker, the amount of resistance being a function of the rotational speed of the rocker. The mechanical energy from the rotation of the driving arm is absorbed by the shock absorber and dissipated as heat to the environment.

Hydropneumatic rocker arms are tested on test rigs, where tightness tests, pressure tests of 970 bar, damping characteristics, tests at reduced temperature and resistance to vibration, humidity and salt fog are carried out.



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ARMOURED VEHICLES AND ARTILLERY SYSTEMS

IMITATOR OF A CANNON SHOT ISA – 155 TRAINING AMMUNITION

Zakłady Sprzętu Precyzyjnego NIEWIADÓW Sp. z o.o. > p. 229

The Imitator of a Cannon Shot 155 mm round perfectly enables to train activity of loading and shooting alike the utilization of live ammunition and even practice shooting. A special plug ensures complete burning of the propellant during firing. The energy created during firing is sufficient to ensure automatic functioning of the weapon system even in extreme conditions. Considering the minimal danger area (100 meters) no firing range is demanded for training and the cost of training are just fraction of the cost needed for live ammunition firing.



ISA-73 mm cannon shot imitator

Zakłady Sprzętu Precyzyjnego NIEWIADÓW Sp. z o.o. > p. 229

73 mm cannon shot imitator ISA-73 with a PG-15P charge is used for training soldiers, familiarization with the mechanisms of automatic loading and imitation of the shot-fired from the 2A28 gun.



Armoured vehicles and artillery systems Armoured vehicles and artillery systems

KRAB 155 mm – Self-propelled howitzer

Huta Stalowa Wola S.A. (PGZ) ► p. 204

The Krab gun-howitzer is a 155 mm self-propelled tracked howitzer designed in Poland by the Huta Stalowa Wola.

The KRAB self-propelled howitzer is designed to destroy missile systems, artillery and anti-aircraft missile batteries, command posts, communications nodes and field fortification, mechanised and motorised sub-units located deep within the enemy formation, and other important support area facilities.

The Krab self-propelled howitzers used by the Polish Army have successfully proven their value in real-life military operations in Ukraine. Their sale to the Ukrainian side is the first export contract for this armament. Advanced fully equipped turret and combat-proven base platform, made it possible to develop a highly lethal and reliable system, which also remains highly ergonomic and meets the toughest crew-safety standards. The KRAB howitzer has been fitted with a range of the latest hardware and software systems, providing the platform with fully autonomous capabilities. The systems include an integrated TOPAZ C2/Fire Control System, control terminal, targeting and ballistic computers, along with the Ballistic radar, land navigation and topographical positioning system, GPS and odometer, internal communication system.



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M120 RAK 120 mm mortar turret Huta Stalowa Wola S.A. > p. 204

120 mm RAK mortar turret can be integrated on any platform – wheeled, tracked provided that the platform meets the performance requirements concerning the payload. Autotargeting system and autoloader that can load rounds into the mortar throughout the turret movement range. The solutions in question minimize the reaction/engagement times. The mortar is fully autonomous.







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Oil Hydraulic Systems for Tracked and Wheel Vehicles

PONAR Wadowice S.A. ► p. 215

The system consists of our proprietary high-quality elements, including e.g.:

- → a pump unit
- → valve block
- → oil tank
- → piston hydraulic cylinders with mechanical brakes
- → linear hydraulic cylinders
- → rotary hydraulic cylinders
- → roof opening cylinders, piston/piston rod diameter 50/36mm, stroke 398 mm
- → hydraulic cylinder of a bolt
- → swivel joint lock cylinder





A hydraulic power unit designed for e.g.:

- → lifting and unfolding structural elements
- → opening and closing the roof
- → for leveling the vehicle
- → raising and lowering the masts
- → as well as locking and unlocking the mechanisms



Armoured vehicles and artillery systems Armoured vehicles are arbitrary systems

OVERHAULS AND RETROFITTING OF MBT Leopard 2A4/T-72/PT-91

Zakłady Mechaniczne "BUMAR-ŁABĘDY" S.A. ► p. 228



Our technical and maintenance services have suitable know - how and experience to carry out the inspection, overhaul, upgrading and modernization of this type of tanks.



Overhaul works:

- basic repairs checking the basic operational parameters of the devices replenishment of operational fluids and lubricating;
- → result overhaul detection of all defective units and restore its technical efficiency;
- → medium overhaul restore the technical efficiency of the tank. Restore the operational time to the next scheduled overhaul (major overhaul) for the chassis and all devices;
- → major overhaul restore the full operational time of the MBT. Dismounting and inspection the whole assemblies and subassemblies of the tank and checking it's nominal and permissible wear according to the standardizing defect cards.

As part of the overhaul works, tanks can be retrofitted with new components in the form of additional equipment packages with varying costs of implementation.



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Overhauls of Armoured Recovery Vehicle (WZT-2/WZT-3)

Zakłady Mechaniczne "BUMAR-ŁABĘDY" S.A. ► p. 228

The design of the ARV allows to retrofitting and increase a universality through the installation of interchangeable modules of equipment and additional armaments. By using the specific type of modules, the vehicle can obtain a specified specialization, which significantly expanding the existing possibilities:

- → minefield clearing vehicle support of armoured division in the scope of passing through the minefield;
- → scattered mine laying vehicle support of armoured division in the scope of mining with new scattered mines;
- → deactivation support vehicle support of armoured division in the scope of tanks and other vehicles deactivation from radioactive and chemical precipitation.



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ROSOMAK 8x8 APC ROSOMAK S.A. ► p. 217

ROSOMAK wheeled Armoured Personnel Carrier is a vehicle based on the modular design, making it possible to tailor the vehicle, as a platform, to the requirements of the contemporary battlespace. The high power output provides the APC with high top speed and good levels of manoeuvrability – also in rough terrain. The design allows for rapid replacement of individual systems and components.



- → New, modular construction multiple applications
- → Designated to transport and protect the crew and infantry soldiers against small arms fire, AT grenade launchers and IEDs
- → IFV version armed with 30 mm automatic cannon, dual ATGM launcher, 7,62 machine gun
- → Powerpack driving system
- → High level of modular ballistic and mine protection ensuring the safety of the crew and inventory
- → Auxiliary power unit (APU)
- → CBRN filtration system
- → Firefighting and suppression system
- → Omnidirectional observation system
- → Breakwater







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ARMOURED VEHICLES AND ARTILLERY SYSTEMS

TUR VI AMZ-KUTNO S.A. ► p. 194

It is an innovative product with a modular design, designed from the beginning in compliance with the standards and requirements of military technology. One of the variants of TUR VI is the Light Armoured Transporter, implemented in series production, designed for special operations carried out by the Police, Special Services and the Bureau of Anti-Terrorist Operations. Its design is based on an augmented mobility chassis with a 4x4 drivetrain, optionally 6x6. Due to its innovative lightweight design, the vehicle's payload reserve allows it to provide ballistic protection at the level expected by the user, while maintaining high vehicle dynamics. The vehicle also allows the use of additional special assault equipment, such as tactical entry and rescue system. The spacious interior provides the ability to carry eight people.

Technical parameters:

- → Engine: diesel 362 hp
- → Transmission 5-speed automatic
- → Suspension:
 - Front independent, reinforced, with springs and telescopic shock absorbers
 - Rear with springs and telescopic shock absorbers
- Permanent 4x4 drive or 6x6
- → Armouring Level I and II according to STANAG 4560



- → Shrapnel resistance I and II level according to STANAG 4569
- → Length 6440 mm
- → Width 2350 mm
- → Height 2640 mm

Alternative versions:

- → Vehicle armoured ambulance
- Vehicle for the transportation of specially protected persons
- → Vehicle for transportation of specially protected cargoes
- Vehicle for transportation of unexploded ordnance



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WARAN 4x4 Multi-Purpose Tactical Vehicle

Huta Stalowa Wola S.A. (PGZ) ► p. 204

This multi-purpose tactical vehicle is a medium-class armoured wheeled vehicle for a wide range of applications that allows taking 8 (2+6) crew members aboard. The design and technical parameters of the 4x4 vehicle meet the requirements of all STANAG standards applicable to this type of equipment. At the same time, the vehicle comply with valid road traffic regulations, therefore it can be operated on public roads for emergency management or training purposes.





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Armoured vehicles and artillery systems Armour

ZSSW 30 Remote-Controlled Turret System

Remote-Controlled Turret System (ZSSW-30) is designed to combat, destroy and suppress enemy light and heavy armoured targets and other objects, including the enemy's infrastructure, in different climate conditions and to provide fire support for units during combat activities, irrespective of the time of the day. Remote-Controlled Turret System features a 30 mm automatic cannon with dual-feed system; 7,62 mm coaxial machine gun, 8 pcs. smoke grenade launchers, double ATGM, SPIKE. The turret system has bi-axial stabilization of the basic armament, cannon and machine gun, two-axis, independently stabilized observa-



Huta Stalowa Wola S.A. (PGZ) ► p. 204



tion devices for both the commander and the armament operator, and it features an additional observation device for conducting combat operations in an emergency mode.

The turret system together with function stands is to be autonomous not only in tactical terms but also in terms of construction, giving the possibility of adapting it to various carriers including tracked ones.

The carrier of the RCST is the KTO ROSOMAK 8x8 base vehicle. The RCST is also adapted to the New Amphibious Infantry Fighting Vehicle "Borsuk".



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COMMUNICATION EQUIPMENT AND C4I SYSTEMS



BMS JASMINE

TELDAT ► p. 222

BMS JASMINE is the latest generation, comprehensive and network centric battle management system dedicated to tactical echelon (battalion, company, platoon and section) or rescue operations. This is the first BMS in Poland and one of the few in the world. The system enhances and automates the processes of command and communications and combat operations. It is designed to develop modern and comprehensive C2 on-board systems at tactical level. The system is dedicated to all types of vehicles, vessels and flying objects in armed forces. It can also be used by mobile troops of various types of public services, after the adjustments to their specific needs. On the base of this solution modules, the various system configurations of the same standard can be constructed using its like blocks. The solution can be also used as an autonomous system.



BMS JASMINE as an on-board ICT node provides modern, efficient, mobile, and multi-service ICT infrastructure dedicated to a tactical level, designed in IP technology; optimal selection, integration, use and monitoring of on-board equipment (including communication means, transmission media, sensors, effectors and endpoint devices); high security level by applying network devices that meet the highest level of national and NATO standards (e.g. cybersecurity) validated by penetration and vulnerability tests; interoperability with the coalition systems, among others by the implementation of NATO standards.





COMMUNICATION EQUIPMENT AND C4I SYSTEMS

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COMP@N Software Defined Radio WB GROUP ► p. 224

The SDR COMP@N radio offers a wide range of features, such voice transmissions broadcast, MANET radio functions, and the possibility to choose between different waveforms (WF) and a range of supported frequencies. The radio is offered in a handheld and mobile versions and allows to choose between different waveforms (WF) and range of supported frequencies. The radio comes with a wide range of functionalities, such as basic e.g. voice transmissions broadcast, complex e.g. MANET radio / all available functions. Current requirements of the modern battlefield, with all limitations, or even a lack of available radio resources, determine the need to use various types of radios working with many types of waveforms (WF). Fulfilling of these expectations is a challenge that can only be achieved by a radio communication system, for which the main goal is to provide a comprehensive implementation of user's services while taking into account the limitations of the planning spectrum.

COMP@N provides a comprehensive security in the range of TRANSEC, NETSEC and COMSEC mechanisms based on AES-256 algorithms and additional usage of SCIP technology (STANAG 5068). The main services include data services: IP data, Serial Data, sensor data, as well as data for BMS systems —> Situation Awareness / GPS; analog voice and digital voice (which supports the flat and vertical structure), remote and local management services and capability to integrate with existing infrastructure elements such as other radios, terminal devices, vehicles and civilian radios.



COMMUNICATION EQUIPMENT AND C4I SYSTEMS

C3IS JASMINE TELDAT ► p. 222

C3IS JASMINE is an automatic and comprehensive software solution – C3I network centric system dedicated to all command echelons from operational down to dismounted soldier. The innovative and primary feature of this product is that it consists of wide range of ready to implement solutions based on the versatile Set of Services which directly fits to the requirements of the armed forces. This solution ranks with the C4ISR (Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance) class systems. The development of this highly specialized software has contributed to the significant progress of C2 systems also in alliance dimension. It allowed to place Poland in this area at the forefront of NATO countries.





C3IS JASMINE was designed according to the Service Oriented Architecture concept and has fully unified and comprehensive set of services that ensures its scalability and modular structure. With the functionalities its highly specialized set of services, the offered system incorporates many Software Modules including as follows:

- HMS C3IS JASMINE software / Multidomain Combat Management System for the Operational and Tactical Level;
- → BMS C3IS JASMINE software / Battlefield Management System for Battalion, Company, Platoon & Section;
- → DSS C3IS JASMINE software / Dismounted Soldier System;
- → JFSS C3IS JASMINE software / Joint Fires Support System, including JTAC;
- → CMS C3IS JASMINE software / Multilevel Crisis Management System.



COMMUNICATION EQUIPMENT AND C4I SYSTEMS

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Digital radio relay R-460A

Transbit Sp. z o.o. ► p. 223

Digital radio relay R-460A is intended to build high capacity radio lines (High Capacity Line of Sight - HCLOS). The radio relay operates in the extended frequency band III as well as in band IV. It belongs to the latest generation of devices having software defined modulation methods (Software Defined Radio). It is equipped with advanced algorithms to protect against interferences and information interception. The radio relay R-460A is highly integrated, easily configurable and modular, developed in order to fulfil strict military requirements. The radio relay includes the following modules:

- → Unit controlling the radio relay R-460A-BBU
- → RFU unit for IV band of R-460A-RFU-IV

→ RFU unit for III+ band of R-460A-RFU-III Within the band IV, there is a possibility of transmission with the speed rate of up to 400 Mbps (two separate frequencies up to 200 Mbps) and transmission with the speed rate of up to 100 Mbps in the band III+. Using the Switched Beam antenna allows for changing sectors and working with 8 different directions at the same time. Directed antennas and a selective receiver secure the transmission of R-460A from jamming, and additionally there is a possibility of using frequency hopping as an additive secure tool. Both bands III+ and IV have effective ranges of communications up to 30 km, but there is a possibility of using retranslation of signal in order to make a chain of command.



FlyAway SMART Terminal

GISS Sp. z o.o. ► p. 203

SMART by GISS is a compete FlyAway VSAT terminal, offering a wide range of configurations suited to each customer's requirements. It comes with motorized antenna of aperture of the customer's choice form 1,5m up to 2,4m and Antenna Control Unit with autopointing feature as a standard, and can be equipped with Fiber Optic module, conventional IDU section, or No-IDU Modem Module with various modems. It is possible to integrate network devices, UPS, and other required accessories according to customer's requirements.

Advantages:

- → Flexible configuration according to the customer's needs.
- Wide range of different antenna sizes.
- Bespoke IDU with Integrated Terminal Controller (ZKT) or No-IDU option.
- → Fiber Optic modules with L-Band signals transmission available.
- In-field, toolless switching of the working band by changing only RF module.
- Motorized and dedicated ACU with automated pointing feature as standard.
- Intuitive local GUI and WEB interface.
- Powered from AC (mains) with UPS option.
- Packed with dedicated hard-case system.



COMMUNICATION EQUIPMENT AND C4I SYSTEMS

FONET Digital Communication Platform

WB GROUP ► p. 224

FONET is a set of devices and their software creating a unified data exchange base between military vehicles on the battlefield. Comprising a single scalable, modular and platform-agnostic solution, FONET hardware allows end users to select the most appropriate mission-relevant C4I configurations for tactical ground vehicles.

Digital communication platform FONET hardware, when integrated on board a tactical ground vehicle, provides end users with the ability to operate a variety of mission capabilities to enhance connectivity and situation awareness, provide accessibility to lethal and non-lethal effectors, and reduce decision-making and targeting cycles at the lowest tactical level.





This aggregation of C4ISTAR systems across the battlespace not only enhances the operational effectiveness of small unit teams, but also provides redundancy levels in data pathways, particular relevant to missions conducted in Command and Control Disrupted or Denied environments (C2D2Es), similar to those currently being witnessed in Eastern Europe.

Specifically designed to support the generation and management of a Collaborative Operating Picture (COP), FONET enables ground forces to operate C4ISTAR configurations across any platform agnostic tactical ground vehicle employed on the battlefield.

PIK MC Communication Integration Platform – Mission Critical WB GROUP ► p. 224



The safe, integrated dispatcher communication and crisis management system is a comprehensive device supporting integration of various communication technologies used in rescue and crisis management operations. It can also be used to perform other tasks requiring a dispatcher-based communication.

The system was designed in accordance with the international 3GPP Mission Critical Services standards and it can be used by state public safety services: police, border guard, national revenue administration, emergency services: ambulance service, fire departments, rescue services, critical infrastructure security services: refineries, power plants, ports, airports, warehouses, services responsible for security and safety during mass events e.g. concerts, football matches, etc., as well as for personal protection and property security companies.

Its key functionalities include nationwide safe dispatcher communication based on LTE and PLTE cellular networks, operation in an autonomous mode by setting up its private network, integration of various radio communication systems (including incompatible ones), e.g.: Tetra, DMR, analogue radio, etc., organization of dispatcher communication, a safe mobile access to databases and logs, live video feeds from drone and mobile crews' cameras, broadband Internet access using LTE, PLTE and satellite networks, easily integrable with other systems, as well as situational awareness building and expanding.

COMMUNICATION EQUIPMENT AND C4I SYSTEMS

SatPack Cobalt Terminal

GISS Sp. z o.o. ► p. 203

An innovative, portable, and fully modular VSAT system has been developed to support the most demanding applications of our customers, elevating SatCom capabilities to a higher level. Its flexible design allows the terminal to be customized to meet the specific needs of end-users, ensuring timeless quality and reliability.

Key Features:

- → Various modem options for both TDMA and SCPC operations.
- → Multiple RF options, including X, Ku, and Ka bands with power 20W or 40W.
- → Toolless module swapping in field environments.
- → Full configurability to meet customer's requirements.
- → Quick setup in under 5 minutes.
- → Local GUI for terminal monitoring and control.

This system boasts a military-grade design, offering reliability in all conditions with an IP67 rating. It is lightweight, weighing less than 20 kg with a 1-meter dish, and comes with a dedicated backpack or hard case for easy transport.

Power Supply Options:

- → Capable of being powered by AC (mains), DC, or BB-2590 batteries.
- → With BB-2590 batteries, the power supply functions as an uninterruptible power supply (UPS), ensuring continuous satellite connectivity even during power interruptions.





TRR-8M Tactical Radio Router integrates IPv4/IPv6, MULTICAST

→ AutoWAN – a mechanism that automatically builds a WAN

→ tunAKI – a mechanism of automatic L3 tunnels, FULLMESH

Features: monitoring, analysis, filtering, archive of detected in-

cidents. Resistance to DdoS attacks. BLACK NETWORK ROUTER.

AES256 encryption and 2/3 level encryption. Automation of connections, configuration, reconfiguration, authentication authorization

→ ARElink – a mechanism of automatic no-IP tunnels (L2)

→ OSPF/AC – automatic operation of OSPF protocol.

and UNICAST, SAT, 4G/5G networks.

→ RAY – responsive dynamic routing

process, creation of alternative routes.

Unique technologies used:

structure.

→ ZERO cfg/loss

Wojskowe Zakłady Łączności No. 1 S.A. (WZŁ-1) ► p. 225

The TRR8 was equipped i.a. with the following:

Tactical Radio Router 8

- → 10 Gbps optical interfaces (ZERO CFG)
- → ST, CTOS, MFM,LC optical interfaces
- → Ethernet 4kV 10/700us electrical interfaces compliant with ITU K.44
- → ITU-T G8032 Ethernet Ring Protection Switching (ERPS) mechanism.
- → WIFI 6e AX 2.4G, 5G and new 6.7 GHz radio interfaces
- → Ultra-sensitive 5G modems with directional antenna systems
- → Containerization of data in data containers in IP tunnelling of AES cascades
- → Automatically skipped GSM/LTE/5G tunnels (SKIPnat);
- → Independent cryptography at layers L2/L3/L4 (MACsec, IPsec, VPN)
- → SDN "Virtual Router," "Virtual Switch."
- → SD WAN
- → 7 x Ethernet RJ45F



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COMMUNICATION EQUIPMENT AND C4I SYSTEMS

in early strength community

Tactical Terminals TELDAT ► p. 222

In addition to comprehensive automated C4ISR systems TELDAT manufactures endpoint devices, that are one of a kind. They are, for example, the part of the family of the military, high-performance, resistant and constantly developed and tested tactical computers, dedicated to current and future military programs and projects. They are highly appreciated by customers and used by them in many military solutions. Tactical Terminals - due to their technical features are one of the most modern and robust in the ICT military world. They are ruggedized tactical computers dedicated to C4ISR solutions in the armed forces or in different type of public emergency and special services. Terminals can be utilized on-board the vehicle or portable. Tactical Terminals are designed to operate in harsh military environments, which meet high military standards e.g. anti-shock, climatic and environmental. These solutions enable our devices to operate in water and make them drop





and shock resistant. Tactical Terminals offer flexible, modular design that can be configured in any manner. Furthermore, they may be manufactured with the use of the latest, fastest, most efficient, and optimal electronics (CPUs, memory, storage space), interfaces, and communications modules, such as WiFi 2.4/5 GHz, 4G/LTE, 5G, Gigabit Ethernet, USB 3.0, Bluetooth 5.0, GPS, Galileo and BeiDou. This makes the terminals' architecture and functions expandable. The maintenance is also easy, throughout the whole lifecycle.





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COMMUNICATION EQUIPMENT AND C4I SYSTEMS

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Topaz Integrated Combat Management System WB GROUP ► p. 224

A fully integrated system enhancing situational awareness in the military and civil sectors, providing support in strategy, mission planning and preparation.

The TOPAZ system integrates the unmanned aerial systems, allowing highly accurate observation and target selection, and a rapid strike response using the loitering munitions. Data and voice communication between the different vehicles within the RSU are facilitated by the FONET – voice and data communication system, which is incorporated with either a third-party radio or the Comp@n software defined vehicular radio. All of the system's components are manufactured by WB GROUP.

Main features include an advanced software to be integrated with various strike systems, enabling to perform precise ballistic calculations, fully integrated communications and command network, ensuring effective management and command at every operational level, integration of all artillery strike systems and loitering munitions systems to perform precise air strikes, as well as advanced surveillance systems for total situational awareness. This makes Topaz a system that ensures full control over all military assets, situational awareness and precise and quick data transmission along with security and reliability in the most extreme conditions.



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COMMUNICATION EQUIPMENT AND C4I SYSTEMS

C4L systems Communic

VoIP gateway CV-12r-01

Transbit Sp. z o.o. ► p. 223

Voice call manager CV-12r-01 is designed to be used in sets of access points between a digital telephony network and a VoIP telephony network and most of all as an access gateway between IP network and different radio station types. The device works in tandem with data processing devices such as computers and routers compliant with IEEE 802.3 and IEEE 802.3u standards.

The Integrator has 12 Ethernet electrical interfaces, with 6 of them capable of being optical. Additionally, it features a complete RS serial interface that supports both synchro-

nous and asynchronous modes, allowing for up to 4 RS interfaces. The device offers the capability to connect up to 4 reliable analog CA/CB telephones. As a radio integrator, it provides the ability to connect to 4 HF or VHF radios using analog differential connectors.

The system offers specialized modes such as Voice RS, which enables voice transmission including encrypted RS channels within the radio, and RS Lan, which allows for a virtual RS serial port on a computer via an IP network.





VSAT MASTER Satellite Terminal

GISS Sp. z o.o. ► p. 203

The VSAT Master Terminal has been designed to establish secure broadband satellite connections via geostationary satellites, operating in X-band, both the standard Kuband and the extended Ku-band and Kaband, supporting various network topologies such as Point-to-Point (P-t-P), STAR, MESH, and HYBRID. This terminal is centred around a 3.8m Dual Offset parabolic antenna and equipment, enabling it to operate concurrently with multiple TDMA and SCPC modems.

Each of these network topologies can be easily accessed by each modem independently by adjusting its configuration. The station is primarily engineered to function as a master station within the network, but its final role depends on the configuration of the modem.

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COMMUNICATION EQUIPMENT AND C4I SYSTEMS

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White Rabbit Switch the sub-nanosecond time-synchronisation switch for large distributed systems

Creotech Instruments S.A. ► p. 198

The White Rabbit Switch (WRS) by Creotech provides sub-nanosecond accuracy and picoseconds precision of synchronization for large distributed systems, allowing for deterministic and reliable data delivery.

Based on the technology created at CERN and fully tested under the most demanding conditions of the Large Hadron Collider, WRS allows allows for reliable and precise time-stamping of measurement data and makes it possible to run data acquisition in large installations while using the same network for data transmission.

White Rabbit Switch works on a distance range over 10km using optic fiber and allows to connect thousands of nodes in an Ethernet-based network.



Wideband radio R-450C-01

Transbit Sp. z o.o. ► p. 223

Wideband radios R-450C-01 are designed to create wireless local (LAN) and wide (WAN) IPv4 package networks, using the band I (from 225 MHz to 400 MHz). R-450C is the first Polish programmable digital radio station – Software Defined Radio (SDR). Using routing protocols such as: RIPv2, OSPF, PIM-DM, PIM-SM, OSLR. The radios are highly resistant to interferences and adverse propagation phenomena such as signal reflections (multipath) or losses, which makes it possible to organize wireless computer networks between mobile objects (e.g. reconnaissance vehicles), as well as high capacity access networks. High security of communication is provided by the built-in Frequency Hopping mechanism, and encrypted information transfer (AES-256). The devices automatically change their modulation due to quality of propagation of radio waves. The Quality of Service is defined by the user depending on the situation or size of sent/received data. Considering that, the device can be used to deliver multiple services, such as Voice over IP, video conferences, Internet, email or other network services. In given frequency band R-450C has 176 channel frequencies, and each one can be 1 MHz to 4 MHz wide. In its work, radio uses OFDM (BPSK, QPSK, 16QAM, 64QAM) modulation. The creation of MANET- Mobile Ad-Hoc Network with Multi-Hop function.



COMMUNICATION EQUIPMENT AND C4I SYSTEMS

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CYBER & ANALYSIS, INFORMATION PROTECTION



All in 1 Zero Client Terminal SIL720-L/T

SILTEC Sp. z o.o. ► p. 219

Zero client is a computer with no local storage, therefore it is perfectly fitted to military field applications like mobile C2 Centre. Zero client uses firmware to boot off of the network and connect to the server. It downloads what it needs directly into memory rather than onto a hard drive. Such a solution prevents data from being intercepted by the enemy in the event of a takeover of a C2 position.

- → Based on ClearCube CD1024
- → Teradici TERA2321 processor (PCoIP protocol)
- → No HDD/SSD/eMMc (only 256Mbit NVRAM for configuration data, diagnostic logs)
- → No OS
- ➡ 15,6 FHD screen
- → Interfaces: SFP, USB (DB9), SmartCard reader
- → Aluminum housing with dedicated pendrive section (revision)
- → Keyboard and touchpad made of silicon
- → Meeting SDIP-27 Level A standard

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ARGUS PSIM the physical security information management class platform, integrating technical security systems TELBUD SA > p. 221

ARGUS is a PSIM class (physical security information management) integrating software for facility security management. It is entirely manufactured in Poland. ARGUS joins all new and existing systems into a single supervisory and control platform. It integrates systems of single and distributed objects, regardless of the type of system and device manufacturer. ARGUS collects, processes and presents data coming from many devices belonging to the following example systems: fire alarm systems, access control, CCTV, alarm systems, BMS and SCADA. The ARGUS software has an integrated anti-drone system module.

The system includes radar, a radio wave jamming device, RF detectors and a complex of long-range cameras. The ARGUS system operator can use one system simultaneously integrating all security systems operating on the premises, including the anti-drone system. All data is presented on synoptic maps and in the event log. The states of each element are stored in the database along with the history. ARGUS system can be used for the integration of security systems installed in different facilities. This includes small facilities such as storage facilities, office and other building complexes, industrial and power facilities and extensive military complexes and crisis management centres. ARGUS is a suitable system to be applied in large and distributed facilities of particular importance for the national economy and defence. AR-GUS received the 2nd degree award in the State Security Leader competition in 2023.



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Borderscan for the protection of smart borders

Enigma Information Security Systems – ELFO Consortium ► p. 202

Borderscan is an innovative biometric enrolment solution developed to meet the needs of the EES. Following the successful implementation of the EES Directive, the EU's IT agency has begun work on implementing a cen-

tral entry/exit system to automatise the registration of travellers from non-Schengen countries. The system is expected to be operational throughout the Schengen area by the end of 2024.

Key features of the solution:

- → Implementation of automatic enrolment of biometric data such as facial image and fingerprints.
- → Enabling self-scanning of data by persons crossing the EU border.
- → Automatic adaptation of the device to the height of the person being enrolled.
- → Verification of the quality of the retrieved data according to set criteria.
- → Automatic data transmission to a central system.
- → Designed for operation in a indoor area.
- → Easy installation and transferability between workstations thanks to support for so-called transport and operational positions.

BorderSCAN - technical data:

- → 24 Megapixel camera, ICAO-compliant
- → 10-fingerprint reader (4-4-2), FAP 50, FBI-certified (Appendix F compliant)
- → Reader with automatic fraud detection function
- → Built-in speakers to play voice announcements for travellers
- → Specially customised operating system and proprietary software with API for integration into customer applications
- Rj45, USB 3.0, Kensington Lock connectors

The device has been successfully operating in the Polish Border Guard for two years, confirming its effectiveness and reliability.



CYBER & ANALYSIS, INFORMATION PROTECTION

Cyber Fortress



Cyber Fortress is a simulation game about building the most resilient ICT environment security system and responding effectively to various threats from cyberspace. Each team

is given a predetermined budget, which can be increased during the game. The security measures available to the teams are divided into 8 categories (Organization, Physical Infrastructure, Whole Network, Network Edge, Internal Network, End Devices, Applications and Data). Security Cybersecurity Foundation. ► p. 199

measures are scored according to their effectiveness in revention (identification and protection) and response (response, detection and recovery). The team that best prepares its organization for events wins.

Cyber Fortress is gamified learning, based on the conscious and targeted use of game design mechanisms to activate, motivate and engage a selected group of participants. Cyber Fortress is a closed workshop, it has a beginning, a course and an end. The participants of the game are focused on winning. The game scenarios are based on real and current events.

Cryptomage Cyber Eye™

Cryptomage Inc. ► p. 198

Cryptomage Cyber Eye[™] is a Network Detection and Response class cybersecurity probe that goes beyond traffic flow analytics, offering real-time anomaly detection and prediction based on network behaviour. By analyzing protocol behaviour, packet analysis, and host communications behaviour, powered by ML and AI algorithms, it provides a unique approach to network traffic analysis.

Unlike many security solutions that focus solely on user and host behaviour, Cryptomage Cyber Eye[™] also incorporates unusual low-level network behaviour. This comprehensive analysis enables organizations to identify, monitor, and triage traffic flows, connections, and potential malicious events, empowering security teams to enhance security and automate threat discovery and prevention. The probe evolves and integrates with other security solutions, augmenting threat detection capabilities. It continuously adapts to emerging threats, ensuring robust protection. Key features of solution include real-time network monitoring, event management, real-time threat detection, a forensic module, and a GDPR module. These functionalities equip organizations with the tools to detect and predict hidden network traffic, botnet C2 communication, malware activity, 0-day attacks, and DDoS attacks as well as other cyberthreats.

Cryptomage Cyber Eye[™] addresses challenges across industries such as financial services, telecommunications, utilities, government, military and uniformed services, manufacturing, and healthcare.



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Enigma Electronic Monitoring System (EMS)

Enigma Systemy Ochrony Informacji Sp. z o.o. ► p. 201

Enigma offers many solutions that improve the operation of state institutions and introduce the latest technologies into a public service in key areas for the state. One of them is a solution for electronic monitoring of convicted persons - Enigma Electronic Monitoring System (EMS).

This system enables the technical implementation of several very important functions:

- → serving house arrest or imprisonment at home;
- supervision over compliance with the ban on approaching specific places or areas (restraining order, e.g. stadium ban);
- supervision over compliance with the order for people to remain in a specific area (e.g. ban on leaving the city);
- → supervision over compliance with the prohibition on approaching defined people or protecting victims against violence.

These are key issues from the point of view of institutions caring for the safety of citizens and the justice system. The Enigma Electronic Monitoring System can be used for the needs of police forces, probation and prison services in order to carry out their vital tasks.

The system consists of several components, delivered depending on the customer's needs:

- → a central software system ensuring supervision of persons subject to EMS operations:
 - for 24-hour supervision of convicts
 - the ability to designate prohibited zones for the convict on the map and mandatory zones, leaving which within a defined time will result in an alarm
 - automation of the institution's basic processes (including monitoring centre, alarm handling schemes, device logistics, handling formal documentation, reporting)
 - dozens of alarms generated when convicted persons perform prohibited activities
 - full accountability of the actions of users and convicts
 - possibility of installation in an on-premise environment, in a public or private cloud, and delivery in the SaaS model
- → transmitters installed on the limbs of convicted persons
 - only radio transmitters or radio transmitters with the ability to determine the convict's position based on GPS, A-GPS and LBS;
- → stationary receivers intended for installation in place indicated as the place where the sentence is served
- → portable receivers with GPS, A-GPS and LBS, with which people using the system are equipped - including victims of violence - that detect transmitters in their surroundings and generates alarms in the event of contact with them

→ a set of specialized installation and control tools designed to operate the system

Enigma is the only recognized supplier of such a solution from a territory of the European Union, ensuring a high standard of both the system, devices and related services. The system works in many countries, both in the EU and beyond, enabling customers using it to save time and money, as well as contributing to citizen satisfaction.



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Filter Tuning Software

SpaceForest Sp. z o.o. ► p. 219

Filter Tuning Software (FTS) is a computer aided powerful software suitable for manual and automatic cavity filters tuning. This unique software is based on artificial intelligence algorithms and novel computational methods.

FTS gives the production greater manpower flexibility, high repeatability and vastly improved efficiency over traditional manual tuning. An intuitive interface allows for easy adaptation of new filter types and significant savings of the tuning time. Only a short training is required to fluently operate the software.

FTS allows for precise tuning of microwave filters even for a tuning operator with limited experience. The program indicates which tuning elements should be adjusted, in which direction and by what value. An intuitive interface allows for an easy adaptation of new filter types and significant savings of tuning time.

FTS can be installed on an external workstation or inside Windows based VNAs. It can be integrated with standard industrial robots available on the market or with SpaceForest Multi Head Tuning Robot. The automated tuning stations are dedicated for mass production, especially in large production volumes or when lack of experienced tuning operators.



FEATURES & BENEFITS

- → One software applicable to all types of filters
- → Reduction of training time and labour cost
- → No expert skills needed to tune filters
- → Eliminates human errors
- → Assists in identifying filter design faults
- → Capable of tuning complex filters/multiplexers used e.g. in space industry



Best in class software for combating economic crimes designed for criminal analysts. The use of Financial Trail will radically shorten the analysis time, improve quality and shift the burden of work from importing and standardizing information to their proper analysis. Financial Trail has built-in import engines for hundreds of financial transaction formats that will allow you to semi-automatically import them into the database, eliminate duplicate transactions and harmonize transaction types. If a format is not yet supported by us, we will add it to the software as part of standard support.

Financial Trail

Matic S.A. ► p. 209

A joint analysis of all data in a case from many financial institutions based on graphs and flexible dashboards allows you to quickly verify many analytical theses. Display your information resource in tables, graphs, charts; mark, filter, tag create reports and export data in an easy and fast way. In addition, we have automated some of your difficult work so that you can focus on your analysis and not on tedious data combing. Take advantage of the expert scenarios built into the software, analyze data quickly and efficiently, at a massive pace.

And many more:



- → Currency module,
 → Dedicated report module,
- → Built-in modus operandi,
- → Duplicate search algorithms and merging objects,
- → i2 Analyst's Notebook integration,
- → Easy exports,
- → Efficiently import multiple files.

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IDENTT Biometrics Engine IDENTT ► p. 205



Person Recognition AI Enabling Safe Identification

Leveraging data from already deployed cameras and sensors, Biometrics Engine assures the identity and detects fraud attempts instantaneously with unique, secure deployments available not only in the cloud, but also under an on-premise regime. Biometrics Engine is not only able to recognize artificially or age-augmented face characteristics of the same person, but also notify of multiple fake identities presence (for the same biometrics), presentation attack (PA) or injection attack (PA), such as DeepFake, under variable operating conditions: for both remote, end user-device deployments, and in-person-based security protocols.



IDENTT eWallet IDENTT ► p. 205

Virtual Identity Assurance Complaint with EU Digital Identity (EUDI) Wallet Regulation

Combining robust cryptographic security, ease and speed of use, IDENTT eWallet allows companies and governments to implement interoperational virtual identity document processing compliant with latest EUDI Wallet requirements. With Biometrics Engine verification of face biometrics built in, IDENTT eWallet protects against virtual identity theft through user device-level malware or other third party actions, assuring that no stolen virtual identity can be used in the process.

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IDENTT Vision IDENTT ► p. 205



Automated eKYC/Onboarding Compliance with AI-Based Identity Verification

Enabling customer acquisition automation in banking, finance, telecom, or entertainment, IDENTT Vision offers a complete, eKYC-compliant identity verification solution. With easy-to-use end user interface and an extensive set of SDKs, IDENTT Vision empowers creation of new, digital services, such as online bank account creation, new phone number registration, and more. Based on the proprietary, world's largest structured identity document knowledge database, IDENTT Vision performs automated analysis and verification of 300+ identity document versions (passports, identity cards, residence permits, drivers licenses, virtual (eWallet) and eID chip-equipped documents issued by over 200 countries around the world, aiding in expat or non-ordinary document-based identity verification.



Plumla-NGN

Enamor International ► p. 201

Plumla-NGN is an FPGA based packet processor compatible with SDN OpenFlow architecture with full speed packet processing up to 160 Gbps with extremely low latency < 8µs. Ready to support high throughput network interconnections in core and access networks, 5G networks and industrial control systems infrastructure (ICS/OT).

Key features:

Compliant with SDN OpenFlow 1.3 specification and ready to be integrated with SDN controllers

Network interfaces:

- → 4 x 40 Gbps (QSFP+)
- → 4 x 10 Gbps (SFP+)

Network parameters:

- → packet processing 160 Gbps, 240M pps
- → low latency only $<8\mu$ s
- → 0 packet loss proved by RFC 2544 tests

Use cases:

- → Network traffic redirections to cybersecurity analysis (IDS/IPS/FPC)
- → Load balancing for IPSec and network services
- → IP traffic tunneling
- → IP filtering
- → MPLS service



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Portable VTC System SIL788 - MVTC/WRB

SILTEC Sp. z o.o. ▶ p. 219

The portable VTC terminal, designed and manufactured by Siltec on the basis of Cisco Webex Room Bar. SIL788 -MVTC/WRB is a videoconferencing system in a suitcase, enabling conducting video-meetings in field military conditions. Resistant to demanding climatic conditions such as sand, impacts, corrosion or vibrations.

- → Case with internal aluminum frame equipped with vibro-isolators
- → Based on Cisco Webex Room Bar (CS-BAR-NR-K9)
- → 17,3 FHD hardened screen with UV filter
- → 1080p camera, integrated mic and audio
- → Interfaces: RJ45/SFP, HDMI, USB A/C
- → Battery power system with battery level indicator, 230V AC, DC 12V
- → Meeting SDIP-28 NATO Equipment Zone 1, SDIP-27 Level B



RP-201-01 Routing Platform

Transbit Sp. z o.o. ► p. 223

The RP-201-01 Routing Platform allows to perform several network functions simultaneously, i.e., Router with electric and optical interfaces, Firewall, Session Border Controller, etc. It allows to build field IT networks both wide area and local ones. The device is designed for use in sets of mobile equipment (e.g., field apparatus rooms) and fixed equipment used for building IP networks. The basis of RP-201-01 is a hypervisor that enables the launch of services that perform specific functions.



Basic network functions are performed using Cisco platform for routing. The device is also prepared as an access point for Polish Military Network. It has built in security system based on IPSec, IKEv2, ssl-vpn, RADIUS and Cisco IOS Firewall. It also uses changeable hard drive which contains its software. Universal Cisco IOS Software used in the device give us possibility to define router functionalities using software. RP-201-01 is equipped with the electric group interface 4x10/100/1000Base-T/TX, 8 optical interfaces 1000Base-SX with ST connector and 2 serial RS-232C interfaces. The device uses network functionalities such as: IPv4 and IPv6 (unicast and multicast), GRE, MGRE, STP, VLAN, MPLS, DHCP, DNS, DDNS, DNS proxy, RIPv1, RIPv2, OSPF, OSPFv3, BGP, EIGRP, VRF i L2TP v3. Having so many built in functionalities provides cooperating with systems already used in the military, but also secures its useability in the future.

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Safety of Critical Data Electromagnetic and Ballistic Protection in a Transportable (Mobile) Container

Jakusz Sp. z o.o. ► p. 206

Safety of critical data electromagnetic and ballistic protection in a transportable (mobile) container

- → separated and fully secured server room, data warehouse, command or communication centre with high efficiency and resistance to changeable external factors
- → supplied with an adapted vehicle, forming a complete transportable server room set
- → transfer of data and reaching stationary databases and data centre both home and abroad
- multiple and safe transportation archives of replacement data, critical information

Container in the basic version:

- → structure adjusted to repeated transportation,
- → resistant to external factors, including fire protection,
- → resistant to heat penetration from the outside,
- equipped with dedicated anti-vibration systems and vibration monitoring systems,
- → at least 3 racks for the needs of IT 42U 800 x 100 (it is possible to install 4 racks),
- → power supply system, switchroom, PDUs,

UPS back-up system in redundancy of n+1,

- precise air conditioning in order to ensure correct environmental parameters for IT devices in redundancy n+1,
- → fire extinguishing and early detection system, environmental monitoring system, structured cabling system,
- → safety systems, power supply and IT service lines,
- electromagnetic protection with increased attenuation parameters,
- → protection from HEMP (High-Altitude Electromagnetic Pulse),
- → self-unloading system (time of preparation for transport - 15 minutes) without any additional loading devices.

Container with additional equipment:

- → protection from acoustic eavesdropping,
- → ballistic protection, according to STANAG 4569,
- → chemical and biological filters,
- → automatic, extendable antennas,
- → IT equipment.



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SCADVANCE XP

SCADvance XP®

ICsec S.A. ▶ p. 205

SCADvance XP* is a comprehensive 360° security platform for real-time monitoring of industrial networks, consisting of both software and hardware components.

What distinguishes SCADvance XP[®] is its utilization of specialized predictive and analytical models, powered by machine learning algorithms (ML/AI), that adapt to each OT network configuration. This enables the system to accurately detect anomalies and threats within the industrial network, thus enhancing the security and resilience of critical infrastructure.

SCADVANCE XP enables a complete inventory of OT networks, including device identification, network mapping, and the generation of detailed connection reports across all OT networks.

SCADvance XP* conducts automatic, real-time audits of the OT network, enabling the detection of the system's weakest links, including unwanted communication and potential attack vectors. The system immediately identifies events deviating from the standard behaviour of the industrial network (automatic anomaly detection, attacks including Zero-day cyberattacks and system crashes).

Supporting specialized protocols, SCADvance XP* operates independently of ICS control systems' manufacturers and suppliers and can be easily integrated with external systems (SIEM, UEBA, SOAR, data bus, API).



SecureVisio – cybersecurity management platform

SecureVisio ► p. 218

SecureVisio is a unified and automated cybersecurity management platform providing protection and compliance. Platform unifies 9 cybersecurity solutions within security operations, risk, compliance and data protection including:

- → Asset Discovery
- → Risk management
- → Vulnerability Management
- → Data protection
- → Threat Intelligence
- → XDR (Extended Detection and Response)
- → SIEM (Security Information and Event Management)
- → SOAR (Security Orchestration, Automation and Response)
- → UEBA (User and Entity Behavior Analytics) By unifying these capabilities SecureVisio prioritizes incidents and vulnerabilities to meet the specific needs of your organization. This approach enriches SIEM output and improves overall cybersecurity efficiency by allowing cybersecurity teams to focus on high-impact incidents and minimize false positives. SecureVisio fosters proactive cyber decisions, diminishes operational risk and elevates cyber awareness across organizations through extensive KPIs and risk trend analysis (KRIs).

Platform highlights

- → Asset Discovery: Automates the discovery, identification and documentation of the IT environment providing essential context data to other SecureVisio components
- → SIEM Solution: Collects event data across the organization, aligns alerts with the MITRE ATT&CK framework and enriches them with contextual information for comprehensive IT environment visibility
- → Vulnerability Detection: Employs various scanners and CVE feeds to automatically identify vulnerabilities in both IT and OT environments
- → Business Impact Analysis: Offers real-time prioritization of security alerts and vulnerabilities, alongside insights into potential costs related to security breaches and vulnerabilities across critical assets
- → SOAR Solution: Automates threat investigation and response with easy-to-use playbooks targeting key security scenarios
- → Threat Modeling and Attack Simulations: Visualizes potential attack pathways to critical assets on the Network Map, aiding in the anticipation of cybercriminal activities
- → Compliance: Our platform follows key regulations such as NIS2, DORA and GDPR
- → Deployment Options: Our products are available on cloud and on-premise

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Servers Room



- System is based on containerized housing adapted for IT infrastructure assembly
- → A container consists of three separate compartments: an operational compartment with IT infrastructure and two technical compartments for the generator set and air-con condensers
- → The compartment based structure allows to equip it with all of the relevant data centre system within the container dimensions. No additional devices are needed for mounting outside the container
- → A containerized Data Centre is connected to utility power through an electrical supply board
- → In case of applications requiring transportation of a data centre with IT equipment, the Rack cabinet is mounted to the container with shock absorbers that prevent the effects of vibrations and shocks during transportation



SILTEC Sp. z o.o. ► p. 219

Max IT power consumption: Max No. of IT rack cabinets: Max depth of rack cabinet: Cooling system redundancy: Generator Set Power: Housing dimensions:

100kW 10 1200mm N+1 or 2N up to 250kVA Length: up to 12m, Width: 3m, Height: 3m



- → The cooling power of one unit depending on the model varies from 10 to 35kW. Maximum cooling power installed in the containerized date centre can be set up to 100kW in total
- → None of the components of the cooling system is located outside of the outer dimension of the container
- → Electrical system is equipped with UPS (Uninterruptible Power Supply) and batteries for continuous IT devices power supply even during blackouts
- → Battery backup time depends on the system configuration
- Optional built-in generating set for backup power supply inside the container dimensions
- → The containerized Data Centre is adapted for an electrical lifting system installation for selfloading and unloading off the lorry
- → The system can be build inside the profiles of the container
- Other optional systems: fire alarm, access control, CCTV, remote control of operation parameter

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Shielded Cabinet SIL720 - SzE19xx Series



SILTEC Sp. z o.o. ► p. 219

In the case of individual projects requiring the use of devices that are not available in the TEMPEST version, we suggest alternative solutions such as Shielded Cabinets. These provide effective shielding against the radiated emissions coming from such equipment. The design of the enclosure is adapted to the type, shape and configuration of the equipment to be protected.

Shielded Cabinet available in SDIP-27 Level A, B, C versions.

- → 19" Shielded Cabinets in various heights
- from 16U to 42U
- → Width: 700 mm or 800 mm
- → Depth: 800 / 1000 / 1200 mm
- → EMC Power Filters adjusted to required attenuation levels
- Interface panel (USB / VIDEO / FO)I
- → FO channels in bottom cover
- → Front and rear door (left or right-sided)
- → Power distribution units inside
- → Fans (number of fans adjusted to installed equipment)
- → Ventilation steering (thermostat or microprocessor panel)
- → Shelves (fixed or slide shelves)
- → Wheels to allow movement
- → Splitted rack for crypto solutions

SUS-24-02 Tactical Server

Transbit Sp. z o.o. ► p. 223

The SUS-24-02 tactical server is intended to be used, in mobile objects, in which it is necessary to build computer networks with highly efficient servers. Servers SUS-24 may fulfil a function of a service server, constituting a central point of ICT networks providing services for functional persons.

The device comes with a high-performance Intel Xenon[®] D series 1500 or 1700 processor. It features a disk compartment that enables fast swapping of up to 4 drives, including 2 SATA drives in the m2 format and 2 drives with a fast NVME interface.

The server also allow to virtualize both servers and workstations. SUS-24-02 has 4 built-in network cards two of which two enable it to work with SFP+ 10GBase-SR, 10GBase-LR, 10GBase-T, 1000Base-SX, 1000Base-LX models, and the other two enable it to work in the 100/100Base-T standard. SUS-24-02 enables to insert a graphics accelerator in one of two variants: Nvidia Tesla T4 or Nvidia A2 Tensor.



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TEMPEST Filter SIL - TFS16A

SILTEC Sp. z o.o. ► p. 219

Concerning the latest guidelines and requirements for the use of security measures, Siltec has responded to market needs by designing its own TEMPEST Filter solutions.

- → Max current 16A
- → Low leakage current, suitable for installation in facilities equipped with residual current circuit breakers
- → Minimum attenuation 60db in the range 100kHz -1GHz
- → Neutrik's powerCON plug for 220-230V, other at request
- → 3 Sockets as standard, more can be adapted at request

TEMPEST NATO SDIP-27 and EU IASG 7-03 compliant IT equipment

SILTEC Sp. z o.o. ► p. 219

Siltec is a leading manufacturer and supplier of dedicated TEMPEST hardware. The company offers a wide range of computers, peripherals and network equipment to ensure the security of the processed classified information. We have three Electromagnetic Shielding Laboratories, allowing us to carry out TEMPEST standard measurements. Siltec offers design of dedicated equipment, precision engineering and manufacturing and related service support.

TEMPEST equipment:

- → computers and workstations
- → monitors
- → notebooks
- → servers & network equipment
- → printers & MFP
- → scanners
- → shielded cabinets
- → customized products



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ENGINEERING, LOGISTIC AND CHEMICAL EQUIPMENT



AMBULANCE DEMARKO S.A. ► p. 199

The ambulance is created on the base of IVECO chassis MUV 70W18EIII. Purposely selected due to extensive GVW of 7 000 kg in comparison with its compact size. The container dedicated for transport of four casualties on stretches, optimally maintains the off-road conditions providing at the same time maximum space in the medical compartment. The filter ventilation system ensures safety of the persons inside the vehicle cabin and medical container. The system meets the requirements of Defence Standards. Comfortable cabin secures driver's comfort of work, comparable with modern vans. Proven, reliable diesel engine, adapted to use NATO F-34 fuel is still meeting EURO III exhaust pollution standard.





The 132 kW of power and 420 Nm of torque ensure hight top speed as well as excellent dynamic during off road operations. The medical container is well equipped with medical equipment securing capability to provide first aid to the transported 4 patients on stretches or 6 persons between of which 2 are still transported on stretches while remaining 4 are traveling in seating position. The modern One-Touch-Click Technology TM implemented to operate with top stretches makes patients' handling easier and faster. The electric installation fitted on the ambulance secures assembly of all kinds of lights required on military operations.



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GENERAL PURPOSE TRUCK WITH CRANE DEMARKO S.A. ► p. 199





The vehicle of payload 6 500 kg, curb weight 25 496 kg and GVW 32 000 kg. Capable of transporting i.a. fourteen (14) EURO pallets, two (2) containers ISO 10' and one (1) container 20". Equipped with articulated crane with max. lifting capability of 22 000 kg at arm length of 3 m and 360° angle of work. The loose or weather sensitive cargo can be transported under tarpaulin.

The vehicle can operate with trailer, all together of GCW 60 000 kg. The electric system and all related elements are compliant with ADR requirements making the vehicle applicable for transport of dangerous materials and goods.

The presented truck configuration is one between many different kinds of produced by DEMARKO S.A. superstructures fitted on chassis selected by a customer. The general-purpose superstructures of various arrangements, prime movers and multi-lifts for load platforms type FLATRACK are also members of family. All designed individually following individual customer's requirements.



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MS-20 DAGLEZJA A WHEELED VEHICLE-LAUNCHED SUPPORT BRIDGE

OBRUM Sp. z o.o. ► p. 213



MS-20 "DAGLEZJA" mobile bridge is capable to of carrying the heaviest NATO vehicles including ABRAMS MBT's and infantry to cross water and terrain obstacles with a span of up to 20m (according to STANAG 2021). The fillings between bridge spans provide convenience and safety for people crossing the bridge. A dedicated semitrailer is designed to transport a bridge span, to expand its width from 3m from transport to the 4m working position, launch and retrieve the span across an obstacle. The bridge is ready for performing crossing operation in less than 30 minutes (including the complete technical preparation). The vehicle is approved for operation in traffic on public roads. MS-20 "DAGLEZJA" set consists of a Jelcz C662D.43 6×6 towing vehicle, 6×6 (hydraulic) semitrailer, bridge layer and PM-20 span.



Main features:

- → Allows to transport all types of vehicles (tracked or wheeled) and the infantry to cross terrain obstacles of up to 20 m
- → The only mobile bridge equipped with fillings between bridge spans
- → For use in rough terrain conditions

Advantages:

- → High mobility
- → Rapid launch and retrieval across an obstacle up to 10 minutes (excluding the time required technical preparation)
- → Ballistic protection of the crew available in the armoured version
- → Operation in a wide range of environmental and terrain conditions
- → Approved for public roads traffic



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NS-26

Lubawa S.A. ► p. 207

The NS-26 is a universal structure designed to perform various tasks, from command posts, through field hospitals, warehouses, etc. The tent is composed of a rigid frame made of unified aluminum profiles with a quick deployment system, which minimizes the time required to put it up. The sheathing is made of fire-resistant polyester fabric, with special finishing ensuring thermal and light reflex (thus improving the efficiency of lighting and air conditioning systems). It meets the requirements for accommodation of 6 people with the equipment.

The NS-26 tent is suitable for all terrain conditions (mountains, uplands, lowlands, deserts, forests and lakes, etc.) and climatic zones (polar, moderate and inter-tropical), including conditions of high air and ground humidity, intensive sunlight, as well as low temperatures, intensive rain and snow. The operating temperature range is from -30°C to +60°C. Inside the tent there is a possibility of maintaining comfortable temperature from +18°C to +21°C, regardless of climatic zones, thanks to the use of additional equipment, e.g. air conditioners, heaters, power generators.

Technical parameters	
Length	5,20 m
Width	4,80 m
Height at the centre	2,50 m
Usable area	25,00 m ²





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SEMI-TRAILER ST555-20W.M and ST775-20W.M DEMARKO S.A. > p. 199

Modular concept. The system of two semi-trailers consists of two trailer platforms adapted to be connected to the one universal goose neck one. Hydraulic cylinders, in addition to the height adjustment system, allow adjustment of the load effecting a fifth wheel of a tractor. The proposed arrangement of these three elements, two kinds of load platforms along with universal goose, make transport organization more efficient, faster and flexible. This way, the multirole arrangement was made, dedicated for transport of cargo, vehicles but also heavy and high combat equipment like howitzers or mobile air defence systems up to 50 000 kg weight, the first configuration. A heavy, armour vehicles or cargo in many different arrangements up to 70 000 kg of total weight, in the second configuration. To secure all required functions related to loading and unloading processes the goose neck is equipped with power generator in One-Hydra-Neck Technology as well as two winches of 24 000 kg each. The winches and guiding rope wheels are arranged in the configuration securing capability of loading and unloading of damaged vehicles but also self-recovery. The electric 24 V waterproof system is built in the arrangement creating possibility to use the multirole transport system not only within military operations but also civil ones.



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SEMI-TRAILER ST775-20W DEMARKO S.A. ► p. 199



The semi-trailer of the Heavy Equipment Transport (HET) family with payload 70 000kg, is dedicated and respectively equipped for transportation of heavy and armoured vehicles of both wheeled and tracked kinds. Having cargo deck of 10 550 mm length at total semi-trailer length of 15 530 mm, it is capable to of performing efficiently and effectively transportation of all heavy vehicles available and deployed currently by any army worldwide. The standard cargo deck of 3 450 mm width and 960 mm height supported with hydraulically operated ramps, is equipped with system of rope wheels dedicated for loading and unloading damaged vehicles. Simple, running gear consists of seven extra wide axles with twin wheels providing exceptional stability. The five axles are with hydraulic steering securing excellent manoeuvrability and extending tires live. Wheels equipped with Run-Flat inserts allow the trailer run even after a tire puncture. The goose neck with adjustable from 1 250 mm up to 1 650 mm coupler height allows attaching and operation with many different prime mover trucks. The 24V waterproof electric installation is configurated to be equipped with military as well as civil lights systems.



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SEMI-TRAILER ST775-24W.H-PA DEMARKO S.A. ► p. 199

The semi-trailer of the Heavy Equipment Transport (HET) family with payload 70 000 kg, is dedicated and respectively equipped for transportation of heavy and armoured vehicles of both wheeled and tracklaying kinds. Having cargo deck of 11 400 mm length at total length of 16 380 mm, it is capable to perform efficiently and effectively transportation of all heavy vehicles available and deployed currently by any army worldwide.

The standard cargo deck width of 3 000 mm can be extended smoothly up to 3 500 mm, using dedicated hydraulic system, improves considerably comfort of loading and transport of wide combat vehicles. The unique, independent, hydraulic suspension secures tactical mobility at the highest level. Supported by inclinometers, accelerometers, encoders, has extraordinary rotating and swinging capability. The suspension stroke of up to 600 mm secures the semitrailer capability to perform missions successfully almost in every terrain, thanks to possibility to lift up respectively entire cargo deck. Originally of 1 100 mm height. The articulated goose neck, also hydraulically powered and electronically controlled secures semi-trailer capability to be attached to every prime mover with the fifth wheel height from 1 250 mm up to 1 650 mm. The dedicated arrangement of rope guiding wheels increases deployment range as also damaged vehicles can be efficiently loaded and unloaded. Hydraulically operated and electronically controlled rear ramps are supporting these processes

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RFS halls are some of the more spectacular tent halls. Their lightweight and unique construction does not require permanent bonding to the ground and allows the construction of an RFS tent hall with a span of 15 to 75 meters and any length in modules every 5 meters. Each module has a system that allows bi-directional tensioning of the sheathing, which definitely increases the strength parameters of the hall and the comfort of use. Rekord Group is a leader in the construction of lightweight tented aircraft hangars, such as service hangars for C-class aircraft, mobile hangars for helicopters, and we build TV studios as well.

HAN-type halls are designed to allow rapid relocation of halls for use as military and civilian hangars. The use of modular construction makes it possible to adjust the area of the facility by expanding it. HAN-type hangars perform well in extreme climatic conditions, including Arctic, desert, temperate and tropical climates. Advantages: minimization of operating costs, ability to adjust the size depending on the purpose, quick opening of entire gable walls.

ALU tent halls provide unlimited possibilities for interior design, making them ideal for military bases or events. They are also erected as temporary exhibition facilities, trading halls, trade pavilions, conference and wedding halls. The range of additional equipment of the proposed halls (heaters, air conditioners, dividing walls, lighting, etc.), the variety of finishes (walls made of safety glass or PVC panels, soffit, dividing walls, etc.) make the proposed halls provide optimal flexibility for the organization of events not only as regards of the season of their use, but also the size and type of event. Tent halls are equipped with modular floor systems, which are characterized by high strength, quick assembly, aesthetics and relatively small

Tent halls REKORD Hale Namiotowe ► p. 216

dimensions for easy transportation. Rekord Hale Namiotowe sp. z o.o. provides services related to the organization of accommodation bases, canteens in the form of equipped tent halls: with bunk beds, mattresses, tables and Bavarian benches, dining facility areas and the possibility of ordering additional accessories and equipment.

We are a strategic supplier of comprehensive services for the Polish military and allied forces. We design, build and equip military camps comprehensively: from site preparation to supporting social and living infrastructure.

MNT is a military technical tent based on a frame structure, providing the ability to perform maintenance and repair work on weapons and military equipment in field conditions. Tested in various climatic zones, it is characterized by high resistance to changing weather conditions.

The construction of the tent provides a short time of assembly and disassembly, and the materials used in the production of the cover are resistant to corrosive aggressive environmental factors, chemicals for disinfection, decontamination, detergents used for cleaning or petroleum based mps products. It is possible to connect several tents in series and parallel, thereby increasing the usable area.

VACU's innovative and environmentally friendly products, based on vacuum technology used in aviation, are smart and sustainable sanitation solutions. The group includes toilets, urinals, washrooms and showers, which can function independently or combine into modules of any configuration. Our VACU toilet is an innovation on the market – the first vacuum toilet system in Poland, based on state of the art sanitary solutions taken from aviation. It saves water (only 0.8l per use) and is chemical-free (no chemicals required).



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Worker's Town for the needs of PKN Orlen expansion project Modular System Sp. z o.o. ► p. 212

The functionality of container and modular construction, fast implementation time according to individual needs, cost optimization, mobility and the possibility of introducing changes over time, contribute to the growing interest in container products as an alternative to traditional construction.

Example of implementation: Worker accommodation for PKN Orlen. Location: Olefins III PKN Orlen Płock/Biała

Within 5 months of signing the contract, technical documentation was prepared, the campus was designed,

manufactured and built ready for occupancy. 14 residential buildings for 6,000 people including living quarters, sanitary facilities and communication systems. All buildings are connected to utilities: water and electricity. The campus setup has 4 canteens for 2,000 people with full kitchen facilities. The campus also has administration facilities like a police station, security rooms and a laundry for residents.

The entire campus was built with 2,500 container modules with a total area of 37,000 square meters.



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FORCE PROTECTION AND MOBILITY



AD-2000 Parachute System

Air-Pol Sp. z o.o. ► p. 194

Thanks to its two-stage main parachute deployment and stabilization system, the AD-2000 parachute system allows delayed deployment jumps by jumpers who are not proficient in the free-fall technique. Thus, AD-2000 minimizes the training time of soldiers for ram-air parachute jumping. The excellent lift-to-drag ratio of the canopy used in AD-2000 makes possible flights of up to 30 km whilst also very good manoeuvrability allows the jumper to freely choose the landing spot.

AD-2000 is equipped with:

- → a special version of the CYPRES-2 automatic device with the reserve canopy,
- → a three-ring, single-grip main canopy release system,
- → wide size adjustment of harness with cushions,
- harness for cargo container which allow both lowering of the container and its emergency release during the flight,
- → RSL.





Specification of AD-2000 Parachute System

- → NSN number:
- → Certificate number (in accordance with ETSO C23d):
- → Canopy area $[m^2 / ft^2]$:
- → Main canopy number of jumps / service life:
- Reserve canopy number of jumps / service life:
- → Assembly weight [kg / lbs]:
- → Suspended load [kg / lbs]:
- Min jump altitude [m / ft]:
- → Descent speed with the stabilizing parachute [m/s / ft/s]:
- Deployment systems:
 - static line,
 - two-stage deployment system
 - stabilisation / manual deployment with KAP-3P1 automatic device,
 - RSL,
 - manual deployment of reserve parachute with CYPRES automatic device.

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1670-43-000-0615. ETSO C23d): 64.086.010. 27,87 m² / 300 ft². e life: 1,500 jumps / 12 years. vice life: 20 jumps / 12 years or 40 documented packings. 17.5 kg / 38.58 lbs. Min 78 kg / 171 lbs, Max 140 kg / 308.64 lbs. 200 m / 650 ft.

30-35 m/s / 98.5-115 ft/s.

ALEXA Light Weight Gas-Tight EOD Container

Jakusz Sp. z o.o. ► p. 206

Gas-tight EOD container design provides:

- maximum level of protection against shock wave, fire and fragmentation,
- strengthening CBRNE security,
- rapid isolation and transport of hazardous materials with a maximum weight of 1,5 kg TNT equivalent,
- → isolating hazards and moving them away from populated areas.

A cost-effective, mobile, easy-to-use solution for: special forces / border guards / police / bomb disposal units / public facility security services.

The ALEXA container is suitable for mounting on a robotic drive unit and on a pick-up chassis enabling:

- → placing close to the hazard and fast isolation of hazardous materials,
- rapid movement to the place of danger, in crisis and war situations,
- operating in confined spaces and heavy traffic areas.

Additionally the design of the ALEXA container allows sampling of post-detonation gases from a closed container and:

- checking pressure inside the container body, →
- venting of gases after detonation, →
- sampling of gases from inside the container into special containers for further analysis.

Parameters:

- → wired or radio remote control,
- fully automatic container opening/ closing system,
- possibility to work with a EOD robot,
- wide range of carriers/vehicles to use in terms of permissible gross weight of the vehicle.







Technical parameters		
Maximum explosive		1,5 kg (TNT)
Type of container		gas-tight
Maximum weight of tr	ansported object	50 kg
Maximum size		
of transported object	600 mm x 450 mm x	400 mm (LxWxH)
Maximum size		
of the container	1200 mm x 1500 mm x	1300 mm (LxWxH)

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Armoured Observation Container

SILTEC Sp. z o.o. ► p. 219

Armoured Observation Container (OKO) allows you to view and record the image around the container from six cameras, including two mounted on the mast, while ensuring the protection and safety of the container operators thanks to the armoured structure that meets the requirements of the KE2 level according to STANAG 4569 edition 3.

Manufactured in accordance with 1CC load and hook container standard, which enables its loading and transport with the use of vehicles adapted for this purpose. Dedicated hook lift truck can be delivered together with the container.

The defence solutions of the Armoured Observation Container, which increase the level of protection of operators and their safety, include: a structure that meets the requirements of the KE2 level according to STANAG 4569 edition 3, shooting positions, an evacuation hatch, windows with tilting louvers and a filter-ventilation system. For observation activities, the container is equipped with two high-speed cameras mounted on an 8-meter retractable pneumatic mast, four stationary cameras located with remotely controlled external floodlights at the corners of the container, a simultaneous viewing and recording system, an operator's desk and a communication system. The container has the option of connecting an external mains supply or operating from a power generator installed

in the technical space, equipped with the function of automatic in case of the power loss. In the event of a temporary power failure, the UPS device will enable data recording and proper system termination.

In addition, the Armoured Observation Container is equipped with an air-conditioning system and air heaters, two beds, weapon racks, a refrigerator, LED lighting, external lighting with motion sensors, as well as a sanitary and hygienic room.

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DEDAL (AD-95s.3 AZ-95s.3) series 3 Parachute System

Air-Pol Sp. z o.o. ► p. 194

DEDAL series 3 troop parachute (AD-95s3+AZ-95s3) is designed for basic and advanced training jumps, combat-training jumps and combat jumps. The AD-95s.3 parachute system can be equipped with a steerable or non-steerable main canopy. The purpose of the DEDAL series 3 parachutes are airborne troop landing operations with combat equipment from high and low altitudes. Parachute harness supports standard containers with equipment and weapons. The AD-95s.3 canopy has a unique ability to change the functionality of the parachute by the jumper when airborne. After deployment, the parachute falls vertically (no forward speed). The forward speed appears only if the jumper decides to open the drive slots that give the canopy horizontal speed and allow the parachute to manoeuvre.



The AZ-95s.3 reserve parachute is designed to rescue a jumper in case of partial or total failure of the main canopy. Deployment of the canopy is accelerated by a spring mechanism. AZ-95s.3 can be deployed with either hand. In addition, the parachute can be equipped with an AAD.

Specification of DEDAL series 3 Parachute System

- → NSN number: 1670 - 43 - 002 - 2634 + 1670 - 43 - 002 - 2635.
- → Certificate number: 64.086.006a + 64.086.005a.
- → Canopy type: conical, steerable (optionally non-steerable).
- → Canopy area $[m^2/ft^2]$: $110 \text{ m}^2 / 118 \text{ ft}^2 + 63 \text{ m}^2 / 538.21 \text{ ft}^2.$
- → Canopy diameter [m / ft]: 13.2 m / 43.31 ft + 9.8 m / 26.24 ft. ~12 s (main canopy).
- → Rotation time [s]:
- Main canopy [number of jumps / service life]: →

12 years (max 20 years).

18.5 kg / 40.8 lbs + 8 kg /18 lbs.

150 jumps /

- → Reserve canopy [number of jumps / service life]:
 - 1 jump at 350 km/h,
 - 12 jumps at up to 225 km/h,
 - 20 deployments in auxiliary mode, / 12 years (max 20 years).
- → Assembly weight [kg / lbs]:
- → Max suspended load [kg / lbs]:
- → Deployment speed of the main parachute:
 - Min 120 km/h / 65 KTS,
 - Max 400km/h / 216 KTS with min. 3-second delay.
- → Deployment speed of the reserve parachute:
 - Min 110 km/h / 60 KTS;
 - Max 277.8 km/h / 150 KTS;
 - Max 400km/h / 216 KTS with min. 5-second delay.
- → Min jump altitude (main canopy) [m / ft]:
- → Min jump altitude (reserve canopy) [m / ft]:
- Descent speed [m/s / ft/s] (main canopy):
- → Descent speed [m/s / ft/s] (reserve canopy):
- → Forward speed [m/s / ft/s]:
- → Descent speed with a stabilizing drogue parachute [m/s / ft/s]:



- → Deployment systems:
 - static line,
 - static line with spring-loaded pilot chute,
 - · two-stage stabilized deployment system backed with KAP-3P1
 - automatic device,
 - manual deployment by ripcord backed with KAP-3P1 automatic device.

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- 7.9 m/s / 26 ft/s (at 185 kg).
- 0 ÷ 4.5 m/s / 0 ÷ 14.76 ft/s.
- 150 m / 492 ft. 100 m / 328 ft.

185 kg / 408 lbs.

- 5.4 m/s / 17.7 ft/s (at 185 kg).

35 m/s / 115 ft/sec.

Feniks Future Parachute System

Air-Pol Sp. z o.o. ► p. 194

The Feniks Future Parachute System is dedicated to parachute training of soldiers who have previously mastered jumps with a free-fall opening system. It is perfectly suited for parachute sport and as a parachute for instructors conducting AFF training. The container is available in different sizes depending on the user's requirements regarding the main and reserve canopy assembly. Depending on the order, the harness is custom-manufactured to size or with the possibility of adjustment to ensure maximum comfort for jumpers who remain on stand-by for a long period of time.





Specification of Feniks Future Parachute System

→ Certificate number

(in accordance with ETSO C23d): 64086002.

- → Canopy area [m² / ft²]:
 - 10.87 m² / 117 ft²,
 - 11.51 m² / 124 ft²,
 - 12.26 m² / 132 ft²,
 - 13.00 m² / 140 ft²,
 - 14.86 m² / 160 ft²,
 - 15.79 m² / 170 ft²,
 - 16.25 m² / 175 ft²,
 - 18.58 m² / 200 ft²,
 - 19.97 m² / 215 ft²,
 - 20.44 m² / 220 ft².





- Reserve canopy area $[m^2 / ft^2]$:
- 13.28 m² / 143 ft²,
- 13,74 m² / 148 ft²,
- 13,74 m² / 148 ft²,
- 13.93 m² / 150 ft²,
- 16.25 m² / 175 ft²,
- 17.46 m² / 188 ft²,
- 19.32 m² / 208 ft²,
- 19.97 m² / 215 ft²,
- 21.18 m² / 228 ft².



- → Assembly weight [kg / lbs]: ~11.5 kg / ~25.35 lbs.
 - Min/Max suspended load [kg / lbs]: 165 kg
 - / 264.55 lbs.
- → Max deployment speed [km/h / KTS]: 277.8 km/h / 150 KTS.
- → Deployment system: soft BOC pilot chute.
- Backup:

→

- AAD dedicated CYPRES II,
- RSL.

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Feniks Military G-9 Parachute System

Air-Pol Sp. z o.o. ► p. 194

Fenix G-9 Military is a parachute system designed for HAHO jumps. The G-9 canopy is a cross-over of a parafoil and a parachute which makes it an ideal solution for long distance gliding flights.

Due to its parameters, the G-9 canopy is very demanding which makes it suitable primarily for very experienced soldiers. A wide range of applications is possible thanks to a variety of available deployment systems, regardless of the equipment and its size. The harness has been designed to provide maximum comfort and convenience for the jumper during long flights.

The parachute can be adjusted to the height and dimensions of the jumper.



Specification of Feniks Military G-9 Parachute System

- \rightarrow Certificate number (in accordance with ETSO C23d):
- → Main and reserve canopy area $[m^2 / ft^2]$:
- → Number of cells:
- → Lift-to-drag:
- → Assembly weight [kg / lbs]:
- → Min/Max suspended load [kg / lbs]:
- → Max deployment speed [km/h / KTS]:
- → Descent speed of deployed canopy [m/s / ft/s]:
- → Descent speed with the drogue parachute [m/s / ft/s]: 45 m/s / 147.63 ft/s.
- 64086004. Deployment systems: 34.83 m² / 375 ft².

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23 kg / 50.70 lbs.

181.43 kg / 400 lbs.

2.5 m/s / 8.20 ft/s.

277.8 km/h /150 KTS.

- soft BOC pilot chute,
- grip/spring-loaded chute,
- static line,
- static line to deploy drogue,
- two-stage/drogue.

→ Backup:

- AAD dedicated CYPRES II,
- RSL.

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The Feniks S parachute system is the foundation of the entire Feniks parachute series. It is designed for parachute training both for beginners and for advanced jumpers as well as for skill-honing trainings. It is a perfect set for basic trainings, sport and leisure, as well as advanced parachute training. With correctly selected sizes of the main canopy and reserve, it perfectly plays its role as a parachute for students and AFF instructors. Its container is designed to provide maximum comfort for jumpers also during long standby periods. The technical solutions applied in the system make it perfectly support safe movement on board the aircraft (jump masters) without the risk of accidental deployment of the parachute. Feniks is designed for all parachute trainers. In the "back-toback" system, Feniks has containers for the reserve and main parachutes and an integrated harness for a single jumper.

It is perfectly suited for parachute sport and as a parachute for instructors conducting AFF training. The container is available in different sizes depending on the user's requirements regarding the main and reserve canopy assembly. Depending on the order, the harness is custommanufactured to size or with the possibility of adjustment to ensure maximum comfort for jumpers who remain on stand-by for a long period of time.

Specification of Feniks S Parachute System

- → Certificate number (in accordance with ETSO C23d): 64086003.
- → Canopy area [m2]:
 - 21.36 m2 / 230 ft2.
 - 23.22 m2 / 250 ft2.
 - 24.15 m2 / 260 ft2,
 - 25.08 m2 / 270 ft2.
 - 26.01 m2 / 280 ft2.
- → Reserve canopy area [m2 / ft2]:
 - 21.18 m2 / 228 ft2,
 - 21.83 m2 / 235 ft2,
 - 23.04 m2 / 248 ft2,
 - 23.22 m2 / 250 ft2,
 - 24.61 m2 / 265 ft2,
 - 25.08 m2 / 270 ft2,
 - 26.75 m2 / 288 ft2,
 - 26.94 m2 / 290 ft2,

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• 27.87 m2 / 300 ft2.

- → Assembly weight [kg / lbs]:
- Min/Max suspended load [kg / lbs]:
- → Max deployment speed [km/h / KTS]:

~15.5 kg / ~33 lbs. 181.4 kg / 400 lbs. 277.8 km/h / 150 KTS.

Deployment system:

soft BOC

pilot chute,

loaded chute,

 AAD – dedicated CYPRES II,

• grip/spring-

• static line. Backup:

• RSL.

Feniks S Parachute System

Air-Pol Sp. z o.o. ► p. 194





FORCE PROTECTION AND MOBILITY



FLAME signal mine

Zakłady Sprzętu Precyzyjnego NIEWIADÓW Sp. z o.o. > p. 229

The signaling mine is intended for the protection of military facilities, storage areas, border crossings, etc.

Description of the operation:

After pulling the tripwire, the cotter is pulled out and pin released, which, hitting the primer, causes it to detonate and firing the powder charge and to eject the signal cartridge from the body of the mine.

The burning time of the cartridge is $4,5 \pm 1,5$ sec.

Mobile camouflage

Miranda Sp. z o.o. ► p. 211

Mobile camouflage designed for camouflaging vehicles both on the move and at a standstill. It is made of custommade panels for each vehicle. It provides multi-band UV, VIS, NIR, TIR, RADAR protection. It effectively changes the thermal and radar signatures of vehicles, making them impossible to detect. This results in a significant increase in survivability and a reduction in the loss of resources on the modern battlefield. Mobile camouflage imitates the texture of the natural environment, leaves, and terrain, providing a sense of space and enhanced protection in forest, desert or mountain environments. The modular design of the mobile camouflage allows the camouflage panels to be adapted to a specific vehicle and quick installation on vehicles. The use of a panelled design also allows for easy replacement of damaged camouflage components.



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Mobile high-capacity evacuation ferry PEP.30-01 type

ARMPOL Research and Development Company ► p. 196

The ferry is designed for:

- → evacuation from flooded areas of civilians and all kinds of property,
- → securing ad hoc crossings of water obstacles in cases of damage to bridges,
- securing unusual rescue operations, → such as extinguishing a burning bridge,
- water transport of high-volume and high-tonnage → objects in the national economy.

TECHNICAL AND OPERATING PARAMETERS General Data:

- → Total weight of the shuttle 31 100 kg
- Dimensions of the shuttle as a trailer (L x W x H) →
- → Shuttle dimensions when unfolded (L x W x H)
- → The displacement
- → Unladen immersion
- → Dipping with a load of 30 t
- → Swimming speed with no load
- → Cruising speed with a load of 30 t
- → Tractive force
- → Rated power of ferry drive motors
- Fuel tank volume →
- Supply voltage of on-board installation



14030 x 3400 x 4000 mm
19850 x 6360 x 3620 mm
108 t

approx. 700 mm

approx. 1200 mm

approx. 13 km/h

approx. 9 km/h

25 kN

16001

2x313 kW

Performance parameters:

- Temperature range →
 - Temperature range of storage
- from-10 do +50°C
 - from -45 do +65°C (after computer hardware was debunked)



FORCE PROTECTION AND MOBILITY

PIAP FENIX Lightweight EOD & reconnaissance robot

Łukasiewicz – PIAP ► p. 208

PIAP FENIX^{*} is a light, backpack-deployed EOD & reconnaissance robot. It has been created to conduct reconnaissance in the immediate vicinity of military operations, including places inaccessible to humans. Excellent field properties of PIAP FENIX^{*} robot (track-wheels chassis with moveable front flippers) ensure easy movement on hardened road surface, dirt roads, pathless tracts and in urban areas.

The robot's gripper can be equipped with a cable cuter, window shredder, 40mm or lesssized water disruptor, shotgun, X-RAY system, etc for required situation when operating.

PIAP GRYF EOD mobile robot

Łukasiewicz – PIAP ► p. 208

PIAP GRYF[®] is mobile robot used for reconnaissance of terrain and hard to reach places. The Robot's wheels can easily be removed, which reduces the dimensions of the robot and thus facilitates missions in tight spaces. Owing to the applied drives, the robot smoothly overcomes uneven terrain and obstacles up to an angle of 45°. The robot is characterized by excellent manoeuvrability. Low weight makes it easy to transport and carry and its modular design allows for quick and easy change of additional equipment.

The robot is controlled via a modern, light control panel that, thanks to a brand-new design, allows for intuitive joystick operation in all degrees of freedom of the manipulator's arm. The large touchscreen makes it possible to inspect suspicious cargo, luggage, or IEDs, at a safe distance.

The Robot is already being operated by armed forces around the world, in South Korea, Indonesia, Nigeria, Senegal, Romania, Italy, France and Finland.

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PIAP IBIS Heavy robot for pyrotechnic operations

Łukasiewicz – PIAP ► p. 208

PIAP IBIS[®] is a robot designed for pyrotechnic operations and reconnaissance. Upon installation of additional devices, it can be used, among others, for disposal of dangerous objects, chemical detection, and rescue operations.

The six-wheeled chassis with independent drive of each wheel allows to operate in challenging and varied terrain. PIAP IBIS* is a fast robot (10 km/h). Special design of mobile base suspension ensures optimum wheel contact with the ground. The manipulator with extendable arm ensures a large reach (over three meters) and a high range of motion in each plane. It is the main pyrotechnic robot at the largest airports in Poland and in the service of the border guard, police and military police.



PIAP PATROL Robot for C-IED and CBRN tasks

Łukasiewicz – PIAP ► p. 208

PIAP PATROL* is a medium EOD tracked robot used for detection and neutralization, which can support operators in the most dangerous tasks. The robot design ensures the use of several accessories at the same time. The lightweight robot control panel is integrated with mobile x-ray systems and CBRN sensors. Robot's dimensions and applied drive system allow to carry out activities both inside buildings and in difficult terrain and its compact and modular design allows it to be transported even in a passenger car.

Manipulator with 6 degrees of freedom and a gripping function enables to lift and dispose loads up to 30 kg with maximum reach of 2 m.



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Static camouflage 2D Multispectral Winter Camouflage Net

Miranda Sp. z o.o. ► p. 211

2D Multispectral Winter Camouflage Net is designed to protect people and equipment. The nets are made of durable materials and have a unique spatial structure in the form of concave and convex sections ensuring better blending in with the natural environment, and providing protection across the entire spectrum of UV, VIS, NIR, SWIR, TIR, RADAR electromagnetic radiation. The UV reflection properties of the winter camouflage net are comparable to those of a snow-covered environment, providing advanced protection against early detection devices that operate in the UV range. The camouflage pattern and color parameters are designed for the environment in which the camouflage will be used. They perfectly blend in with the natural surroundings and provide effective protection against optical recognition systems and the aided and unaided eye.

The latest solutions are made of lightweight high-strength textiles with very good performance parameters. The design of the net fabric provides excellent situational awareness. The external environment is perfectly visible to the observer from under the camouflage net. In the winter version it is possible to make additional openings.



Camouflage nets are supplied with the accessories necessary for proper installation.

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Static camouflage Optical and multispectral static camouflage 2D single and double-sided versions

Miranda Sp. z o.o. ► p. 211

2D multispectral camouflage nets are designed to protect people and equipment. They are made of durable materials and have a unique spatial structure in the form of concave and convex sections ensures better blending in with the natural environment, and providing protection across the entire spectrum of UV, VIS, NIR, SWIR, TIR, RADAR electromagnetic radiation. The camouflage pattern and color parameters are designed for the environment in which the camouflage will be used. They perfectly blend in with the natural surroundings and provides effective protection against optical recognition systems and the aided and unaided eye. The latest solutions are made of lightweight highstrength textiles with very good performance parameters. The design of the net fabric provides excellent situational awareness. The external environment is perfectly visible to the observer from under the camouflage net.

Double-sided printing allows using the same camouflage in two different terrains, e.g. forest and desert terrain, or rocky desert and mountainous terrain which makes it possible to quickly relocate troops.

The camouflage nets are supplied with the accessories necessary for proper installation.



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Static camouflage Optical and multispectral static camouflage 3D

Miranda Sp. z o.o. ► p. 211

3D multispectral camouflage nets are designed to protect people and equipment. They are made of durable materials, have a unique spatial structure, and provide protection across the entire spectrum of UV, VIS, NIR, SWIR, TIR, RADAR electromagnetic radiation.

The 3D version imitates the texture of the natural environment, foliage and terrain, giving the impression of spatiality and providing increased protection in forest environments. A special dedicated camouflage pattern blends in perfectly with the natural surroundings and provides effective protection against optical recognition systems and the aided and unaided eye.

The design of the net fabric provides excellent situational awareness. The external environment is perfectly visible to the observer from under the camouflage net. The load-bearing and filling layer is created from materials with higher tensile and tear strength, which ensures greater longevity of the camouflage in harsh conditions.

Camouflage nets are supplied with the accessories necessary for proper installation.



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Thermal and anti-radiation inner liners

Miranda Sp. z o.o. ► p. 211

Thermal and anti-radiation inner liners are used as internal hangar linings. Depending on the type, they provide protection against external temperature changes and against thermal infrared and microwave recognition. Technological solutions used in the lining, prevent the detection of equipment and people inside the hangar using radar waves. The effect of hiding from radar is achieved by absorbing and scattering the energy of microwave radiation. The fabrics used in the anti-radar inner liner have flame-retardant and self-extinguishing properties.

Each layer of the composite performs its own function, giving the whole its unique properties while maintaining a relatively low mass per unit. This translates into the possibility of using a lighter support structure for the hangar.



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Vehicle Filtration & Ventilation Unit UFS.B2.02-100FW/24V, w.02A

ARMPOL Research and Development Company ► p. 196

The device protects the usable space against the effects of natural pollution from the atmosphere, use of weapons of mass destruction (BMR) and contamination with selected toxic industrial substances. It provides a comprehensive solution for the protection of people and equipment in utility spaces of buildings with an average cubature of up to 20 m³, stationary and intended for transport, including: vehicle cabins, vehicle box bodies and containers.

The device is available in various versions - depending on the structurally required method of installation on the facility and the scope of operation, including additionally: air efficiency measurement and automatic activation of the filtering and ventilation regime in cooperation with the contamination alarm.



Technical and Operating Parameters

ZFW.B2-02 (L x W x H)Total mass (without packaging) Filter used Nominal supply voltage Nominal power Nominal power Recommended overpressure in the protected space External static pressure of fans Nominal output in case of filtration and ventilation Nominal output in case of ventilation Tightness Protection factor Acceptable noise level Range of operating temperatures Range of storage temperatures Device classification

740 x 400 x 400 mm up to 75 kg FPT-200M/P lub FPT-200B 24 VDC/27,6 ±0,5 VDC 110 W 4 A min. 200 Pa +50 Pa min. 1 000 Pa min. 100 m3/h - 10% min. 120 m3/h - 10% $\leq 0.1 \%$ $\geq 10\ 000$ less than 80 dB/A from -30 to +50oC From -50 to +70oC NO-06-A101, NO-06-A103, NO-42-A213

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NAVAL VESSELS AND SYSTEMS



Minehunter KORMORAN II

Remontowa Shipbuilding S.A. ► p. 217

Three modern Kormoran II class minehunters ORP "Kormoran", ORP "Albatros" and ORP "Mewa" were built by consortium leading by Remontowa Shipbuilding Gdańsk and also includes OBR CTM S.A. and PGZ Naval Shipyard from Gdynia.

The warships are dedicated to perform minehunting activities in the Polish Exclusive Economic Zone (EEZ) autonomously, as well as a Task Unit (TU) duties performed as a part of tactical task groups (TGs). They are also intended for cooperation with the allied naval forces (TFs) in the Baltic and the North Sea, and designated to be a part of Standing NATO Mine Countermeasures Groups (SNM-CMG). Kormoran II (also known as project 258) is a MCM Vessels class of the Polish Navy, designed and built locally. The hull is made of non-magnetic steel. Their main missions include the search, classification, identification and neutralization of sea mines. Minehunters KORMORAN II class are capable for hoist transfer and fuel replenishment at sea (RAS), which makes KORMORAN II ready for longdistance mission. All warships come with a training package (properly trained crews through operator and maintenance courses) and logistic support package (ship tailored

with a set of repair documentation, spare parts, consumables). The minehunters were handed over to the Polish Navy in 2017–2022 and they are stationed in the Naval Base in Gdynia as part of 13th minesweeper Squadron of the 8th Coastal Defence Flotilla.

Three more vessels, which were ordered in 2022, are just under construction.





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OSU-35K Naval Armament System

Consortium Pilica: PCO (PGZ) ► p. 214 PIT-RADWAR S.A (PGZ) ► p. 214 Zakłady Mechaniczne "Tarnów" S.A. (PGZ) ► p. 228

Precision and effectiveness OSU-35K is a remotely controlled, stabilized naval weapon system equipped with a 35 mm automatic gun with an independent optoelectronic target tracking system. Its structure made in carbon fiber technology allowed to significantly reduce the size and weight, as well as to achieve a high level of ergonomics in operation. OSU-35K provides engaging air targets manoeuvring with course, speed and altitude in the fire zone as well as surface targets. Designed both to integrate with CMS (Combat Management System) as well as for autonomous operation, independently of the CMS. Integrated Observation and Tracking Head ZGS-35K includes thermal imaging camera, daylight camera, high-repetition laser rangefinder, video tracker and short-range interrogator.





Main elements:

- ➤ Automatic gun system (AM-35K),
- → Integrated observation and tracking head (ZGS-35K),
- → Fire control system unit (BSKO-35K) and a backup fire control station (RSKO-35K),
- ➤ The open architecture of the system, its modularity and scalability allow full integration on ships of various types,
- Capability of precise target engaging,
- Simultaneous engaging of various types of threats (double-sided feeding system for various types of ammunition, programmable air-burst ammunition system),
- → High level of ergonomics in operation thanks to structure made in carbon fiber technology,
- → Possibility of integration on ships of various types.



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SENSORS



FIELDctrl 3D MIMO Radars: Advance, Range, Runway, Ultra

Advanced Protection Systems S.A. ► p. 195

Advanced Protection Systems designs, manufactures and supplies top-of-the-range MIMO 3D radars for LSS (Low-Slow-Small) target monitoring.

Precise target detection information provides an advantage over competing radars. Distance, angle and height are provided in real time. Innovative technology allows other sensors – cameras as well as effectors – jammers – to automatically target the drone.

Artificial intelligence and machine learning algorithms enable automatic classification – the FIELDctrl 3D MIMO radars accurately distinguish drones from birds. What's more, they are able to track multiple objects of different classes simultaneously.

FIELDctrl 3D MIMO radars can accurately detect all types of drones: rotary and fixed-wing, radio-controlled and non-radio-controlled, fully autonomous, and class 1–3. They even detect microdrones at distances up to 6 km.

Swarms, hovering drones and drones moving across the radar beam, i.e. having a zero Doppler velocity, are also effectively detected, tracked and classified.



FIELDctrl Advance 3D MIMO Radar

Field of view (azimuth/elevation) Radar type Output power Frequency of operation / frequency tuning range Class of emission Bandwidth Supply voltage Ingress protection Dimensions (LxWxH) excl. mounting brackets Weight (panel only) Effective detection and classification range for micro UAVs – RCS 0.01 m2 Minimum target altitude (AGL) Minimum UAV detection speed Colour version available 90°/60° FMCW 80 W, 19 dBW from 9.7 to 10 GHz 300 MFXN 300 MHz 24 VDC and 230 VAC variants IP66/IP67 645 x 360 x 180 mm 31.4 kg 3 km

1 m 0 m/s (hovering drone) military green desert sand



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FIELDctrl Range 3D MIMO Radar

Field of view (azimuth/elevation) Radar type Output power Frequency of operation/frequency tuning range Class of emission Bandwidth Supply voltage Ingress protection code Dimensions (LxWxH) excl. mounting brackets Weight (panel only) Effective detection and classification range for micro UAVs – RCS 0. 01 m2 Minimum target altitude (AGL) Minimum UAV detection speed Colour version available

FIELDctrl Runway 3D MIMO Radar

Field of view (azimuth/elevation) Radar type Output power Frequency of operation/frequency tuning range Class of emission Bandwidth Supply voltage Ingress protection code Dimensions (LxWxH) excl. mounting brackets Weight (panel only) Effective detection and classification Range for micro UAVs – RCS 0. 01 m2 Minimum target altitude (AGL) Minimum UAV detection speed Colour version available

FIELDctrl Ultra 3D MIMO Radar

Field of view (azimuth/elevation) Radar type Output power Frequency of operation/frequency tuning range Class of emission Bandwidth Supply voltage Ingress protection code Dimensions (LxWxH) excl. mounting brackets Weight (panel only) Effective detection and classification range for micro UAVs – RCS 0.01 m2 Minimum target altitude (AGL) Minimum UAV detection speed Colour version available 90°/30° FMCW 80 W, 19 dBW from 9.7 to 10 GHz 300 MFXN 300 MHz 24 VDC and 230 VAC variants IP66/IP67 645 x 360 x 180 mm 31.4 kg 5 km

1 m 0 m/s (hovering drone) military green desert sand

45°/20° FMCW 80 W, 19 dBW from 9.7 to 10 GHz 300 MFXN 300 MHz 24 VDC and 230 VAC variants IP66/IP67 850 x 567 x 190 mm 40,6 kg 8 km

1 m 0 m/s (hovering drone) military green desert sand



1 m 0 m/s (hovering drone) military green desert sand





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MSI-DS TERRAHAWK PALADIN

Advanced Protection Systems S.A. ► p. 195

The MSI-DS TERRAHAWK PALADIN system is the result of cooperation between APS and UK-based MSI Defence Systems. Radar panels, a soft-kill effector (jammer) are designed and manufactured by APS; a hard-kill effector 30 mm MK44 Bushmaster chain gun is made by Northrop Grumman Corporation. The entire set is controlled by the APS-developed CyView C2 system. The C2 system allows the MSI-DS TERRAHAWK PALADIN platforms (currently four) to be combined into one module and managed together. The state-of-the-art 3D MIMO FIELDctrl Advance radars enable UAV detection, tracking and classification. They can be neutralised in two ways: non-kinetic (soft-kill effectors) and kinetic (hard-kill effectors).

The module can be controlled from any platform by assigning a MASTER or SLAVE function. This increases the system's effectiveness and survivability on the battlefield.



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Passive Coherent Location Radar XY-PCL-K

XY-Sensing Sp. z o.o. ► p. 226

The XY Passive Coherent Location Radar (XY-PCL-K) is a novel product capable of detecting and identifying all kinds of airborne objects / targets including helicopters and drones. The XY-PCL-K Radar, because of its nature and utilized radar techniques, does not contaminate electromagnetic spectrum and it is safe for environment and life species. Since no electromagnetic energy is emitted by the radar, it cannot be detected and eliminated by an anti-radiation missile as in the case of active radar. The XY-PCL-K is an ideal and low cost solution delivering the valid and credible air surveillance information which can be exploited by military and civilian airspace users. The AS-PCL Radar is fully autonomous, but it can also be supervised/controlled by the operator onsite or from a remote location if necessary (Command Post, Higher HQ etc.). The proposed AS-PCL Radar is based on the 10 ft intermodal container (cargo) shelter with a fully independent, self-load/unload system, equipped with HVAC (heating, ventilation, air conditioning) system, own power generator, telescopic antenna mast, additional 1 km fibre-optic cables to connect other stations and able to host one operator.

XY-PCL-K Technical Parameters

a) Illuminators of Opportunity - the PCL radar uses FM (88-108 MHz) radio and DVB-T television transmitter (470-862 MHz). Both DVB-T and DVB-T2 standards are supported.

b) The system provides 360° coverage, by using circular antenna arrays.

c) The system can operate 24/7 in any environmental conditions.

d) Detection and tracking coverage volume that supports every type of mission:

- Maximum instrumented range: 300 km →
- → Minimum instrumented range: 50 m Maximum height/elevation: 15 km
- Minimum height/elevation: 0 km
- → Maximum elevation angle: 45°
- Minimum elevation angle: 0°
- **-**Target minimum speed: 5 m/s
- Target maximum speed: 1000 m/s

e) Accuracy of target coordinates determination:

- Horizontal: 200-700 m Vertical: 500-1500 m Speed: 5-15 m/s
- **→** Direction: 0.5-5.0°

f) The antenna system automatically rises itself to a height above ground that will assure detection of targets moving at low and very low heights

g) Multiple ECCM/EP capabilities

h) Target information update rate / information refresh rate - 1 s

i) Processing and display capacity:

- Bistatic plots: 10 000 →
- → Bistatic tracks: 1000
- → Cartesian tracks: 1000
- → Illuminators of Opportunity: 10 000
- j) The system can be operated entirely remotely.

k) The system has open architecture and can cooperate with external systems. It can accept inputs from other systems, e.g., detections from active radars can be used to initialize tracks. It can send data to other systems.

l) The system can be integrated with external systems, including proprietary/non-standard systems.

m) The whole system can operate within -30 + 500 C n) There is a 12 kW power

source guarantying the power (230/400 V AC, 50 Hz) for all equipment (radar station, HVAC, lighting system, selfload/unload system, etc.) augmented by the battery system ensuring the uninterrupted operation.





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SKYctrl L containerized system

Advanced Protection Systems S.A. ► p. 195

This large-scale system in an autonomous container – suitable for protecting forces, high value assets, and command posts – has been designed so that only one operator is needed. It is possible to use different variants of the FIELDctrl 3D MIMO radars: Advance and/or Range..

The SKYctrl L is integrated in a mobile container adapted to difficult weather conditions. It is possible to link up to four SKYctrl L units, with the possibility of communication and data synchronisation between the individual systems using a fibre optic cable. The included radar, optoelectronic and jamming systems are automatically raised according to operational requirements. All equipment is stored in the container during transport.

SKYctrl L is fully adapted to be transported by vehicles with high off-road mobility. No additional lifting equipment is required.



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SKYctrl Omnidirectional FPV drone neutralizer

Advanced Protection Systems S.A. ► p. 195

The jamming device (jammer) is an essential element of the neutralising module in the integrated counter-drone SKYctrl system.

One of its main functions is to combat FPV (first person view) drones and to protect troops. It can be both integrated with an external system or used on its own.

The device can operate in a manual mode (without any external software) and in an automatic mode. The neutraliser is controlled by the company's own network-centric command and control system, CyView C2.

The output power in each jamming band is up to 10 watts. The omni-directional antennas provide up to 4 dBi gain, making the unit highly effective against UAVs with a maximum jamming range of up to 500 m, depending on the power of the drone's navigation and control signal and the distance between the drone and the operator.



Omnidirectional range Modular design Battery operation time Operating temperature Weight Water immersion Power supply

Antennas compliant with Easy to transport

up to 500 m up to 7 RF bands 6.5 hours -30° to +50° 15-28 kg MIL-STD-810H 24 VDC, 36 VDC, 230 VAC variants MIL-STD-810H IP66/IP67

SKYctrl S

Advanced Protection Systems S.A. ► p. 195

Detection, tracking, classification and neutralisation of LSS (low-slow-small) targets.

- Precise 3D multi-target tracking radar with an MHT algorithm (multiple hypothesis tracking)
- Automatic classification; distinguishes between drones and other aerial objects
- → Detection and defeat of class 1-3 drones
- → Automatic jammers with directional antennas covering the communication and navigation bands of drones
- → Dedicated and user-friendly C2 software; the PDQ tool for mission optimisation
- → Extremel y fast set up: full deployment in less than 5 minutes
- → Dedicated API for radar data transfer to external systems; easy integration with hard-kill effectors
- Automatic positioning and heading control

This version of the SKYctrl system consists of a maximum of two radars and one jammer. It is possible to integrate hard-kill effectors.

The SKYctrl S is intended for use by light infantry units to protect borders and public events. It is already in service with the Polish Armed Forces and the Ukrainian Armed Forces. It is designed to meet the most dynamic needs of our partners. Its deployment time is below 5 minutes.



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Ship's Dynamic Positioning System

AUTOCOMP MANAGEMENT Sp. z o.o. ▶ p. 197

The Dynamic Positioning System (DP) is a computer-aided system designed for ship manoeuvring. The DP system's task is to maintain a set position of the ship or to control the movement of the ship according to a set trajectory. The Dynamic Positioning System can operate in automatic, semi-automatic and manual modes and interfaces with the Command Post (SD).

The DP system performs the following functions:

- maintenance of a preset position or movement along a preset trajectory,
- maintenance of a pre-set position or motion along a pre-set trajectory with minimum energy requirements,
- → control of the ship's propulsion systems so as to ensure compensation of disturbing forces and moments.

Quantities measured in the dynamic stabilisation process:

- → ship's position DGPS-RTK system, GPS SAAM,
- → wind speed and direction anemometer
- → compass heading gyrocompass,
- → speed of ship's movement DLOG
- → speed of sea currents sea current meter
- → heeling and acceleration MRU gyroscope plumbbob.

Measurement data for the DP system is supplied from the Navigation Data Distributor (DDN) and directly from the gyroscope plumb-bob. The DP system is delivered as a set of functional components, the completion of which depends on the vessel's specificity.

The system software runs on a Windows runtime platform and is structured on the so-called plug-in architecture. System operation is fully supported by the operator's graphical interface or, to a selected extent, supported/replaced by hardware console modules.



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Small Intelligent Light Satellite Terminal SilPack Series

SILTEC Sp. z o.o. ► p. 219

Silpack is a manpack class SATCOM terminal. Equipped with two replaceable antennas (60 and 100 cm) operating in X, Ku and Ka Bands. Having capability of replacing modems, the terminal assures flexible solution for different communication topologies. The terminal is delivered with a positioner which allows for pointing the antenna at a proper satellite. Equipped with software package – tool for monitoring and control purposes of embedded devices.

Technical specification

Antenna

- → Frequency bands X, Ku, Ka
- → Dish diameters 60, 80, 100 cm

Ku Band

- → TX frequency [GHz] 13,75-14,50
- → RX frequency [GHz] 10,70-12,75
- → Polarization Linear
- → BUC 8 W (Other options available)
- → PLL LNB

X Band

- → TX frequency [GHz] 7,90 8,40
- → RX frequency [GHz] 7,25 7,75
- → Polarization Circular
- → BUC 10 W PLL LNB

Modems

- → ND Satcom Skywan 5G mini
- → Comtech UHP-210
- → Teledyne Qlite
- → Other options on request

Functionalities

- → Ethernet LAN (1 Gb/s) x 2
- → GPS receiver
- → Compass
- → Satellites and locations database
- → Angles calculation
- → Pointing support
- → M&C software
- → AZ/EL/POL adjustable in wide range
- → Levelling

Power supply advanced

- → AC 100 240V, 45 60Hz, DC 12 36V
- → Batteries BB2590/U, BB-390B/U
- → Car lighter, car battery

Environmental conditions

- → Operating temperature -30° ÷ +50°
- → Storage temperature $-40^{\circ} \div +60^{\circ}$
- → Humidity 100 %
- → Weight (backpack not included) < 20 kg



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SIMULATION AND TRAINING



Complex Tactical and Fire Simulators for Crews of Combat Vehiclesand Tanks in the Platoon Version AUTOCOMP MANAGEMENT Sp. z o.o. ► p. 197

Autocomp Management Ltd. is a manufacturer and supplier of comprehensive cabin tactical-fire simulators designed for training crews and subunits equipped with armoured personnel carriers, tanks and other military vehicles. The simulators enable realistic projection of tactical and fire capabilities of armament and military equipment during the implementation of combat tasks. The simulation enables the implementation of a full spectrum of tactical and fire tasks by both crews and platoon soldiers, and at the same time provides the necessary data to assess the effects of their training.

The simulators provide various types of tactical operations such as defence, assault, delaying operations, marching, and fire control operations of combat vehicles using computer simulations. The simulators of the platoon version are equipped with a Class Manager position and an After Action Review module. They consist of Crew Simulation Stations placed on motion platforms, where each station contains: a combat module that reflects the turret with the commander's and gunner's stations, a driver's module which reflects his compartment and the operator's station.

The software uses artificial intelligence algorithms to simulate actions on the battlefield and computer-generated behaviour using virtual objects. Cabin tactical and fire simulators allow for effective training of crews, ensuring maximum training effects while maintaining appropriate economy of this process (principle of cost-effect).



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Combat Training Support System "ŚNIEŻNIK" AUTOCOMP MANAGEMENT Sp. z o.o. ► p. 197

The ŚNIEŻNIK combat training support system is an advanced project for complex training of soldiers in garrison conditions on a virtual battlefield. The system provides a comprehensive solution for conducting fire training for soldiers of mechanized, motorized, anti-aircraft, artillery or sharpshooter units at shooting ranges, battlefield or in facilities.

The high resolution of the screens and emitting characteristic sounds of the environment reflect the sounds of the battlefield. The trainnees use real types of combat weapons, adapted

to shooting in the Śnieżnik, equipped with laser modules, pneumative reloading systems and simulators of optical sights. The system also reflects the ballistics of the bullets, corresponding to the types of ammunition.

In addition, environmental and atmospheric factors, types of propellant charges and fuse settings were also provided. The Śnieżnik enables significant savings in the training process due to the lack of costs of ammunition,

The GISS container shooting ranges are specially designed systems consisting of mobile ballistic modules. They allow for the construction of highly specialized training facilities anywhere, catering to the shooting and tactical training needs of uniformed services and civilians alike. These facilities are capable of hosting a variety of training sessions, offering shooting distances ranging from 5 to 200 meters with both fixed and adjustable firing lines. They feature between two to eight shooting positions, accommodating individual, paired, or group training scenarios.

By utilizing standard equipment and live ammunition during training, these ranges elevate the level of practical



fuel, other material resources, no need to move to training grounds and no use of weapons and military equipment.

The Śnieżnik system allows for training commanders in fire control, with the simultaneous participation of subunits of various types of troops, training in combined operations, training in events impossible to be carried out on barracks exercise yards, training in conditions specific for potential mission/operation areas, unlimited training and no weather restrictions.

Container Shooting Range

GISS Sp. z o.o. ► p. 203

training, enhancing concentration and building confidence in acquired skills. The internal training support systems enable comprehensive analysis of training sessions, facilitating identification of individual and group errors, thereby aiding in their prevention during future training and operational missions. In addition to the ballistic modules, the facility can also be equipped with various modules to support the overall functioning of the centre. These modules may include space for training, office, social, logistics, and communication units, housing amenities such as a shooting control station, weapon cleaning room, restroom, training area, waiting room, locker room, or a medical facility.



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Container Shooting Range MoST-2 KLIMAWENT S.A. ► p. 207

MoST-2 container shooting range:

- can be used as training facility for uniformed services → and as commercial facility
- is fully covered shooting range →
- → has 25m shooting line
- has two shooting stalls
- is equipped with tactical lighting system, target retrieval system and CCTV
- is equipped with long life granular bullet trap
- provides possibility of using ammunition of 3600 J maximum initial energy of the bullet, including weapons listed below:
 - pneumatic weapons, 4.5 mm (shot)
 - rimfire pistols and rifles, e.g. 5.6 mm
 - centerfire pistols and rifles, e.g. 7.62 mm, 9.65 mm, 11.43 mm
 - smoothbore shotguns, e.g. 12 gauge,
 - rifles and carbines, e.g. 7.62 mm NATO (not supported: armour-piercing, tracer and incendiary rounds)
- allows trainings from fixed or moving firing lines
- consists of four modules than can be placed on a flat surface in any location
- guarantees the highest air quality due to perfect ventilation system





CQB House Shooting Range

GISS Sp. z o.o. ► p. 203

The armoured CQB House manufactured by GISS is a specially designed system of portable ballistic panels allowing life-sized training facility to be built. This allows for tactical trainings to be organized in conditions most similar to those prevailing on a modern battlefield.

It is also possible to carry out a wide spectrum of live fire trainings undertaken in preparation for the following types of operation:

- Military Operations in Urban Terrain → – MOUT.
- Close Quarters Battle CQB.
- Hostage Rescue Operation HR.
- Counterterrorism CT.
- → Special Reconnaissance - SR.
- → Direct Action - DA.
- -Personal Security Detachment - PSD. In addition to comprehensive preparation for the implementation of the above-mentioned operations, by using



the appropriate elements the CQB House also allows basic skills to be improved, such as situational shooting or even breaching, without exposing trainees to the danger of loss of health or life.

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Internally installed training support systems enable comprehensive analysis of training and identification of individual and group mistakes, helping to avoid them in the future during training and combat operations.

Systems that can be used to make training more attractive:

- Artificial smoke system to allow for training in conditions of limited visibility
- Audio system generating sounds of the battlefield
- **→** Monitoring system for training participants
- Specialised simulation lighting system
- System of mobile targets
- System of integrated bullet-traps



The mobile bullet traps are intended for live-fire tactical training in sheltered and outdoor shooting ranges. The mobile bullet traps can be deployed in linear series or as standalone units. They facilitate any deployment configuration for building "shoot houses". The mobile bullet traps withstand live round fire with a maximum bullet energy of 3600 J, including the following calibres: 9 mm, 5.62 mm, and 7.62 mm (and 7.62 NATO) (excluding: armour-piercing, tracer and incendiary rounds). The KMB-600 bullet traps withstand live round fire with a maximum bullet energy of 6600 J, e.g. 338 LM.

The offer of Mobile Bullet Traps consists of:

- KMR-600 mobile bullet trap (ballistic resistance to 3600J, weight: 150kg)
- KMB-600 mobile bullet trap (ballistic resistance to 6600J, weight: 345kg)

Mobile Bullet Traps KLIMAWENT S.A. ► p. 207

KMR-600 mobile bullet trap

Mobile bullet trap on a wheeled dolly and a backstop. 50 mm anti-ricochet panels installed on one backstop side.



KMB-600 mobile bullet trap

Mobile bullet trap on a wheeled dolly and a backstop. 50 mm anti-ricochet panels and 300 mm solid blocks installed on one backstop side.

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Mobile Container Shooting Range MoST-1 KLIMAWENT S.A. > p. 207

MoST-1 mobile container shooting range:

- can be used as a personalized shooting range, commercial facility as well as training facility for uniformed services,
- → has one shooting stall,
- → has 7 m shooting line,
- → is equipped with multifunctional firearms simulator designed to address both basic and advanced firearms training and simulate differ distances,
- → is equipped with long life granular bullet trap,

- provides possibility of using ammunition of 3600 J maximum initial energy of the bullet, including weapons listed below:
 - pneumatic weapons, 4.5 mm (shot),
 - rimfire pistols and rifles, e.g. 5.6 mm,
 - centerfire pistols and rifles, e.g. 7.62 mm, 9.65 mm, 11.43 mm,
 - smoothbore shotguns, e.g. 12 gauge,
 - rifles and carbines, e.g. 7.62 mm NATO (not supported: armour-piercing, tracer and incendiary rounds),
- guarantees the highest air quality due to a perfect ventilation system.



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Mobile Shooting Target Robotic Target[™] 2WD, Robotic Target[™] 4WD

Tech Robotics ► p. 221

This is a lightweight and mobile remotely controlled platform. Two drive wheels on a flat surface allow for highly dynamic manoeuvrability. ROBOTIC TARGET[™] is capable of operating on existing shooting range objects without modifying the shooting range infrastructure.

Our targets can work with various attachments mounted on our platform, such as the 3D TECHFLEX[™] Shooting Range Dummy Target. Our mobile shooting targets enhance the skills of every shooter. Each of the wheels is powered by a separate motor. With control over direction and speed, an instructor can simulate an unlimited number of scenarios. In a fraction of a second, a simulated target without any warning can become a threat. The purpose of the mobile shooting target is to conduct dynamic training with non-linear scenarios.

Training with the robotic shooting targets can assist soldiers or officers in improving various skills: accuracy, tactical and situational awareness, decision-making, speed and reaction time, safety, scenario-based force-on-force training.



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Modular Tactical Shooting Ranges MoST-5 and MoST-10

KLIMAWENT S.A. ► p. 207

MoST-5 and MoST-10 are indoor shooting ranges for all kinds of shooting trainings. They are made of steel modules which can be transported to any location which has a flat surface. MoST systems are not fix to the ground. The time of building the shooting range is between 180 and 360 days depending on the MoST size.

MoST systems are available in eight sizes:

- → MoST-5 5 m lane width, either 25, 50, 100 or 200 m shooting line
- → MoST-10 10 m lane width, either 25, 50, 100 or 200 m shooting line

The modular design of the MoST systems allow the range length to be modified by the adding or removing modules. Each MoST range can also be disassembled and relocated at any time. MoST-5 and MoST-10 provide possibility of using ammunition of 3600 J maximum initial energy of the bullet, including weapons listed below:

- → pneumatic weapons, 4.5 mm (shot)
- → rimfire pistols and rifles, e.g. 5.6 mm
- → centerfire pistols and rifles, e.g. 7.62 mm, 9.65 mm, 11.43 mm
- → smoothbore shotguns, e.g. 12 gauge
- → rifles and carbines, e.g. 7.62 mm NATO (not supported: armour-piercing, tracer and incendiary rounds) The ballistic equipment consists of:
- → long life granular bullet trap
- → anti-ricochet panels
- → target retrieval system
- tactical and emergency lamps
- → audio system
- → CCTV system





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Optical Sights Simulators for Military Equipment AUTOCOMP MANAGEMENT Sp. z 0.0. ► p. 197

The company's first optical projects were the EMES, PERI, FERO fire control system simulators of the Leopard 2A5 tank commissioned by Krauss Maffei Wegmann GmbH. These simulators precisely reflect the parameters of the original optical devices, including emulation of form and function of the original ones. The optical device simulators are high-fidelity replicas designed for advanced simulator systems which enables the mapping of the shape, its operating elements and output elements.

Autocomp Management specializes in the production of three types of optical devices as below:

- → periscope simulators,
- → target simulators for small arms and sharpshooters,
- → simulators of fire control system sights,
- → night vision simulators of combat vehicle drivers.

The Optics Production Section has its own grinding, polishing and clean production facilities. The section manufactures optical instruments from the design phase to final production of optical parts. The process includes gluing optical assemblies, applying anti-reflective layers and so-called "white" assembly, i.e. integration of optical and mechanical parts.

Other flagship products in the optics department are simulators of small arms sights, including types such as CKW, CWKW, PCS-5M and PCS-5M/1, the Leupold Mark44, Shmidt RH.450 and Shmidt RH.451, and binocular simulators used in the ŚNIEŻNIK combat training support system.



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Pneumatic Decoys

Lubawa S.A. ► p. 207

Decoys are designed to mislead an observer from actual targets and to misrepresent the information about the actual number of deployed forces. Decoys also function as targets for training operations and life fire exercises. The product presented shows the technological and construction possibilities available. Lubawa SA provides variety of options for decoys such as JELCZ 442.32, T-72, KTO ROSOMAK, BWP-1.

Various other forms may also be designed:

- Pneumatic decoys are used for simulation of actual equipment in the real battlefield environment as well as in a group consisting of decoys only.
- → The vehicle is based on a pneumatic frame.
- → The outer sheathing is made of masking fabric and the elements shaping the outline and details specific to the equipment of the vehicle are made of textiles, plywood and polyurethane foam.
- ➤ The inflatable decoy imitates the signature of the real object in the spectra of detection for visible, thermal, and radar.





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Prostokąt

SJCL-6P Driving Simulator for Leopard 2A4 Main Battle Tank

OBRUM Sp. z o.o. ► p. 213

SJCL-6P is a modern simulator developed by OBRUM for drivers of the LEOPARD 2A4 tank. Dedicated software allows to conduct exercises with various simulation parameters (e.g. traffic conditions, off-road terrain driving & ground driving, various climate zones and weather conditions, different seasons and day / night time). The simulator enables training of tank drivers in accordance with the requirements of the modern battlefield. The driver's compartment of the simulator has been reproduced with high fidelity, especially in aspects of control and diagnostic panels and observation / optical devices.

Base components of SJCL-6P include: the driver's cabin with visual system, instructor/operator station, motion platform (6DOF) to increase the level of immersion, hardware set with dedicated simulation software.

The platform with 6 degrees of freedom (6DOF) allows to reflect the displacements, tilts and accelerations of the simulated tank. Reproducing of realistic driving conditions is possible thanks to the simulation of overloads/accelerations and forces impacting the tank during movement.

In addition, dedicated software responsible for evaluation of simulation events and generation of virtual environment, is supplemented with spatial sound effects, ensuring a high level of training realism. The simulator enables training of operation of the driver's compartment mechanisms while driving in various terrain conditions (built-in database of several terrain maps). It allows training in the environment of asymmetric conflicts, recognizing potential threats and reacting in combat situations. The systems includes simulation objects, implemented

tactical tasks that could be assigned by the instructor in the form of repetitive exercise scenarios with use of databases that include built-in objects, maps and simulation events. It also includes simulation of predefined tank failures and damage, learning maintenance procedures performed by tank drivers.

The SJCL-6P simulator is equipped with HLA / DIS communication modules (compliant with NATO standards) that allow integration with other simulation systems.





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SOKOL Parachute Simulator

AIR-POL Sp. z o.o. ► p. 194

The Parachute Simulator SOKOL[™] is a high-performance e.sigma product for the entire spectrum of parachute operations training. SOKOL[™] is a holistic solution, which encompasses all functionalities of a jump, including HALO and HAHO jumps and all types of canopies, including reserves and troop parachutes aswellaspilot chutes.

SOKOL[™] was specifically developed for the multistage and comprehensive training of all parachute jumpers, from beginners right up to paratroopers and Special Forces. All the functionalities were developed in cooperation with instructors and professional jumpers.

Benefits

- -Modular. SOKOL[™]'s modular design and robust steel superstructure enables jumpers to train anywhere, as a single jumper or with a group of other trainees or virtual jumpers. It is also possible to integrate new regions or training locations at any time. Additionally, SOKOL™ is capable of cross-location networking and interfacing with third-party simulators.
- Realistic. All SOKOL[™] simulators feature realistic representations of environments, horizons and descent movements. SOKOL[™]'s extensive 3D geospecific visual databases offer a variety of different terrain options, serving as the basis for all types of exercise and mission planning.
- User-centric. Due to the advanced customization capabilities, it is possible not only to train in numerous terrains, different times of day and weather conditions, but also in realistic environments and mission specific locations, both alone as well as in a group jumping scenario.
- Secure. SOKOL[™] helps you acquire safe and accurate chute control, for a variety of chute and line related malfunctions. You can also practice evasive manoeuvres and collision avoidance, as well as training under stressful situation to help build confidence and calm during jumps.

Specification of SOKOL Parachute Training System

- Free Fall & Static Simulation:
 - Realistic suspension of the parachutist in an original sensor armed harness.
 - HALO/ HAHO training.
 - Fast calibration-free setup.
 - Wireless sensors for free fall steering.
 - 3D body movement simulation during free fall and static line.

- Exercise Creation & De-Briefing:
 - Recording and playback of the simulation for briefing/de-briefing.
 - Instructor station with interactive control over training scenario creation and running drill exercises.
 - Real-time observation and monitoring tool for instructor.
 - Communication system for the instructor and multiple trainees to communicate with each other during a jump simulation.







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- → Realistic Flight Experience:
 - Accurate parachute dynamics for various parachute types.
 - High resolution head-mounted display with high precision head sensor.
 - Ripcord/ hand/ static line or AAD activated deployment.
 - Realistic suspension during canopy ride.
 - Realistic canopy opening simulation with comprehensive malfunction simulation.
 - Steering with Risers.
 - Sound simulation for a realistic and immersive jumping experience.
 - Visual simulation of altimeter, compass and GPS.
 - Motorized force feedback system for all suspension and steering lines.
- → High Fidelity 3D Databases & Models:



- Different photo-realistic terrains and drop zones, and accurate 3D models.
- Option to integrate additional terrains / models.
- Realistic depiction of weather conditions and day /night setting for more holistic trainings.



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Training Simulators

Wojskowe Zakłady Uzbrojenia S.A. (WZU S.A.) ► p. 226



Modified Training Simulator 9F632.M1

Modified Training Simulator 9F632.M1 enables simultaneous training of 6 crews of anti-aircraft missile combat systems in a single virtual battlefield. The use of innovative electronic equipment provides top level training capabilities – the crew is trained with real equipment. The key element of the Modified Training Simulator 9F632.M1 is a new digital air situation imitator whose features include: generating air situation, managing flight parameters of flying objects, managing EW measures of flying objects, instructor supervision over crews in training and continuous communication with crews in training. The crews in training may also use targets generated by real data received from an external source e.g. radar.

Simulator of Anti-Aircraft Missile Combat Vehicle PRWB OSA (SA-8) based on VBS3 technology

PRWB OSA (SA-8) operating crew training to develop habits enabling effective air target engagement in various combat zone scenarios generated in virtual space.



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Wireless Control System WSB-04M for Battlefield Areas

Wireless control system WSB-04M with feedback is a part of the equipment of training facilities of the Land Forces Field Training Centres.

The system allows for radio control of executive devices in the simulation of a battlefield (battlefield figure lifts, moving targets, fire line crossing signals, short stop recorders, warning signals, shot imitators, etc.), providing control of 32 000 objects at the same time, which offers practically unlimited possibilities in controlling even the most complex systems operating on Tactical Exercise Belts, allowing WSB-04M systems to operate on adjoining objects.

AUTOCOMP MANAGEMENT Sp. z o.o. ▶ p. 197

The WSB-04/M is the only system in Poland used at the training facilities of the Polish Armed Forces, which enables complex control of executive equipment, including conducting exercises in Directing Fire in an Attack, in an automatic mode. The system carries out real-time control of the distance between combat vehicles and targets and automatically raises or lowers combat figures as well as activates moving targets, in accordance with the conditions programmed in the exercise by system operator and, most importantly, in accordance with the safety rules contained in the fifth chapter of the shooting training programme. This functionality is unique in its implementation exclusively due to the use of the WSB-04/M system.



SIMULATION AND TRAINING



SOLDIER UNIFORMS AND EQUIPMENT



EOD One Bomb Suit

Lubawa S.A. ► p. 207

Lubawa S.A. presents a technological breakthrough - the first Polish bomb suit EOD One is the one only design that protects against the overpressure wave. This, combined with the unprecedented, 360° protection, delivered by soft ballistics and the total of 9 hard ballistic plates, makes EOD One by far the safest EOD suit available. But there is more. EOD One is also the first suit integrated with a dedicated field support unit. The computer-based unit which is operated by another person, ensures communication and data transfer.

EOD One Suit:

- Protection against overpressure wave (joints be-→ tween elements of the suit are tight and prevent the overpressure from penetrating inside the suit)
- Proprietary helmet featuring a fan cooling system, → inflatable cushions, lights and a camera
- unit
- Quick release system,
- iacket

EOD One Support Unit:

- **→** Dedicated, computer-based unit handling two-way voice communication, digital data transfer (camera vision, graphical files, photos, etc.) and suit features (cooling, lights, cameras)
- EOD One Bomb Suit user has non-stop backup **→** from another member of the team
- 3 modes of connectivity: wireless, hybrid, wired →
- → Excellent solution for training activities
- Unlimited use of case scenarios field action, inci-**→** dent investigation, etc.



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SOLDIER UNIFORMS AND EQUIPMENT

HB-04 ballistic helmet

MASKPOL S.A. ► p. 208

MICH/ACH standard, made of high-tech ballistic materials ensuring optimal protection of the user. The helmet is equipped with the BOA[®] Fit System that ensures a smooth fit for various head shapes.



TECHNICAL SPECIFICATIONS:

- Ballistic resistance: shrapnel-proof V50 rating above 600 m/s for shrapnel of FSP 1,1g, bullet-proof - 357 Magnum JSP 10,2g (425±15) m/s and 9x19 mm FMJ 8,0g (360±15) m/s - according to PN-V-87001:2011,
- Available in 3 sizes (head circumference range 54 – 62 cm),
- Fully adjustable four-strap head harness,
- Size adjustable suspension system provides secure fit to the user's head circumference - available in 3 sizes,
- Made from high-tech ballistic materials,
- Helmet weight depending on size 1,3kg to 1,5 kg,
- Equipped with accessory rails and night vision goggle mounting bracket,
- Compatible with protective equipment: bulletproof vest, gas mask, eye protection, voice communication system with active hearing protection.

HP-05 ballistic helmet

MASKPOL S.A. ► p. 208

Helmet shell made in HIGH-CUT standard. Thanks to deep undercuts, the helmet is compatible with various hearing protection products.



Additional equipment is a masking cover with sewn tapes for attaching cables, and a pocket for a counterweight.

TECHNICAL SPECIFICATIONS:

- Ballistic resistance: shrapnel-proof V50 rating above 600 m/s for shrapnel of FSP 1,1g, bulletproof - 357 Magnum JSP 10,2g (425±15) m/s and 9x19 mm FMJ 8,0g (360±15) m/s - according to PN-V-87001:2011,
- Available in 3 sizes (head circumference range 54 – 62 cm),
- Fully adjustable four-strap head harness,
- Size adjustable suspension system provides secure fit to the user's head circumference - available in 3 sizes.
- Made from high-tech ballistic materials,
- Helmet weight depending on size 1,25 kg to 1,45 kg,
- Equipped with accessory rails and night vision goggle mounting bracket,
- Compatible with military equipment: bullet proof vest, filtering protective garment, gas mask, individual means of voice communication and eye protection devices.

SOLDIER UNIFORMS AND EQUIPMENT

Individual Anti-drone Systems The Antidrone Poncho

Miranda Sp. z o.o. ► p. 211

The Antidrone Poncho "Invisibility cloak" is an individual suit for a single soldier, in woodland variant, that provides perfect concealment in forest and steppe conditions. The use of modern material combinations enabled the creation of concealment in the most important detection ranges: VIS, NIR, and TIR, while maintaining user comfort. The outfit was designed as a direct response to increased activity of drones carrying thermal cameras. It effectively reduces thermal signature, thereby increasing the chances of survival on the battlefield.

The individual anti-drone systems are designed for individual protection of soldiers. They provide effective protection for soldiers in the visible near-infrared (night vision) and thermal range and effectively reduce thermal radiation.

Low weight and small dimensions do not burden the soldier's equipment. The camouflage suit is worn over the standard uniform and provides additional protection against environmental conditions. The elements used, such as reinforcements, pockets or zips, provide the necessary comfort.

Individual Anti-drone Systems Individual Winter Camouflage Suit

Miranda Sp. z o.o. ► p. 211

The individual camouflage suit in the winter variant provides excellent protection against detection in snowy conditions. The selection of specialised materials for the construction of the outer layer of the camouflage suit and the applied camouflage print significantly affects the parameters of concealment among snow-covered vegetation. Innovative material solutions enable protection from detection in all major detection wavelengths, UV, VIS, NIR and TIR, while guaranteeing user comfort.

Individual anti-drone systems are designed for individual protection of soldiers. They provide effective protection for soldiers in the visible near-infrared (night vision) and thermal range and effectively reduce thermal radiation.

Low weight and small dimensions do not burden the soldier's equipment. The camouflage suit is worn over the standard uniform and provides additional protection against environmental conditions. The elements used, such as reinforcements, pockets or zips, provide the necessary comfort.



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KKZ SG-01 bullet-proof vest

MASKPOL S.A. ► p. 208

Standard plate carrier used to carry STAND ALONE hard ballistic plates and other necessary equipment. The ballistic package consists of four hard bulletproof plates providing user protection at the K3 AB level according to the PN-V-87000: 2011 standard, i.e. bullet puncture resistance: 7.62x39 mm, bullet type: PS; 5.56x45 mm, bullet type: SS109.

Lightweight Flame-retardant Fragment-proof Suit

Lubawa S.A. ► p. 207

A light version of an EOD Suit designed for reconnaissance tasks and various specialized missions (e.g. working in environments with high risk of explosions). The Lightweight Flame-retardant Fragment-proof Suit, resistance class acc. to PN-V-87000:2011, is worn on overgarment and/or TYPE-3 chemical protective suit

Features:

- → The suit is composed of a vest with attached adjustable sleeves and trousers,
- → Front, shoulders, and back of the vest have MOLLE/PALS bands sewed in,
- The vest has a rescue grip on the back at shoulder level,
- The bottom of the back has in-built 'comfort pads' to protect the spine and the back,
- → Additional reinforcing pads on elbows,
- Velcro pads in front, back, and shoulders for attaching badges,
- → The trousers are equipped with a system of suspenders with buckles, adjustable length,
- → Additional reinforcement on knees,
- Two-stage adjustment of legs with horizontal zipper bands,
- → MOLLE/PALS bands sewed in at the front and on the back,
- → Suit leg bottoms have a system of 5 cm wide fluorescent and reflective bands,
- → Ballistic inserts in trousers are protected against shifting with sewed-in velcro bands.



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Modular Bulletproof Vest MKO 2.0

Lubawa S.A. ► p. 207

The exact ballistic resistance depends on the configuration of the vest and can correspond to international standard NIJ IV, NIJ IIIA etc. The full assault configuration provides a maximum protection level. The key benefit



of the MKO 2.0 bulletproof vest is state-of-the-art design that allows for a very wide scope of customization, based on mission requirements. The individual components of the vest ensure the maximum freedom of configuration without the unnecessary hustle of extra equipment.

FEATURES:

- → A sleek, comfortable design ensures the maximum freedom of movement and customization to mission-specific requirements
- → Rapid donning on/off and easy adjustment to the shape and size of the user's torso
- → A wide range of circumference and length adjustment
- → Modular design
- → Manufactured of a polyamide fabric and a highstrength polyamide laminate, Panther Khaki camouflage pattern ver. 93

SET CONFIGURATION OPTIONS

- → Lightweight Plate Carrier designed for the ultimate mobility, up to 4 hard ballistic plates (front and rear plates + two side plates),
- → Modular Overt Vest designed to carry two soft ballistic inserts (front and rear) and two side hard ballistic plates,
- → Covert Vest two soft ballistic inserts (front and rear),
- → Chest Rig with Braces designed for high mobility tasks, which require the user to carry additional equipment,
- → Waist Belt with Braces designed for high mobility tasks, which require the user to carry additional equipment,
- → Full Assault Setup this configuration is designed for operations requiring the maximum ballistic protection.

MODULAR BULLETPROOF VEST MKO 2.0 – BALLISTIC RESISTANCE

Class K4 SA* according to PN-V-87000:2011 – 7.62x39 mm BZ (armor-piercing incendiary bullet with a 62+/-2 HRC steel core, weight 7.7 +/-0.1g and impact velocity 735 +/-15 m/s)

FRONT / REAR plate resistance: 3 shots

SIDE plate resistance: 1 shot

*SA (STAND ALONE) – The plate provides the declared ballistic resistance WITHOUT the need of applying a soft ballistic insert or a trauma pad

Class K2 according to PN-V-87000:2011 – (7.62x25 TT bullet; weight 5.5 g; impact velocity 420 +/-15 m/s)

Class 02 according to PN-V-87000:2011 – (1.1 g fragment; 525 <= V50 < 600 m/s)

Resistance to combat knife, e.g. design ver. 92 with impact energy 25 J and allowed penetration of 7 mm

Hard Ballistic Plate (FRONT/REAR/SIDES)

Soft ballistics rear Soft ballistics front Soft ballistics – arm guard Soft ballistics – groin cover Soft ballistics – loins cover Soft ballistics – collar

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MP-6 gas mask MASKPOL S.A. ► p. 208



MP-6 gas mask with a combined filter is designed to protect against harmful effects of chemical warfare (CW) a gents, toxic industrial and radioactive substances and biological agents. The mask meets the requirements of the civil standard PN-EN 136:2001 and the defence standards NO-06-A107 and NO-A2014:2005.

- → FACIAL PART: Made of anti-allergic rubber in 3 sizes for a better fit.
- → VISIOR: Two polymer glasses with impact-resistant properties (V=215 m/s) with the possibility of mounting additional adapters for corrective lenses.
- → SOUND CHAMBER: A sound system with a diaphragm enabling conversation.
- → HYDRATION SYSTEM: Allows for the intake of fluids in a contaminated area.

MT-1 THERMAL IMAGING MONOCULAR

PCO S.A. ► p. 214

MT-1 is one of the lightest, and smallest, thermal imaging devices in the world. Despite the compact design, it provides excellent image quality. MT-1 might be deployed as a standalone, hand-held observation system or as a module attached to the MZN-1 NVG. MT-1 is also compatible with all of the MU-3M monocular accessories for increased functionality.



MU-3ADM MODULAR NIGHT VISION GOGGLE SYSTEM

- System consists of two, reliable MU-3M monoculars of perfect quality, compact size, and high image resolution
- The user may rotate each of the monoculars individually, or simultaneously as goggles, stowing them on helmet
- Automatic shut-off, for each monocular, when stowed upwards
- Weight: goggles + bridge 630 g



PCO S.A. ▶ p. 214



ROCK one bullet-proof vest MASKPOL S.A. ► p. 208

Integrated vest for carrying soft and hard ballistic inserts. Made in laser cut technology using Cordura[®] laminate. The weight of the vest – from 2 to 5 kg, depending on the ballistic package used. Depending on the user's needs, the vest can be additionally equipped with shoulders, abdomen and lower spine covers, as well as with a ballistic collar.

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WEAPONS SYSTEMS, AMMUNITION AND EXPLOSIVES



Anti-tank weapon RPG-76 KOMAR

Zakłady Sprzętu Precyzyjnego NIEWIADÓW Sp. z o.o. ► p. 229

The RPG-76 "KOMAR" single-use, light anti-tank grenade launcher is distinguished by a very low weight, simple structure, easy operation and compact dimensions. The advantage – compared to some RPG grenade launchers – is also safety: in the combat position, hitting the top of the warhead does not cause an explosion.



Combat Modules for Tactical Warheads

Jakusz Sp. z o.o. ► p. 206

Combat Modules for Tactical Warheads

- combat modules for tactical warheads adapted for drones and combat UAVs
- → high explosive modules TERRA
- → thermobaric modules IGNIS

Purpose

Combat modules can be part of warheads integrated with virtually any carrier, provided the mechanical, electrical and IT integration requirements are met. Type of warhead, type of target, effective blast radius, type of explosive, type of agent of destruction, weight of module are selected according to individual needs of the Purchaser. **Impact force**

The design of the modules allows to flare lightly armoured targets, live force and fortified points.

Technical parameters of modules – in accordance with Client's individual requirements.



Example of Modules Parameters

Field tests to confirm the impact force of combat modules

HIGH EXPLOSIVE MODULES	THERMOBARIC MODULES
Configuration I	Configuration I – TGAF
$40\% \pm 5\%$ TNT/ $60\% \pm 5\%$ RDX	
930 g	900 g
235 g	650 g
\pm 1,1 %	± 2,5 %
100,5 mm	100,5 mm
90,0 mm	90,0 mm
	HIGH EXPLOSIVE MODULES Configuration I 40% ± 5% TNT/ 60% ± 5% RDX 930 g 235 g ± 1,1 % 100,5 mm 90,0 mm

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WEAPONS SYSTEMS, AMMUNITION AND EXPLOSIVES

Filling of Ammunition Ammo Filling Lines / Special Chemical Installations

Jakusz provides high quality filling with explosive materials of the following types ammunition:

- → mortar ammunition, e.g. 82 mm, 120 mm;
- → artillery ammunition, e.g. 122 mm, 152 mm, 155 mm;
- → tank ammunition, e.g. 120 mm;
- → engineer ammunition;
- → tactical warheads for drones: HE and thermobaric modules.

Cast charges performed in various sizes and weights (from several hundred grammes to several kilograms). We can design a dedicated charge as per customer's requirements.

The shell / warhead can be filled with such explosives as: TNT, Composition B, thermobaric mixtures.

Jakusz also designs and performs technological lines for production of:

→ ammunition (artillery, tank, mortar, engineer), warheads for drones, aerial bombs and mines; ammunition components such as explosives (TNT, RDX, HMX), propellants (HTP, DMAZ), binders (HTPB, CTPB), plasticizers and others.

Jakusz Sp. z o.o. ► p. 206

We have a wide experience in application of cast method by performance of various types of cast charges. Our technology ensures the highest homogeneity of the final product and repetitive ammo production;

The above turn-key production lines can be offered in stationary or transportable (containerized) versions;

Line capacity is adapted to the customer's needs (from laboratory up to technical scale);

JAKUSZ offers universal set of equipment manufactured according to the EU standards, meeting the highest safety requirements (remote control, safety zones).







FILLING SERVICES

Zakłady Chemiczne "Nitro-Chem" S.A. ► p. 227

"NITRO-CHEM" offers a wide range of filling services. Owned lines for filling services:

- → Line for casting of TNT, RDX, HMX, NTO or their compositions
- → Line for screw filling of projectiles with TNT in calibers from 80 mm to 155 mm
- Line for making pressed charges for military and commercial use

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WEAPONS SYSTEMS, AMMUNITION AND EXPLOSIVES

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HEXOGEN (RDX)





Hexogen is one of the most powerful blasting explosives. It is widely applied as a military explosive both individually (in form of different charges) and as a component of many explosive compositions. After mixing it with RDX plasticizers and other ingredients, plastic explosives are formed. Used, inter alia in HEAT charges and reactive armor.

Compositions:

- → Hexogen phlegmatized with compositions waxes type A-IX-1
- ➤ Composition A3
- Composition A4
- ➤ Composition A5
- Hexogen phlegmatized with compositions waxes
- → Heksogen phlegmatized with Viton
- → Composition B

LMC-2021 60 MM Light Infantry Mortar

The only mortar on the market that allows to fire projectiles up to 2.2 kg while ensuring the guaranteed durability of the barrel at the level of 2000 shots

Equipped with a built-in programmable digital sight with the display of the distance to the target and display of angular values



With the high range and high fragmentation of the projectile, the mortar fire provides effective support to the fighting units under optical visibility in all weather

Zakłady Mechaniczne "Tarnów" S.A. ► p. 228

conditions, day and night Designed to fire 60 mm MAPAM (Mortar Anti-Personal Anti-Material) ammunition with a propellant charge I (Charge 1) by SAAB Bofors Dynamics or 60 mm rounds with a caliber compliant with the STANAG 4425 ed. 2 of any manufacturer



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WEAPONS SYSTEMS, AMMUNITION AND EXPLOSIVES

LMP-2017 60 mm Light Infantry Mortar

The LMP-2017 60 mm light infantry mortar, a direct support firearm, is designed to have a destructive kinetic impact on enemy combat systems. Thanks to its significant range and high fragmentation of the missile, mortar fire provides effective support to fighting sub-units in conditions of optical visibility in all weather conditions, both day and night. The steep trajectory of the missile and the small size of the mortar in the firing position make it possible to hit targets with semi-indirect fire, i.e., observed from the firing position.

The LMP-2017 is suitable for temperate, cold, and dry and humid tropical climates and meets the requirements of group N.14-O-II-A according to NO-06-A101÷103:2005. LMP-2017 operating temperature ranges from -40°C to +55°C. Storage temperature from -60°C to +70°C.



Zakłady Mechaniczne "Tarnów" S.A. ► p. 228

The minimum endurance of the LMP-2017 is 1,500 shots which gives it an advantage over other designs. An additional distinguishing feature of the mortar is the number of rounds fired with uninterrupted fire – 30.

The following projectile types are used for the LMP-2017 light infantry mortar:

- → O-LM60 60 mm mortar projectile with fragmentation shell
- → S-LM60 60 mm mortar projectile with illuminating shell
- → O-LM60N (M60-HE) 60 mm mortar projectile with fragmentation shell.



M107 155 mm Artillery Ammunition Zakłady Sprzętu Precyzyjnego NIEWIADÓW Sp. z o.o. > p. 229

The 155 mm ammunition is intended for destroying targets or temporarily slowing down the movement of enemy forces, destroying stationary targets, places with a large concentration of infantry, field covers, lightly armored targets, weapon systems, military and transport

equipment, etc. The impact of the projectile on the target is carried out by the kinetic energy of fragments of the metal parts of the shell and the shock wave of the explosive charge.

WEAPONS SYSTEMS, AMMUNITION AND EXPLOSIVES

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MR-123

Bydgoskie Zakłady Elektromechaniczne BELMA S.A. ► p. 197

Manually laid anti-tank mines MR-123 are designed to eliminate armoured vehicles and military means of transport.

The MR-123 mine is equipped with a double-acting cumulative charge and a non-contact fuze with self-destruction and auto-neutralisation functions. The mine activates under armed vehicles passing over it or after the programmed period of self-destruction or self-neutralisation. The mine has two security devices.

The MR-123 mine is available in three versions: combat version MR-123, drill version MR-123/C and mock-up version MR-123/O. The drill versions are designed to train miner teams in laying classical mine fields.



Specifications

Weight Dimensions dia./height Type of charge RHA penetration capacity [mm] Type of fuze SD self-destruction SN self-neutralization CCW Convention requirements 3.7 kg
167/90 mm
EFP HEAT, double-acting
60 mm RHA PLATE
Magnetic, delayed or immediate
Programmable
Yes
It has a self-destruction, self-neutralisation function, and it is detectable

MSBS GROT GROT Modular Firearm System





A modern rifle manufactured to the quality standards used for military products. The GROT is a automatic assault rifle, gas operated with short-stroke gas piston system.

The GROT is equipped with a mounting rail integrated into the receiver, in accordance with STANAG 4694 (Picatinny) standard, on which different variants of sights (mechanical and optoelectronic) can be mounted. The rifle has a bed that allows various accessories to be mounted using the M-LOK system. The rifle is supplied from AR-compatible magazines, excluding P-Mag 3rd Gen magazines. The rifle is equipped with:

- a fluted barrel with lengths of 10.5 inches, 14.5 inches, 16 inches
- ➤ a modular bed in the M-LOK system with detachable thermal covers
- → a front grip
- → a pistol grip
- → a telescopic stock with 4 degrees of length and a height- and angle-adjustable cheek rest
- → a flash suppressor with a locknut, mountedwith ½-28 thread (can be changed to an AR-compatible solutions).

The rifle stands out thanks to its highly ergonomic design. It is fully adapted for right- and left-handed shooters, as all the operating controls are symmetrically located on both sides of the weapon (bolt catch, magazine release, charging handle). The user can quickly change the direc-

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in a second s
tion of shell ejection to the left or right, using tools from the toolbox.

The modular design enables a range of design solutions to be created based on base elements, i.e., the barrel assembly, receiver assembly, bolt carrier group. Rapid modification of the weapon by the end user as required. The Grot rifles are sold to export markets, both to typical military users and civilian users. They are also used by special forces. The new design had a successful baptism of fire during the war in Ukraine.



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MWS Modular Weapon System

Zakłady Mechaniczne "Tarnów" S.A. ► p. 228

The ZMT MWS-25 (SKW.308) is a modular semi-automatic sniper rifle manufactured by Zakłady Mechaniczne "Tarnów" S.A. It has been designed to meet the rigorous demands of the modern battlefield. The rifle has a modular design, it's ergonomic and adapted to both right- and left-handed shooters, adapted for use with a silencer and a folding stock. The rifle comes with barrel lengths from 13" to 20" in 308 WIN and 6.5 Creedmoor calibres. The rifle is dedicated to both institutions and sport shooters.

The MWS-25 operates by way of gas discharge through the side opening of the barrel. Powder gases act on the shortstroke gas piston. The gas unit is equipped with an adjustable 4-position gas regulator, thanks to which the rifle can be used with silencers. The design features a safety lever duplicated on both sides of the barrel, magazine release buttons, and mobile assembly release lever. The rifle components and parts are fully interchangeable and its ergonomics is identical to that of the AR15/HK416 rifles. The rifle's barrel can be easily changed, so the user can easily swap it for one with a different length or calibre. The bed assembly can be offered with two mounting systems: M-LOK or KeyMod. Depending on their set-up, rifles can be fitted with a hinged backport that allows the stock to be folded to the right side of the receiver.

The MWS family also offers the ZMT MWS-15 carbine chambered for 5.56x45 NATO (.223 Rem) ammunition. Semi-automatic and selective-fire versions are available with various barrel lengths. It is possible to make a carbine for a different ammunition, e.g. .300 Blackout.



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OCTOGEN (HMX)



Zakłady Chemiczne "Nitro-Chem" S.A. ► p. 227

Octogen is one of the most powerful series-manufactured blasting explosives. It is applied as a military explosive both individually (in form of different charges) and as a component of explosive compositions.

Compositions based on octogen (HMX)

- → Compositions of octogen with trinitrotoluene,
- Octogen phlegmatized with compositions waxes,
- → Octogen phlegmatized with Viton,
- → Octogen phlegmatized with Viton 10%

Recoilless Anti-tank Missile Launcher RPG-75-M

Zakłady Sprzętu Precyzyjnego NIEWIADÓW Sp. z o.o. > p. 229



The RPG-75 M is a recoilless launcher with an armor-piercing projectile, designed to combat tanks and armoured structures. The weapon has a telescopic design.

Length in transport position is only 630 mm.

Length in firing position is 890 mm

RPG-75 M is able to destroy objects with 300 mm armor from a range of 300 m.

Recoilless Launcher for Thermobaric-cumulative Missiles RPG-75-MP

Zakłady Sprzętu Precyzyjnego NIEWIADÓW Sp. z o.o. ► p. 229

The RPG-75-MP dual-purpose recoilless launcher fires a thermobaric / cumulative projectile. The dual purpose of the projectile is achieved by forming the thermobaric explosive into a cumulative charge. The thermobaric cumulative charge is activated by impact fuze with a self-destruct mechanism.

The RPG-75-MP is designed to combat armoured vehicles (cumulative effect), hardened targets (cumulative

and thermobaric effects) and enemy personnel (thermobaric effect).

The weapon has telescopic design.



Recoilless Thermobaric Missile Launcher Zakłady Sprzętu Precyzyjnego NIEWIADÓW Sp. z o.o. > p. 229

The RTG is a recoilless launcher firing a thermobaric projectile, designed for destroying bunkers and other field fortifications. The sighting device has been designed for precise firing at the range of 300 m with temperature compensation. The RTG has a telescopic design.

Length in transport position is only 630 mm. Length in firing position is 890 mm.

Operation of the weapon is very simple, the instructions for use are placed on the launcher's tube. The training version of the launcher – RTG-Sk is designed for teaching basic operation, aiming and manoeuvring. The practice version of the launcher – RTG-Nh (Projectile filled with inert material) is designed for practicing accurate shooting.

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RGP-40

Zakłady Mechaniczne "Tarnów" S.A. ► p. 228

Six rounds cylinder capacity. Compatible with 40 x 46 mm and 40 x 51 mm NATO grenades. Fully ambidextrous. Adjustable stock. The RGP-40 grenade launcher is intended for fighting and disabling ground targets and opponent's facilities including its infrastructure as well as for fire support of military units during combat operations. RGP-40 is also adapted for left-handed shooters. Its effectiveness and advantages have been confirmed on the battlefield.



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The RGP-40 is an individual six-shot revolver-type semi-automatic grenade launcher in which the following types of ammunition can be used:

- → fragmentation (FRAG),
- → target practice /TP with Tracer (TP),
- → practice marker/ with tracer,
- → smoke (SM) (tactical ammunition),
- → smoke with fuze (tactical ammunition),
- → incendiary (INC) (tactical ammunition),

- → illumination (ILLUM) (tactical ammunition),
- → rubber bullet (stun ammunition),
- → ball cartridge (stun ammunition),
- → flashbang (stun ammunition).

The grenade launcher is equipped with a tactical buttstock and two-position inclination angle adjustment. Sight can be mounted on the universal mounting rail. Three rails mounted on the barrel shield allow for mounting additional accessories.



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SHAPE CHARGE

Military Institute of Armament Technology ► p. 211 Zakłady Sprzętu Precyzyjnego NIEWIADÓW Sp. z o.o. ► p. 229

The Shaped Charge is a combat means which is designed to perform engineering work, destroy/damage military equipment, neutralize explosive objects, as well as to conduct unconventional activities (preparing IED).

The advantage of the Shaped Charge is its simple construction and effective impact on objects made of various materials (steel wood, concrete).

The way in which USC is designed guarantees complete safety of the user. USC can be handled safely by a soldier with only basic training in military engineering.

The charge performance stays unaffected after thermal or mechanical shocks.

TYPE 1 Shape Charge

- → total mass: 811,6 g;
- → dimensions: 93 x 168,5;
- → mass of explosive: approx.350 g;
- minimum penetration thickness of the armor plate: 180 mm;
- → Initiation by:
 - electric primer;
 - powder cords;
 - shock tube system;
- → casing: plastic.

TYPE 2 Shape Charge

- → total mass: 1026,4 g;
- → dimensions: 100x80x166,5;
- → mass of explosive: approx. 350 g;
- minimum penetration thickness of the armor plate: 180 mm;
- → Initiation by:
 - electric primer;
 - powder cords;
 - shock tube system;
- → casing: plastic.







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SPPŁW Controlled Anti-Tank Anti-Vehicle Mines

Bydgoskie Zakłady Elektromechaniczne BELMA S.A. ► p. 197

The SPPŁW mines are designed to combat vehicles, armoured transporters and truck/off-road vehicles.

The off-route SPPŁW mine is equipped with an acoustic-thermal non-contact fuze capable of detecting the presence of military vehicles in the mine blast zone. Its EFP combat head used is capable of effectively hitting targets at a distance of several tens of metres (2-50 m), and stopping vehicles travelling in the mine blast axis.

The mine may be used for protecting national borders, defence, delaying operations, covering the withdrawal of own troops, shielding objects, such as command stations in troop deployment areas and diversification activities.

Due to its small size and weight (7 kg) two mines may be carried in a backpack and laid in the battlefield by one person in less than 5-6 minutes.

The mine can operate automatically or under operator supervision. The automatic mode is provided by the version without the authorisation key.

Specifications:

Weight Dimensions (length/height/width) RHA Penetration Power supply MW type Type of fuze Irremovability Self-destruction Self-neutralization Mode of operation Sensors Target selection 7 kg 30/18/15 cm 60 mm - at a distance of 2 to 50 metres Battery Composition B Non-contact YES Programmable YES Automatic/supervised (MITL) Acoustic; thermal YES, the possibility of attacking consecutive or selected targets in column, from 1 to 9 objects,

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Tactical Heads for Unmanned Aerial Vehicles

Bydgoskie Zakłady Elektromechaniczne BELMA S.A. ► p. 197

Tactical heads are designed to combat lightweight armoured tanks and transporters, as well as shooters, machine-guns and resistance points.

The heads are configured for integration with Unmanned Aerial Vehicles (UAV). The integration is carried out in terms of: mechanical, electrical, functional and IT aspects, ensuring proper exchange of data and signals between devices. A UAV equipped with tactical heads enables the monitoring of the foreground, guiding and carrying out combat and drill fire tasks. The assembly and handling are performed by one operator. The heads are available in HE, HEAT, thermobaric, drill and mock-up versions. Each of the heads may be set and dismantled repeatedly during the flight, ensuring that the mission can be cancelled, interrupted or changed at any time. The heads may also be detonated at any time at the discretion of the operator.

Specifications	High Explosive head GO-1 DG HE	High Explosive Anti Tank head GK-1 DG HEAT	Thermobaric GTB-1 DG FAE	Training GO-1 DG HE-TR
Head weight	1000 g	1000 g	1000 g	1000 g
MW type	A-IX-1	OCTOGEN	TBX	INERT
Striking/piercing range	30 m	200 mm RHA	10 m	
Diameter	62/72 mm			
Length	185 mm			
Power supply	12 V			
Daytime camera resolution	640 x 480 pix			
Centre of gravity	93,5 +/- 2 mm			

GX-1 DG HEADS

GX-1 TYPE HEADS

Specifications	High Explosive head GO-1 HE	High Explosive Anti Tank head GK-1 HEAT	Thermobaric GTB-1 FAE	Training GO-1 HE-TR
Head weight	1450 g	1450 g	1450 g	1450 g
MW type	A-IX-1	OCTOGEN	TBX	INERT
Striking/piercing range	12 m (30 m)	180 mm RHA	10 m	
Diameter	98/122 mm			
Length	210/226 mm			
Power supply	12 V			
Daytime camera resolution	640 x 480 pix			
Centre of gravity	67.5 +/- 2.5 mm			

GX-2 TYPE HEADS

Specifications	High Explosive head GO-2 HE	High Explosive Anti Tank head GK-2 HEAT	Thermobaric GTB-2 FAE	Training GO-2 HE-TR
Head weight	4800 g	4800 g	4800 g	4800 g
MW type	COMP-B	OCTOGEN	TBX	INERT
Striking/piercing range	50 m	700-800 mm RHA	50 m	
Diameter	140/150 mm			
Length	260/280/305 mm			
Power supply	12 V			

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TNT





Zakłady Chemiczne "Nitro-Chem" S.A. ► p. 227

TNT IN FLAKES

Blasting explosive widely applied for filling of artillery missiles, mines and other military applications as well as for production of industrial explosives e.g. boosters, demolition charges

TNT IN SOLID PIECES

Blasting explosive applied for production of cast charges. Usage of TNT in solid pieces improves the density of the cast charge and eliminates the risk of cavities which degrades the quality of the charge.

Compositions:

TNT+HNS: 99,5% TNT, 0,5: HNS

UKM 2020S General Purpose Machine Gun

Zakłady Mechaniczne "Tarnów" S.A. ► p. 228

The 7.62 mm UKM 2020S general purpose machine gun is fed with 7.62×51 mm NATO ammunition from an M13 disintegrating belt. It is designed to combat living force, firing assets, technical equipment, in any terrain and under

any meteorological conditions, both day and night. The latest version of the rifle has been developed to improve reliability and durability as well as ergonomics.



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The latest version of the UKM has been developed to reduce the size as well as the weight of the machine gun while maintaining its reliability and durability. The machine gun uses a shortened 440 mm barrel, a left-folding plastic stock and a bipod. The bipod height is adjustable and it can be folded forwards as well as backwards. The rifle is fitted with a mounting rail integrated into the receiver cover and a minimalist mechanical sight with a single setting, plus three mounting rails on the gas tube guard for the attachment of a bipod and accessories.





UŁK Universal Shaped Charge



The UŁK universal cumulative charge is designed to make a single firing shelter in hard and frozen ground by means of explosive action.

The composition of the UŁK includes:

- → one UŁK cumulative charge made of two pressed bricks made of A-IX-1, one booster and a cumulative liner, placed in a plastic housing
- → two charges of PMW plastic explosive
- → one holder and friction igniters
 - The cumulative charge may be initiated by a powder fuse or an electric igniter.



VIS 100 Cal. 9x19 mm The Semi-Automatic Pistol

Fabryka Broni "ŁUCZNIK" – Radom Sp. z o.o. ► p. 202

The 9 mm semi-automatic pistol has been designed in Poland for military and law enforcement personnel. Due to its modern design it can be carried with a chambered round in completely safe, accelerating the firearms response to a scenario. The pistol is an ergonomically shaped, reliable and fast-pointing. It features high-contrast day-and-night sights and high-capacity magazine; and it is also fully ambidextrous. The Tenifer metal coating assures maximum protection of the metal parts against abrasion and corrosion – as well as at-tractive looks. The frame feature a mil-std 1913 (Picatinny) compatible rail, enabling attaching tactical lights or laser sighting equipment.





Technical data:	
Calibre:	9 x 19 mm
Trigger system:	Single Action / Double Action
Trigger pressure:	25N (SA) / 50N (DA)
Trigger path:	~ 7 mm (SA) / ~ 14 mm (DA)
Magazine capacity:	15 rounds
Dimensions:	
Height:	136 mm
Length:	193 mm
Width:	34 mm
Barrel length:	110 mm
Sight length:	156 mm
MASS:	
Weight without magaz	zine: 695 g

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ZSMU

Zakłady Mechaniczne "Tarnów" S.A. ► p. 228



ZSMU is a remote controlled weapon station family providing the vehicle/infrastructure crews/personnel with 360-degrees observation to protect against direct engagements, with minimized threat for the operator, in any terrain conditions, regardless of weather conditions, season, and time of the day.

- → One-person control
- → Modular design
- → Easy maintenance/replacement/reloading of the weapons





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COMPANIES

AIR-POL Sp. z o.o.

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Design, production, research, sale and delivery of military and civilian use parachutes and high-altitude rescue equipment, comprehensive maintenance of parachute and Automatic Activation Devices.

Design and delivery of devices supporting the parachute training process, including jumping and open canopy flight simulators.

The most important achievements

- → Supporting Member of PIA (Parachute Industry Association)
- → Member od National Aviation Council the Association of Polish Aviation Industry
- → Holder of ISO 9001-2015, AQAP 2110.2016, Certificate in design, production and operation on parachute equipment, Combined Airworthiness Organization Certificate, Production Organisation Certificate, NATO Commercial and Government Entity Code NCAGE Certificate

Key Products and Services

- → Basic Parachute Main an AD-95 series 3, Basic Parachute Reserve AZ-95 series 3
- → Operational Parachute AD-2000
- → Sport Parachute FENIKS S/F
- → High Altitude High Opening Parachute System FENIKS MILITARY G9
- → Supplier of Parachute Training Simulator SOKOL M
 - AD-2000 Parachute System ► p. 118
 - DEDAL (AD-95s.3 AZ-95s.3) series 3 Parachute System > p. 121
 - Feniks Future Parachute System > p. 122
 - Feniks Military G-9 Parachute System ► p. 123
 - Feniks S Parachute System ► p. 124
 - SOKOL Parachute Simulator ► p. 160

AMZ-KUTNO S.A.

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AMZ-KUTNO S.A. is a leader in the production of speciality vehicles and conversions based on commercial vehicles, operating since 1999.

It specializes in providing vehicles for the medical sector, uniformed services, value transport, and the army.

It offers ambulances, speciality vehicles, armoured transporters and other customized solutions, combining the latest technologies with an individual approach to projects.

AMZ-KUTNO S.A. is known for its high quality, innovative approach and enjoys recognition on both domestic and international markets.

The most important achievements

- → Economic Award for the year 2021 in the Family Business category from the President of Poland, Andrzej Duda
- → State Security Leader Award 2022 for the LOTR vehicle
- → Defender LOTR 2022
- Main services and products (approved for export)
- → BÓBR 3
- → TUR VI
- → ŻUBR
- → Armoured vehicles such as: Jeep, Toyota land cruiser, etc.
- → 4-stretcher ambulance
- → Police vehicles

■ BÓBR – A modern 4x4 amphibious armoured vehicle > p. 61

■ TUR VI ► p. 73

AP-FLYER

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The company was founded in 2007. Initially, it provided air services and VIP transportation. We create professional solutions for specific needs.

Presently we offer modern products and advanced technologies in the field of IT, telecommunication, EMC, security and biometrics which are intended for business, uniformed services and industry:

- → MADDOS multi-sensor automatic drone detection and neutralization system; mobile and stationary systems for detection, monitoring, warning, identification and neutralization of drones; can be used in all conditions for protection of borders, airports, government and industrial facilities.
- → MADDOS UAV Unmanned aerial vehicles in fixed-wing VTOL configuration (vertical take-off and landing) for surveillance, reconnaissance and rescue missions. Flight time up to 10h with capability of carrying up to 25 kg of payload. Equipped with multiple sensors like EOIR gimbal cameras, advanced navigation systems, IMSI catcher and many more.
- MILBOOK military mobile notebooks, rugged tablets and intelligent Tactical Solutions systems for use in combat vehicles.

The company has got the following certificates: ISO 9001:2015 and WSK (Internal Control System).

The most important achievements

- → We know how to neutralize drones that perform reconnaissance flights or are a threat to security
- → Dozens of system installations completed around the world
- → Innovative and unique solutions

Key Products and Services

- → VTOL UAV 600h surveillance drone
- → VTOL UAV 350e surveillance drone
- → Mobile jammers
 - MADDOS (Multi-sensor Automatic Drone Detection & Observation System)
- MADDOS (Multi-sensor Automatic Drone Detection & Observation System) ► p. 29
- Mobile jammers: Handheld jammer (Handheld-8 Drone C-UAS) ▶ p. 35 Manpack jammer (Manpack-8 Drone C-UAS) ▶ p. 35
- MADDOS VTOL Vertical take-off and landing UAV VTOL 600h ► p. 30 VTOL 350e ► p. 30

Advanced Protection Systems S.A.

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Advanced Protection Systems (APS) is a fast-growing Polish high-tech company, founded by two scientists: Maciej Klemm PhD and Radosław Piesiewicz PhD.

APS develops the groundbreaking FIELDctrl 3D MIMO radars and, based on these radars, the SKYctrl anti-drone system, which effectively detects, tracks, classifies and counteracts unmanned aerial vehicles (UAVs). In addition, the use of ML algorithms makes it possible to automatically distinguish between birds and drones.

FIELDctrl and SKYctrl have been developed entirely in Poland, and are the intellectual property of the company. With a team of over 150 technology, military and business experts, scientists, engineers and programmers, Advanced Protection Systems independently designs, manufactures and implements every component of the technology antennas, electronics and mechatronics as well as software, assembly, testing and final implementation. APS also provides network-centric software (CyView C2). Any sensor or effector can be integrated. APS is flexible – it is not limited to specific solutions as it develops technologies in-house.

Our solutions are designed to protect human lives, military assets, and critical infrastructure in strategic locations. Worldwide, SKYctrl protects critical national infrastructure such as refineries, airports and seaports as well as military bases and government buildings from drone threats. APS is also a strategic supplier of SKYctrl systems to the Polish Armed Forces. The cooperation with the Polish Armed Forces was preceded by a series of rigorous tests aimed at selecting the best technology and CUAS system to protect Poland from drone threats. SKYctrl systems are also being supplied to the Ukrainian Armed Forces to defend against all classes of drone threat, including the Shahed 136. The adoption of SKYctrl by the Polish Armed Forces as well as the Ukrainian Armed Forces provides credible evidence of SKYctrl's role in protecting the airspace in conflict zones or in peacetime.

APS has won many prestigious awards, including the President of the Republic of Poland's International Achievement Award, the Armed Forces Operational Command Award at the 30th International Defence Industry Exhibition (MSPO 2022) in the Force Protection category for the SKYctrl container system, and the Defender Award at MSPO 2018. Key achievements:

- → Polish Armed Forces SKYctrl is used in the Integrated Air Defence System
- → Avinor, Norway protection of Stavanger Airport
- → SKYctrl systems are in service with the Ukrainian Armed Forces in support of the fight for independence

Key products and services:

Advanced Protection Systems has developed several versions of the FIELDctrl 3D MIMO radar and the SKYctrl system to meet the different expectations and needs of its partners:

FIELDctrl 3D MIMO radars:

- → Advance
- → Range
- → Runway

SKYctrl anti-drone system: SKYctrl S

- → SKYctrl L
- → APS&MSI DS-MSI-DS TERRAHAWK PALADIN

- → Ultra
 - FIELDctrl 3D MIMO Radars Advance, Follow, Range, Runway and Ultra ► p. 140
 - MSI-DS TERRAHAWK PALADIN ► p. 142
 - SKYctrl L Containerized system > p. 144
 - SKYctrl Omnidirectional FPV drone neutralizer > p. 145
 - SKYctrl S ► p. 145

ARMPOL Research and Development Company



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ARMPOL conducts development and implementation works and manufactures various types of products in the field of mechanics, electrical engineering, electronics, hydraulics and pneumatics. ARMPOL mainly offers products for special purposes, including military ones. The main areas of activity include: special containers, air-conditioning systems, filter-ventilation systems and power generating sets.

Depending on the construction details and the basic and specialist equipment used, the containers are intended for use as: command and communication centres, command and social centres, storage and energy centres, energy centres, maintenance and repair workshops, medical, specialist laboratories, decontamination stations, canteens, laundries and others.

The special products offered by ARMPOL have the required tests and the necessary attestations and certificates, as well as agreed or approved technical documentation for production. The production is monitored on an ongoing basis and received by the Regional Military Representation. ARMPOL has a concession from the Ministry of Interior and Administration for the design, production, storage and trade of special products for the needs of the Ministry of National Defence.

The company has got the following certificates: ISO 9001:2015 and WSK (Internal Control System).

The most important achievements

- Defender Awards at International Defence Industry Exhibition MSPO in Kielce:
- in 2013 y. Aviation Workshops Container Set designed for airplane and helicopter maintenance and repair type KWL.SX-02
- → in 2006 y. Mobile Command Post Container Set type MMSD
- → in 2003 y. Vehicle Air Filtering And Ventilation Unit type UFS.B2.01-100FW

Key products and services

- → Vehicle Air Filtering And Ventilation Unit type UFS.B2.02-100FW/24V,w,02A
- → Mobile high-capacity evacuation ferry PEP.30-01 type

■ Mobile high-capacity evacuation ferry PEP.30-01 type > p. 126

■ Vehicle Filtration and Ventilation Unit UFS.B2.02-100FW/24V,w.02A > p. 133

AUTOCOMP MANAGEMENT Sp. z o.o.



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ACM Sp. z o.o. is an internationally operating manufacturer and supplier of technologically advanced systems to support training processes for the national defence and uniformed services sectors, as well as for the rail, road and water transportation industries. Autocomp is also a manufacturer of dedicated specialized automation projects for industry and the Polish Navy, as well as instrumental optics solutions.

The company has its own research and development facilities including laboratories for information technology, electronics, optics and mechanics.

- Autocomp's key business lines are:
- Military training and training systems;
- → Training vehicle simulators;
- → Automation and control projects;
- → Instrumental optics solutions.

Autocomp Management's solutions are open systems and can be delivered either as standalone modules, subsystems for third-party training platforms, or allow third-party training simulator modules to be included.

Autocomp's largest foreign partner is Germany's Krauss Maffei Wegmann (KMW) for which the company supplies simulators of the entire Leopard 2A tank family and vehicles based on those chassis. In 2022, Autocomp Management, as the only Polish private entity, was qualified by the US Department of Defense to participate in Lockheed Martin projects.

Key products and services

- → ŚNIEŻNIK a military combat training support system
- → A comprehensive shooting simulator for the APC Rosomak crew in a platoon version
- → POJEDYNEK a civilian shooting training system
- → WSB04 wireless control system with feedback
- PPZR Grom/Piorun training simulator for shooters of the Grom/PIORUN portable anti-aircraft missile system
- → DP system ship's dynamic positioning system
 - Combat Training Support System "ŚNIEŻNIK" ► p. 151
 - Complex Tactical and Fire Simulators for Crews of Combat Vehicles and Tanks in the Platoon Version ► p. 150
 - Optical Sights Simulators for Military Equipment ► p. 157
 - Ship's Dynamic Positioning System ► p. 146
 - Wireless Control System WSB-04M for Battlefield Areas > p. 163

Bydgoskie Zakłady Elektromechaniczne BELMA S.A.

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Bydgoskie Zakłady Elektromechaniczne BELMA S.A. is among the oldest industrial plants in Kujawsko-Pomorski region. The beginning of the company dates back to 1868. Starting from the locksmith plant, the company produced devices for the railway, automotive, defence industry, mining, and also provided various types of industrial services. Currently, it is a modern company in terms of technology and organization, able to meet the needs of demanding customers from Poland, the European Union and the world. It has appropriate technical and production potential and highly qualified team of experienced engineering and technical staff. The company has its own design offices, where it employs specialists in the field of mechanics, electrical engineering and electronics designing modern products, using computer support systems in design and production process as well as many years of experience in precise metal processing. For many years we have implemented management system based on the requirements of EN-ISO 9000 standards, fulfilling the highest quality demands of our customers.

Most important achievements

- → Designed and implementation of the SPPŁW anti-tank mine
- → Implementation into production of heads for unmanned systems
- → Rresearch and development work for the armed forces the latest result of the last such work is BAOBAB-K

Main services and products

- → Controlled Anti-Tank Anti-Vehicle Mines SPPŁW
- → Tactical Heads for Unmanned Aerial Vehicles
- → Heat Mine for Manual Laying MR-123
- → Elements of Mine Scattering System BAOBAB-K
 - BAOBAB-K SCATTERED MINE LAYING SYSTEM ► p. 59
 - MR-123 ► p. 178
 - SPPŁW Controlled Anti-Tank Anti-Vehicle Mines > p. 185
 - Tactical Heads for Unmanned Aerial Vehicles > p. 186

Creotech Instruments S.A.

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Creotech Instruments is a leading Polish manufacturer of satellites and subsystems, as well as quantum computer electronics. The company delivers proprietary solutions to governmental, commercial and research partners, such as the ESA, CERN, and Polish Ministry of Defence. Creotech's subsystems have performed flawlessly on more than 40 space missions. In 2022, the company debuted on the Warsaw Stock Exchange as the first Polish space company. The most important achievements

- → Main Defender award in the Military Reconnaissance Equipment category at the 2023 International Defence Industry Exhibition for HyperSat family of microsatellite platforms.
- → Award of the President of the Management Board of the 2022 International Defence Industry Exhibition for EagleEye reconnaissance satellite.

Main services and products

- → Custom optical Earth Observation, SAR, Comms, SIGINT, PNT or Technology satellite missions in the 30-200 kg range.
- → HyperSat Eagle HR EO, 1-2m GSD high resolution optical observation microsatellite.
- → HyperSat modular microsatellite platform.
- → Mission Design, Registration, Launch Campaign and Mission Operations support.
- → Quantum Systems Electronics design and manufacturing.
- → Electronics Manufacturing services.
- → Transfer of Knowledge and Training.
 - CreoSky 6000: the solution for Space Situational Awareness, Surveillance and Tracking needs ► p. 11
 - HyperSat: a reliable, multi-mission microsatellite platform ► p. 22
 - HyperSat Eagle HR EO: a 1-2m GSD high resolution Earth Observation microsatellite ► p. 23
 - White Rabbit Switch: the sub-nanosecond time-synchronisation switch for large distributed systems > p. 87

Cryptomage Inc.

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Cryptomage Inc. offers cutting-edge cybersecurity solutions with its Cryptomage Cyber Eye[™] probe. This hi-tech ICT company specializes in Network Detection and Response, providing organizations with high-quality, technologically advanced tools.

Cryptomage Cyber Eye[™] goes beyond traffic flow analytics, offering real-time anomaly detection and prediction based on network behaviour. By analyzing protocol behaviour, packet analysis, and host communications behaviour, powered by ML and AI algorithms, it provides a unique approach to network traffic analysis.

Unlike many security solutions that focus solely on user and host behaviour, Cryptomage Cyber Eye[™] also incorporates unusual low-level network behaviour. This comprehensive analysis enables organizations to identify, monitor, and triage traffic flows, connections, and potential malicious events, empowering security teams to enhance security and automate threat detection and prevention.

One of the key strengths of Cryptomage Cyber Eye[™] is its ability to evolve and integrate with other security solutions, augmenting threat detection capabilities. With AI and ML at its core, the probe continuously adapts to emerging threats, ensuring robust protection.

Key features of Cryptomage Cyber Eye[™] include real-time network monitoring, event management, real-time threat detection, a forensic module, and a GDPR module. These functionalities equip organizations with the tools to detect and predict hidden network traffic, botnet C2 communication, malware activity, 0-day attacks, and DDoS attacks.

Cryptomage Cyber Eye[™] addresses various business challenges across industries such as financial services (banking, insurance), telecommunications (operators, providers), utilities (including critical infrastructure), government, military and uniformed services, manufacturing, healthcare, and pharmaceuticals. Its versatility makes it suitable for diverse sectors seeking comprehensive cybersecurity solutions.

The most important achievements

- → The winner of the Polish edition of the European Cyber Security Organisation (ECSO) European STARtup Award 2022
- → STARtup Award 2022, Audience Award, 2nd Place, European Cybersecurity Competition Out of the Box, organized by the European Cyber Security Organization (ECSO)

Key products and services

- → Cryptomage Cyber Eye
 - Cryptomage Cyber Eye > p. 93

Cybersecurity Foundation

CONTACT Adama Branickiego 13 02-972 Warszawa, Poland cybsecurity.org e-mail: kontakt@cybsecurity.org tel.: +48 22 112 0 800

The Cybersecurity Foundation (CSF) is a non-governmental organization founded in June 2010. Our main mission is to raise awareness of threats from the cyber domain. We educate, conduct cyber exercises, and organize events for professionals. We also conduct research and development activities related to IT security and critical infrastructure protection. Our vision is to be one of the most influential institutions in meeting the challenges of a dynamically changing threat spectrum.

The CSF has extensive experience in organizing cyber security exercises, both at the strategic level, with the aim of increasing the ability of organizations and state structures to protect themselves effectively against an attack from cyberspace (Cyber-EXE series of exercises), as well as at the operational and technical level, aimed at checking technical capabilities of cybersecurity teams under simulated attack conditions (CERT Games, CTF competitions). A few years ago, we created a strategy game about cybersecurity. The main goal of the creation of Cyber Fortress was to create simulation game that would allow you to practice a holistic approach. We organize events in the field of IT Security: since 2014, we have organized a conference on IT security – SECURITY CASE STUDY. The conference focuses on technical aspects of cybersecurity, with a special emphasis on case studies.

Most important achievements

- → 4 seasons of Cyber Fortress League.
- → Organizing cybersecurity training: Cyber-EXE, Cyber Fortress as a training.
- → Security Case Study conference.
- → Cooperation with universities, co-creating courses of study related to cybersecurity.

Main services and products

→ Cyber Fortress

■ Cyber Fortress ► p. 93

DEMARKO S.A.

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cybersecurity

DEMARKO S.A. is a company existing for 34 years and specializing in production of dedicated products. It is the owner of the highest level of skills, covering the entire range of production process activities, starting from design and finalizing with sales customer-tailored product. Products of our own design have been sold to customers in 12 countries, always following individual and very particular requirements. Medium in size company situated in town Świętochłowice, in the south of Poland, employs over 200 well educated, engaged and dedicated engineers, technicians and workers. Formally, it is owned and managed by the members of one family. Climbing up during all these years on the stairs of experience, DEMARKO S.A. successfully completed a few re-organizations, adapting its own structure of organization and production to new intentionally set targets and goals. Rewarded with, among others, ISO 9001:2015 and ISO 3834-2 certificates, and implementing AQAP 2110:2016, which has made it certified for production and delivery of military products of its own design. Consequently, registered under NATO NCAGE number 99NMH. Currently, DEMARKO is involved in development and delivery of flexible, modular systems for military and supply logistics as well as custom-ized solutions for transportation of specialized equipment, this way becoming one of very few suppliers of the means dedicated for heavy duty transport, it has also become a partner of the Polish Armed Forces and a supplier to countries – members of NATO.

Main services and products

- → Semi-trailers of different sizes and configurations.
- → Trailers of various configurations and applications.
- → Multi stretches ambulances.
- → Trucks of various different superstructure applications.
- → Subcontracting of production capability.
- → Production of metal components, parts, elements.
 - AMBULANCE ► p. 106
 - GENERAL PURPOSE TRUCK WITH CRANE ► p. 107
 - SEMI-TRAILER ST555-20W.M and ST775-20W.M ▶ p. 111
 - SEMI-TRAILER ST775-20W ▶ p. 112
 - SEMI-TRAILER ST775-24W.H-PA > p. 113

Dronehub

Dronehub.ai e-mail: contact@dronehub.ai **DRONEHUB**

CONTACT Jasionka 954E, 36-002 Jasionka, Poland

Dronehub specializes in providing comprehensive drone-in-a-box systems. We create autonomous solutions, our system does not need an operator to carry out the mission – the entire flight path of the drone is pre-programmed. This is a huge saving of time and money, an increase in the accuracy of measurements, faster analysis of the results obtained, as well as care for the safety of employees and infrastructure.

Dronehub's system consists of three components – a drone, a docking station and proprietary software based on Artificial Intelligence. Our docking stations are suitable for a wide range of industrial drones. The stations endure extreme temperatures (-40C to +50C), offering automated charging or optional battery swapping. Equipped with climate control and fire protection systems, to ensure safety and reliability in harsh conditions.

Our stations connect to drones via a proprietary protocol and to the internet through various methods, adaptable to location needs. We also provide off-the-grid solutions for the defence sector. Our software system enables drone control, mission planning, and data analysis.

Targeting critical infrastructure, our solutions include intelligent inspections, real-time monitoring, asset management, and advanced security features.

Most important achievements

- → Winning the GeniusNY program (the world's largest accelerator for drone companies) with an award of \$500,000 and a one-year residency for the company in the US (2022)
- → Creation of a hybrid drone (HUUVER) that can move in the air, on the ground and in water.
- → Ranked 2nd in the "Aerospace & Defense" category in the "1000 fastest growing companies in Europe" ranking "Financial Times (2023)

Main services and products

- → Dronehub comprehensive drone in a box solution.
- → Railway inspection system a system for monitoring, inspecting and catching deficiencies in long-distance railroad tracks. The project is being carried out in partnership with Deutsche Bahn.
- Perimeter security system together with RCS Engineering, we have developed an innovative property monitoring and security system based on violation detectors that induce an autonomous drone inspection raid. The detectors alert the drone about an intrusion, the signal is picked up by the drone, which autonomously heads

to the indicated location and sends images and information about the status of the security breach to the application.

- → Huuver a hybrid drone capable of moving on land, in the air and in the water.
- → Mobile hub.
 - Dronehub Drone-in-a-box solution ► p. 16
 - HUUVER a hybrid drone capable of moving both on land and in the air > p. 21
 - Mobile Dronehub ► p. 34

Enamor International

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The company delivers cybersecurity, IT, software and electronics to national and NATO military forces and critical infrastructure companies. We are implementing complex IT systems processing classified information for field, mobile and naval national and allied systems. We implement cybersecurity measures in Security Operation Centre. The company delivers tailored software products for data analysis, fusion, correlation and crawling of Internet and Darknet.

The most important achievements

- → Participation in Alliance Ground Surveillance Battle Lab system for NATO AGS Forces
- → Participation in Naval Strike Missile Coastal Defence System for the Polish Forces
- → Cybersecurity system: data analysis and fusion, Internet and DarkNet monitoring, image/video analysis
- → Security Operation Centre implementation
- Key Products and Services
- → Network processor PLUMLA NGN (https://plumla.com)
- → IT systems implementation and delivery including systems processing classified information for field and naval platforms
- → IT security measures implementation
- → Military communication and IT systems
- → Analytical software for data processing, image/video analysis, cybersecurity threats detection, Internet and DarkNet monitoring
- → Security Operation Centre implementation packet analysis and threat detection

■ Plumla-NGN ► p. 97

Enigma Systemy Ochrony Informacji Sp z o.o.

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ENIGMA Systemy Ochrony Informacji Sp z o.o. was established in 1993. The company's core business is extensive integration of ICT systems, solutions in the field of security and protection of classified information, creation and delivery of innovative technological solutions in the area of hardware and software.

Enigma is part of the COMP capital group. As a result of transformations and fusions that followed, the resource of three entities was incorporated into the Company: Safe Technologies (Qualified Certification Centre operating under the CenCert brand), M2Net (a software house) and Pacomp (a design and production company). The culmination of the transformation process was the incorporation into the Company's structures, in 2021, of the separated divisions from Comp (Cryptography Development Division and System Solutions Development Production Division).

At the end of 2023, we were hiring 365 employees, which demonstrates Enigma's dynamic growth. In 2023, our share capital exceeded PLN 30 million.

We have seen very dynamic growth in previous years as a result of the launch of new products such as keypads and the Electronic Monitoring System, based on our own hardware and software solutions.

Thanks to our work and commitment, we are able to meet increasing market challenges and continue to grow 201 in the security and information protection sector.



EUICUA

Most important achievements

- → Implementation of the biggest Electronic Monitoring System in the East-Central Europe.
- → Launch of the Electronic Monitoring System in Italy, Armenia, the Czech Republic.
- → Delivery of BORDERSCAN devices for biometric registration for the needs of the Border Guard.
- → Establishment of the "Centre for Abductions system".
- → Development of ETA-MIL cryptographic products.
- Modernization of the new version of PEM-HEART and Centaur software for NATO needs, certified by the Internal Security Agency.

Main services and products (approved for export)

- → ENIGMA ELECTRONIC MONITORING SYSTEM
- → BORDERSCAN
- → AVISPON CRISIS MANAGEMENT SYSTEM
- → DIGITAL DOCUMENT ARCHIVING
- → rSIGN VIRTUAL ELECTRONIC QUALIFIED SIGNATURE

■ Enigma Electronic Monitoring System (EMS) > p. 94

Enigma Information Security Systems – ELFO Consortium

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The Enigma – Elfo Consortium is a unique partnership that combines the experience and expertise of two highprofile companies, Enigma Information Protection Systems and Elfo. The consortium focuses on a common goal: ensuring border security through modern technologies and dedicated solutions.

Enigma Information Security Systems: Enigma is a producer, supplier and integrator of advanced system security solutions, with a particular focus on specialist security. With over 30 years of experience, the company offers unique expertise on the Polish market, providing services in the area of information protection. Copyrighted cryptographic hardware and application solutions form the basis of the systems created by Enigma, ensuring full security of processed data.

Elfo: Elfo has specialised in the production and supply of lighting equipment and accessories for photographic studios for 40 years. For the last 20 years, the company has also been supplying photography systems for the police, border guards and other uniformed services. With its unique knowledge and experience, Elfo develops to meet the growing demands for both hardware and software. Elfo's products stand for reliability and durability.

The joint efforts of the Enigma – Elfo Consortium aim to create solutions that are not only effective in providing border security, but also innovative and tailored to the needs of smart borders. By combining the knowledge and expertise of both companies, the consortium offers a comprehensive approach to security, covering both hardware and software application aspects of border security.

Most important achievements

→ Delivery of BORDERSCAN devices for biometric registration for the needs of the Border Guard.

→ Implementation of electronic dactyloscopy stations, so-called "booking cabins" for the Polish National Police. Main services and products

- → BORDERSCAN for the protection of smart borders
- → BOOKING CABINS

■ Borderscan for the protection of smart borders > p. 92

Fabryka Broni "ŁUCZNIK" – Radom Sp. z o.o.

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We are proud to present Fabryka Broni "Łucznik" – Radom sp. z o.o. – recognized as one of the most reputable weapons factories in Poland and Europe. For nearly one hundred years we have been a leader in the production of high quality small arms.

Our factory, located in Radom, is a place where tradition meets modernity, precision and innovation. We are a leading manufacturer and supplier of weapons to the domestic and foreign markets, including the Polish Armed Forces, the Ministry of Internal Affairs and Administration, as well as civilian shooters. The Company's flagship products are GROT carbines from the Modular Small Arms System family, Beryl carbines and VIS 100 pistols. While we are proud of our heritage, we are constantly evolving, investing in the latest technologies and manufacturing processes to meet the expectations of our customers from around the world.

Fabryka Broni, which has been in continuous operation for nearly 100 years, is part of the Polish Armaments Group (PGZ), a leader in the Polish defence industry and one of the largest defence concerns in Europe.

The most important achievements

- Design (in cooperation with the Military University of Technology) and development of the MSBS Grot system
- The company successfully provides solutions for the Polish Armed Forces and uniformed services as well as foreign users.
- Numerous awards and distinctions including a special award from the Minister of Defence for the VIS 100 pistol at the 2021 International Defence Industry Exhibition

Key products and services

- → MSBS GROT rifle
- → VIS 100 semi-automatic pistol
- → BERYL rifle

■ MSBS Grot – Grot Modular Firearm System ► p. 178

■ VIS 100 CAL. 9x19 MM – THE SEMI-AUTOMATIC PISTOL ► p. 190

GISS Sp. z o.o.

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04-545 Warszawa, Poland

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GISS was founded in 2012, operating within the airport systems and military communications sectors. Its primary areas of expertise include satellite communications (such as manpack satellite terminals, mobile Fly Away, and Hub stations), shooting training support systems (Shooting House, shooting range systems, reactive target systems, container shooting ranges), ATC (radar systems, WAM/MLAT, ILS/DME/DVOR), and systems integration. The company offers its own range of solutions and collaborates with foreign partners.

In the years 2012-2013, the company focused on radar systems and ILS equipment installation in the aviation industry.

From 2014 to 2015, GISS expanded its product offerings to include training facilities, shooting bases, and shooting range equipment.

In 2016, GISS established an R&D department and embarked on the development of innovative and proprietary products in the satellite communications segment.

By 2018, GISS had established a strong presence in the satellite communications, air traffic management, navigation systems, and shooting solutions sectors, particularly within the training facilities domain.

Since 2021, the company has been headquartered in new, well-equipped facilities dedicated to R&D, complying with the latest standards.

The most important achievements

- → Opening of the GISS Research and Development Centre
- → Delivery more than 100 tactical level satellite terminals for the Polish Armament Agency
- → Achieving the position of the main SatCom supplier to the Polish military
- → Delivery and commissioning of 4 MSSR radars for PANSA
- → Delivery of a MLAT system at the Warsaw Chopin Airport for PANSA

Key products and services

- → Manpack satellite terminals
- → FlyAway mobile satellite terminals
- → HUB type stations
- → VSAT systems integration
- Designing SatCom systems

- → Containerized shooting ranges
- → Shooting house type shooting ranges
- → ATC systems integration
- → SATCOM Training
- → ATC integrations
- → Project Management
 - Container Shooting Range ► p. 151
 - CQB House Shooting Range > p. 152
 - FlyAway SMART Terminal ► p. 81
 - SatPack Cobalt Terminal ► p. 83
 - VSAT MASTER Satellite Terminal ► p. 86

Huta Stalowa Wola S.A.

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ICEYE

Huta Stalowa Wola S.A. is a company with a long tradition in the defence industry, having been operating in the market for 85 years. It has experience in the civil industry as a manufacturer of construction machinery. As a leading manufacturer of artillery military equipment IFVs and the equipment for the engineering forces, HSW S.A. has a recognisable brand and is guided in its activities by values and standards that distinguish the Company from its competitors.

Main Achievements

- → The company has for years remained one of the most important suppliers of solutions for the Polish Armed Forces, and is also a major exporter
- → Cooperation with renowned foreign partners
- → Development of a number of new weapons systems, including M120 Rak automatic mortars, Borsuk New Infantry Amphibious Fighting Vehicle
- Numerous awards, including the Defender and Laur Bezpieczeństwa [Safety Laurel] at the International Defence Industry Exhibition and an award in the "Innovation for Security and Defence" competition under the honorary patronage of the Head of the National Security Bureau and the Director of the National Centre for Research and Development

Main Products (authorised for export)

- → KRAB 155 mm self-propelled howitzer
- → M120 RAK 120 mm mortar turret
- → BORSUK New Infantry Amphibious Fighting Vehicle with the RCTS ZSSW-30
- → LANGUSTA II rocket launcher
- → WA ammunition truck
 - BAOBAB-K SCATTERED MINE LAYING VEHICLE ► p. 59
 - BORSUK Amphibious Infantry Fighting Vehicle > p. 60
 - KRAB 155 MM SELF-PROPELLED HOWITZER ► p. 66
 - M120 RAK 120 mm mortar turret > p. 68
 - WARAN 4x4 MULTI-PURPOSE TACTICAL VEHICLE ► p. 74
 - ZSSW-30 REMOTE CONTROL TURRET SYSTEM ► p. 75

ICEYE POLSKA Sp. z o.o.

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acquired via its own constellation, Solutions (providing insights during natural catastrophes) and Mission Sales, whereby satellites are launched on behalf of clients for sovereign use. Following the beginning of the armed conflict in Ukraine, ICEYE has delivered one of its satellites for exclusive use by Ukrainian Armed Forces, and continues to support efforts in providing reliable daily intelligence.

A TYPICAL ICEYE SATELLITE MISSION SOLUTION:

- → Example: 4-10 of ICEYE's latest Sar Satellites
- → Delivered Launch-ready in approximately 18-24 months
- → Arrangement of launch services on client's behalf into low earth sun-synchronous orbit (leo sso)
- → Provision of a mission ground segment in client's country for sovereign satellite control and data receipt
- → Support for operations and maintenance throughout the satellite service life
- → Training by world experts for constellation operations, data acquisition and processing

Most important achievements

- → First miniaturized SAR satellite launched to orbit globally in 2018
- → Sovereign satellites delivered to clients in UAE, as well as governments of Ukraine and Brazil
- → Largest SAR satellite constellation, offering fastest revisit of any location in the world

Main services and products

- SAR Imagery (see diagram):
 - Scan Mode
 - Strip Mode
 - Spot Mode
 - Spot Fine
 - Dwell
 - Dwell Fine
 - Spot & Dwell Precise (to be announced soon)
- → SAR Satellite Manufacturing, Assembly, Launch (via SpaceX Rideshare) for clients
- → Satellite Capacity purchase access to ICEYE's constellation for extended periods
- → Natural Disaster Solutions (analytics): Floods, Wind, Wildfire, Hail
 - ICEYE'S LATEST GENERATION SATELLITE ► p. 24

ICsec S.A.

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ICsec provides advanced cybersecurity solutions for protecting industrial infrastructure.

The company built a comprehensive Industrial Control Systems (ICS) security platform comprising of both software and hardware elements designed to minimize business risks associated with cyber-attacks on industrial control networks.

This platform boasts a broad range of functionalities, setting a new standard in the cybersecurity of industrial OT networks.

The most important achievements

→ Developing a comprehensive 360° security platform for real-time monitoring of industrial networks, consisting of both software and hardware components.

Key products and services

→ SCADvance XP^{*} – the next generation IDS system for industrial networks

■ SCADvance XP® ► p. 100

IDENTT

CONTACT Generała Romualda Traugutta 45 50-416 Wrocław, Poland identt.pl e-mail: kontakt@identt.pl tel.: +48 882 184 848 IDENTT enables automated identity proofing and recognition in mission-critical systems across the globe. Ensuring the highest assurance level of your identity, IDENTT is synonymous with state-of-the-art safety and trust in identity verification.



Using its proprietary artificial intelligence, IDENTT automates the onboarding, authentication or access control processes for industry leaders in banking, telecommunications, entertainment and heavy industry. PKO BP, KGHM, Swisscom, BNP Paribas, FEG, and many others rely on IDENTT's world-renowned expertise in biometrics and identity document processing.

Developing its entire AI and identity processing engines in house, IDENTT offers custom cloud and on-premise-based deployments meeting the strictest governmental and enterprise requirements. With an in-house team of experts in identity verification and biometrics, IDENTT supports the needs of agile, future-driven solutions, while ensuring top-grade security, reliability, and no external access, as required by law enforcement and government deployments.

IDENTT is the first company in Poland which received the certificate confirming compliance with eIDAS regulations for remote identity proofing based on an identity document processes for trusted services. This is an extraordinary achievement, demonstrating that IDENTT not only prioritizes security but is also substantively prepared to serve as an identity verification entity.

Achievements

- → Bank Accounts Opened in Poland using IDENTT Vision AI for identity recognition
- → Al-Based eKYC Processes Completed for EMEA customers
- → Identity Document Versions Issued Around The World Supported by IDENTT Vision
- → eWallet Identity Verifications Performed using IDENTT EUDI Wallet (Q3/23-Q1/24)
 - IDENTT Biometrics Engine > p. 96
 - IDENTT eWallet ► p. 96
 - IDENTT Vision ► p. 97

Jakusz Sp. z o.o.

JAKUSZ 🖪

CONTACT Przemysłowa 40 83-400 Kościerzyna, Poland

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JAKUSZ is a Polish company with 39 years of manufacturing experience. It operates in the international defence and security market in the area of design, production and implementation of innovative solutions for equipment and technologies. Our expertise comprises ammunition disposal, special chemical technologies, and handling of hazardous items containing explosives. The company conducts extensive research and development activities including dynamic detonation tests. Company owns design, technology and manufacturing capabilities.

Jakusz SpaceTech Sp. z o.o. is a manufacturer of "green" rocket fuel – HTP (hydrogen peroxide with purity up to 98%). It conducts scientific research in cooperation with the European Space Agency (ESA).

The most important achievements

Jakusz Group is an internationally recognized brand. It operates in more than 40 countries, providing after sales service with local partners.

The company have accomplished multibranch projects including transportable containerized facilities in different countries. Each product or technological line is always designed and adjusted to specific local requirements and conditions.

Key products and services

- → isolation, transportation, storage and neutralization of unexploded ordnance, improvised explosive devices
- security of data processing in ICT systems mobile server rooms on chassis with electromagnetic and ballistic protection,
- → design of technological lines for the production of components of rocket fuels and explosives,
- → elaboration of ammunition of various calibers and production of combat modules for drone warheads,
- → industrial methods of disposal and recycling of munitions complete technological lines.
 - ALEXA Light Weight Gas-Tight EOD Container > p. 119
 - Combat Modules for Tactical Warheads ► p. 174
 - Filling Of Ammunition Ammo Filling Lines / Special Chemical Installations > p. 175
 - Hydrogen Peroxide (H2O2) HTP > p. 21
 - Safety of Critical Data Electromagnetic and Ballistic Protection in a Transportable (Mobile) Container ► p. 99

KLIMAWENT S.A.

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Klimawent was founded in 1992 as a private company. We are a well known producer of filtration and ventilation units. Within our assortment there are following groups of products, i.e. fans, blowers (air-supply fans), filtering units, vehicle exhaust extractors, systems of snow removal from the roofs.

In 2017 the company started the production of container and modular tactical shooting ranges MoST and mobile bullet traps. Shooting ranges MoST are equipped in effective ventilation and filtration system which eliminates the level of the lead to the limit of quantification.

All our appliances are our own solutions worked out by our engineers' team. Manufacturing takes place in our premises under supervision of technological employees.

We continually invest in high-tech infrastructure, advanced technologies as well as development of qualification of our engineers, and especially, the development of our company. The innovative implementations are based upon our results of Research and Development Lab, which contribute to larger success.

The most important achievements

- → patented technical solutions of the shooting range MoST
- → innovative idea and design of shooting ranges MoST
- → shooting ranges MoST have the certificates which were issued by Military Armament Technical Institute

Key products and services

- → modular tactical shooting range MoST-5 and MoST-10
- → container shooting range MoST-2
- → mobile container shooting range MoST-1
- → mobile bullet traps KMB-600 and KMR-600
 - Container shooting range MoST-2 > p. 152
 - Mobile Bullet Traps ► p. 153
 - Mobile Container Shooting Range MoST-1 > p. 154
 - Modular Tactical Shooting Ranges MoST-5 and MoST-10 > p. 156

Lubawa S.A.

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Lubawa S.A. is a Polish manufacturer of tents, protective vests, demining and EOD equipment and tool sets, gear for the Polish Armed Forces, firefighters, Police and other uniformed formations. The company has 70 years of business experience, and the products have been deployed by several NATO member country armies.

The most important achievements

- → Launching a Research and Development Center with the ballistics laboratory as the first such a comprehensive laboratory in central Europe
- → Development of export sales to more than 40 countries around the world
- → Manufacturing innovative products and introducing them to international markets

Key products and services

- → Vests protecting against various types of threats: fragments, bullets, combat knife and spike (e.g. Gryf, MKO 2.0, Sigma)
- → Inflatable and rigid tents (e.g. NS Series, NPM, MMT, NX)
- → EOD One Suit with the P2 support unit
- → Lightweight fragment proof and fire retardant demining suit
- → Inflatable decoys (e.g. Rosomak APV, T-72 and Leopard 2 MBT)
- Multispectral camouflage systems
 - EOD One Bomb Suit ► p. 166
 - Lightweight Flame-retardant Fragment-proof Suit > p. 169
 - Modular Bulletproof Vest MKO 2.0 ► p. 170
 - NS-26 ► p. 110
 - Pneumatic Decoys > p. 158





Łukasiewicz Research Network – Industrial Research Institute for Automation and Measurements PIAP

CONTACT Aleje Jerozolimskie 202 02-486 Warszawa, Poland www.iedd.eu / www.piap.lukasiewicz.gov.pl e-mail: mds@piap.lukasiewicz.gov.pl tel.: +48 22 87 40 164; fax: +48 22 87 40 221



Established in 1965 Łukasiewicz Research Network – Industrial Research Institute for Automation and Measurements PIAP is the leading center of robotics, automation, and industrial measurements in Poland. Over 250 employees, divided into interdisciplinary teams, conduct research on new technologies. Łukasiewicz - PIAP Institute is the first and largest Polish manufacturer of mobile robots for special applications in army, police, border guards and fire fighters. Robots and robotic devices are used in C-IED operations, surveillance and remote observation, protection of borders and infrastructure, search and rescue missions, crisis management, monitoring and patrolling, detection and CBRN threats analysis.

The Łukasiewicz research network is the third largest research network in Europe, consisting of 22 Polish research institutes, including Łukasiewicz-PIAP.

The Łukasiewicz Research Network offers businesses attractive, broad and competitive technological solutions. Łukasiewicz provides a unique "challenge system" powered by a group of 4,500 scientists, who take up a business challenge and present the entrepreneur with potential solutions. At the same time, it provides access to cutting-edge capabilities and unique scientific infrastructure in the country. Most importantly – the entrepreneur does not bear the cost of preparing the conception of the research works. Łukasiewicz conveniently meets the expectations of the business. The entrepreneur can contact Łukasiewicz through an online form on our website lukasiewicz.gov.pl/en/business/, but also directly in over 50 locations of Łukasiewicz Institutes and their branches throughout Poland. Each site provides the same, high quality, product or service. Łukasiewicz focused on research areas such as: Health, Smart and Clean Mobility, Digital Transformation and Green and Low-emission Economy.

- PIAP FENIX Lightweight EOD & reconnaissance robot > p. 127
- PIAP GRYF EOD mobile robot ► p. 127
- PIAP IBIS Heavy robot for pyrotechnic operations ► p. 128
- PIAP PATROL Robot for C-IED and CBRN tasks ► p. 128

MASKPOL S.A.

CONTACT Konieczki 42-140 Panki, Poland maskpol.com.pl e-mail: maskpol@maskpol.com.pl tel.: +48 34 310 94 16



Protective Equipment Company MASKPOL S.A. is the Polish leader of this market sector with advanced Research and Development as well as manufacturing technologies. We manufacture a wide range of ballistic protection, such as helmets and bulletproof vests, chemical protection equipment – gasmask, protective clothing and decontamination equipment and also anti-riot equipment; shields, batons and riot suits. The main clients include military and police units and border guard. All our products are made in accordance with highest quality and safety norms, provide the highest possible levels of protection and are exceptionally ergonomic. Our products are constantly developed, meeting our clients ever changing expectations.

Main Services and Products

- → HELMETS
- → VESTS
- → GAS MASKS
- → PROTECTIVE GARMENTS
 - HB-04 ballistic helmet ► p. 167
 - HP-05 ballistic helmet ► p. 167
 - KKZ SG-01 bullet-proof vest > p. 169
 - MP-6 gas mask ► p. 171
 - ROCK one bullet-proof vest > p. 171

Matic SA

CONTACT Puławska 300A 02-819 Warszawa, Poland matic.com.pl e-mail: office@matic.com.pl tel.: +48 22 543 90 00



Matic SA has been operating on the Polish IT market since 1990. We specialize in delivering advanced information technology services and solutions as well as systems vital for national security and defence. Our offering is especially tailored to the needs of institutions of public administration, uniformed services and the enterprises which operate in strategic industries. We can say with pride that we actively participate and support the technology transformation processes of Polish companies and state institutions.

The Matic SA Company has:

- → Quality Management System,
- → Information Security Management System (in accordance with the following standards: ISO 9001: 2015, AQAP 2110: 2016, ISO / IEC 27001: 2017),

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Investigative IT:

financial data,

large data sets,

intelligence methods.

Forensic analysis system,

Research and development projects:

Financial Trail: Standardization and analysis of

Development of a tool for combating financial

innovative methods of processing and visualizing

DisinfoRmation detection system using artificial

crimes in economic transactions, based on

White intelligence (OSINT solutions),

Monitoring data streams (COM-INT),

Drone detection and protection system.

Analysis of retention data in GSM communication,

- → Industrial Security Certificate,
- → Concession for the manufacture and marketing of products for military or police purposes.

Key products and services

IT Infrastructure:

- → servers,
- → Disk arrays,
- → Tape Libraries,
- → Virtualization,
- → Operating systems and databases,
- → Designing and implementing dedicated IT systems,
- → IT infrastructure management systems,
- → Backup systems.

Data Management and Analysis:

- → Digital Archives,
- → Efficient databases and hardware solutions,
- → Data warehouses and Big Data class systems,
- → Reporting tools (BI).

Security:

- → Training and education,
- → Vulnerability management systems,
- → SIEM class solutions,
- → Internal network protection systems,
- → Data protection on mobile devices.

■ Financial Trail > p. 95

MESKO S.A.

CONTACT Legionów 122 26-111 Skarżysko-Kamienna, Poland mesko.com.pl e-mail: info@mesko.com.pl tel.: +48 41 253 62 81



MESKO S.A. is a manufacturer of world-class defence products with 100 years of manufacturing experience. Its core business includes manufacturing for defence and national security needs. The company's products are used by the Polish Armed Forces and other entities responsible for national security. The company is an internationally recognised supplier of products to the armies of NATO countries. The plant has state-of-the-art technology for the production of missiles and ammunition, including kinetic energy ammunition, and infrastructure for the disposal of redundant combat assets.

MESKO S.A., based in Skarżysko-Kamienna, began operations in 1924 as Państwowa Fabryka Amunicji. It has spent years building up its manufacturing experience, being the largest producer of ammunition and rockets in Poland from the very beginning.

Our missile programmes are crucial and of strategic importance for the Polish army. They include first and foremost the PIORUN Portable Anti-Aircraft Missile System, one of the global leaders in terms of effectiveness and precision of operation in its class.

Greatest achievements

- → Numerous export contracts for the Piorun Portable Anti-Aircraft Missile System (USA, Norway, Estonia, Baltic States) and Grom (Lithuania)
- → Export of small calibre ammunition to, among others, the USA.
- → Awards and prizes, among others, for the Piorun Portable Anti-Aircraft Missile System at trade fairs at home and abroad, including the 2016 President's Award in Poland.
- → Implementation of the Grom, Piorun, Pirat programmes
- → New R&D programmes

Main Services and Products (authorised for export)

- → Small- and medium-calibre ammunition
- → Mortar ammunition
- → Tank ammunition
- → Artillery ammunition

- Rockets and missiles
- → PIORUN PORTABLE ANTI-AIRCRAFT MISSILE SYSTEM
- M-21 FENIKS HE 122 mm missile

■ PIORUN Portable Anti-Aircraft Missile System > p. 53

Military Aviation Works No. 2 (Wojskowe Zakłady Lotnicze Nr 2 S.A.)

CONTACT Szubińska 107, 85-915 Bydgoszcz, Poland www.wzl2.mil.pl e-mail: sekretariat@wzl2.mil.pl tel.: +48 52 36 28 601



WZL2 has been offering comprehensive maintenance and modernization services including airframes and engines for over 75 years, as part of the one-stop shop formula. In addition to military aviation, the company's activity in the field of General Aviation is constantly developing. The plant is an Authorized Service Centre for Cirrus and Diamond aircraft under the PART CAO approved comprehensive airworthiness organization and PART 145 approved maintenance organization for EMBRAER ERJ 170/190 aircraft. The company is also a manufacturer of Unmanned Aircraft Vehicle Systems, including UAV category Tactical Short Range or Loitering Munition System DragonFly.

The company is equipped with a very modern machine park. Most components are manufactured on the basis of fully automated, precise and efficient production lines. WZL2 has modern machines for machining (CNC and measuring), modern lines for applying electroplating coatings and a chemical laboratory, professional department of paint shops and stations for non-destructive failure-detection tests (NDT).

Most important achievements:

- → Design and production of aviation products;
- → Loitering Munition System (LMS) DRAGONFLY production;
- → F-16 / C-130 MRO;
- → Civil aircraft repair and maintenance;
- → Aircraft painting.

Main services and products (approved for export)

- → Scope of services:
 - Repair and overhaul of military aircraft;
 - Periodical maintenance of aircraft;
 - Servicing and overhaul of LRUs;
 - Production and repair of service equipment;
 - Modernization and integration of avionics;
 - Aircraft painting;
 - Civil aircraft repair and maintenance;
 - Loitering Munition System (LMS)
 - DRAGONFLY production;
 - Service on site or at airbases.
 - Civil aviation CAO ► p. 9
 - Design and production of aviation products ► p. 12-14
 - Dragon Fly > p. 15
 - Maintenance of C-130 Hercules ► p. 31
 - Maintenance of F-16 ► p. 32
 - Maintenance, Repair and Overhaul (MRO), Aircraft Painting > p. 33

- Design and production of aviation products:
 - Aircraft avionics equipment;
 - Testers and control equipment;
 - Aircraft ground support equipment (GSE);
 - Spare parts;
 - Electrical connections.

Military Institute of Armament Technology (Wojskowy Instytut Techniczny Uzbrojenia – WITU)

CONTACT Wyszyńskiego 7 05-220 Zielonka, Poland www.witu.mil.pl e-mail: witu@witu.mil.pl tel.: +48 22 761 44 25



Military Institute of Armament Technology (WITU) is the leading military institute in Poland, carrying out scientific and R&D work in the field of defence and security. The Institute supports Armed Forces of Poland by providing innovative and comprehensive solutions for armaments and military equipment. The Institute experience includes multiple high-tech projects started at TRL1 and later included in the service in the Polish Armed Forces. Such project are often effect of synergic cooperation with partners such as universities, startups and industry. Areas of activity include:

- scientific research, analytical work,
- small arms and individual equipment,
- rocket / missiles and artillery,
- radiolocation and optoelectronics,
- simulators and trainers,
- UAV's and their armament.

Military Institute of Armament Technology uses three proving grounds that can support multitude of tests. Due to desolation of those grounds it is possible to detonate up to 1000kg of TNT equivalent and test long range munitions for up to 40 km.

The most important achievements

- → one of the largest military institutes in Poland
- → 98 years of experience in weaponry development and testing
- → own proving grounds

Key products and services

- → SPARTAN simulators and training facilities
- → family of GK warheads dedicated for UAVs
- → 120mm ammunition for LEOPARD MBT
 - Giez/WarbleFly Loitering Ammunition System > p. 19
 - SHAPE CHARGE ► p. 184

MIRANDA Sp. z o.o.

CONTACT Jedwabnicza 1 62-700 Turek, Poland www.mirandamilitary.pl www.miranda.pl e-mail: miranda@miranda.pl tel.: +48 63 280 01 00



Miranda Spółka z o.o. is known on the textile market as a modern manufacturer of high quality and technologically advanced polyester, polyamide, as well as mixed fabrics and knits. As one of the few textile manufacturers in Europe, we can offer a full production cycle, located in one place and based on a constantly modernised machinery park.

Miranda Spółka z.o.o has a 70-year tradition in textile production and a 15 year tradition in the production of camouflage systems. We are mainly engaged in the production of static and mobile camouflage. Over the past 5 years, we have significantly developed our research and development facilities, employing qualified personnel and equipping laboratories. We have a professional anechoic chamber, thermal cameras in the $3-5\mu$, $8-14\mu$ ranges, hyperspectral cameras and a drone equipped with cameras operating in the optical, near-infrared, and thermal ranges. As a result, we are able to perform many tests in a short period of time.

Our mission is to produce products tailored to individual customer requirements. Miranda's R&D facilities over the past 5 years have focused on the development of various camouflage systems, such as multispectral and optical camouflage covers (3D, 2D, single-sided or double-sided), tailor-made mobile camouflage for each vehicle, customized camouflage suits, camouflage and anti-drone screens, and anti-radar and thermal insulation liners for aircraft hangars. Our biggest achievement is the development of a knitted camouflage fabric with excellent strength and durability parameters.

Key products and services

- → Static camouflage: optical and multispectral static camouflage 3D
- → Static camouflage: optical and multispectral static camouflage 2D single and double-sided versions

- → Mobile camouflage
- → Individual anti-drone systems: Individual winter camouflage suit and the Antidrone Poncho
- → Thermal and anti-radiation inner liners
 - Individual Anti-Drone Systems Individual winter camouflage suit ► p. 168
 - Individual Anti-Drone Systems The Antidrone Poncho > p. 168
 - Mobile camouflage ► p. 125
 - Static camouflage 2D Multispectral Winter Camouflage Net ► p. 129
 - Static camouflage Optical and multispectral static camouflage 2D single and double-sided versions ► p. 130
 - Static camouflage Optical and multispectral static camouflage 3D > p. 131
 - Thermal and anti-radiation inner liners ► p. 132

MODULAR SYSTEM Sp. z o.o.



CONTACT Bielska 19 09-412 Ogorzelice, Poland modularsystem.pl e-mail: biuro@modularsystem.pl tel.: +48 24 366 79 00

Modular System is one of Europe's largest manufacturers of container systems. Over the last few years, Modular System has been providing turnkey critical infrastructure solutions for the needs of refugees, uniformed services and medical care. The company's experience and professionalism ensures the rapid delivery of safe and high-quality modular container systems in emergency situations, including armed conflict, humanitarian emergencies and natural disasters. The mobile container systems offered by Modular System are appreciated by many of users throughout Europe and the United States. MODULAR SYSTEM deliver products to 17 countries worldwide.

We guarantee good lead time while maintaining high quality and aesthetics.

- → Experience in container application in civil and military environment in Poland and Europe
- → The latest trends in container design and production
- → Knowledge and experience of container production process and material technology
- → Modern production facilities
- → NATO SUPPORT PROCUREMENT AGENCY standards and requirements for securing military infrastructure for the functioning of NATO units
- → A wide range of portable cabins for office, sanitary, WC, military and special design purpose
- → Efficient processing of complex orders
- → Build-up and flat-pack versions
- → Individual approach for each project
- → Functional and easy to adjust schemes for various installations

Certificates and licences:

- → ISO 9001:2015 Quality Management System Certificate
- → AQAP 2110:2016 Quality Management System Certificate
- → NATO Code for National Economy Entity
- → NATO storage numbers (NSN) for manufactured containers
- → License no. B-022/2019 dated 5th April 2019 for conducting economic activity in the manufacture and marketing of products for military or police

Key products and services

Functionality of container and modular construction, fast implementation time according to individual needs, cost optimization, mobility and the possibility of introducing changes over time, contribute to the growing interest in container products as an alternative to traditional construction.

Our modular systems make it possible to build multifunctional facilities:

- → military modules
- → office modules
- → sanitary modules
- → modular residential buildings
- → medical modules schools, kindergartens, nurseries, other spaces in various branches of the economy and public utilities
- → outpatient clinics and other medical facilities
 - Worker's Town for the needs of PKN Orlen expansion project > p. 115

N7 Space Sp. z o.o.

CONTACT Puławska 145 02-715 Warszawa, Poland

n7space.com e-mail: sscibior@n7space.com tel.: +48 607 475 837



N7 Space specializes in the development of low-level (embedded) on-board software for space applications, in particular in the development of critical software qualified to criticality levels C and B according to ECSS standards.

Since 2018, the company has been successfully implementing projects for the space sector, primarily for the European Space Agency (ESA). In addition to embedded software activities, N7 Space is involved in the development of tools for the automatic development and validation of flight code based on modeling in formal languages (Model-Based Software Engineering, MBSE), as well as the implementation of modern programming languages (such as C++ or Rust) in qualified critical software development.

The most important achievements

- → Over 20 European Space Agency projects successfully completed
- → Contribution in PROBA3, HERA, Comet Interceptor, ARIEL, EagleEye space mission
- → Spice4Space ECSS-conformance assessment successfully passed

Key products and services

- → ESA ECSS qualified bootloaders (BSW) for space-grade ARM and LEON microcontrollers
- → ESA ECSS qualified board support package (BSP) for space-grade ARM and LEON microcontrollers
- → ESA ECSS qualified CANopen library for space-grade ARM microcontrollers
- On-board software qualification for criticality levels C and B On-board software development for scientific instruments/payloads
- → Independent Software Verification and Validation (ISVV)
 - ESA ECSS Qualified Board Support Package for SAMRH71F20 ► p. 17
 - ESA ECSS Qualified Bootloader for SAMRH71F20 > p. 17

OBRUM Sp. z o.o.

CONTACT	obrum.pl
Toszecka 102	e-mail: info@obrum.pl
44-117 Gliwice, Poland	tel.: +48 32 30 19 209



OBRUM is a supplier and professional centre for engineering vehicles and training solutions including simulators for the Polish Armed Forces and foreign military customers. Extensive competencies of OBRUM in the field of design of mechanical, hydraulic solutions for engineering and combat vehicles, and even tracked combat platforms prove that the company is capable to handle projects of the highest complexity.

OBRUM is a well recognized point of reference in the field of engineering vehicles on an international scale. The company also develops and manages technical documentation and interactive user manuals.

OBRUM is dedicated supplier within PGZ of digital trainning solutions, including simulators for crews of MBT's and Infantry Fighting Vehicles (driver, gunner, commander), Computer Based Trainings and procedural simulators supporting the training process of crews including those of MS-20 Bridge crews as well as of engineering staff.

OBRUM cooperates with the world-class defence companies including those from the USA, France, and Germany. The company participates in EDF programs aimed at developing innovative solutions in the land domain.

- → Wide range of capabilities
- → Extensive experience
- → Proven track record
- → Commitment to innovation
- Most important achievements
- → MS-20 Bridges
- → Driving simulators for Leopard 2 MBT
- → Containerized simulators for driver, gunner and commander
- → Simulators for crews of MS-20 Bridges
- → CBT's and procedural simulators for technical staff
- → Service applications

Main services and products

- → Design and integration of engineering vehicles
- → Mobile Bridges
- → Training and simulation
- → R&D Services
- MS-20 "DAGLEZJA" A WHEELED VEHICLE-LAUNCHED SUPPORT BRIDGE ► p. 108
- SJCL-6P Driving Simulator for Leopard 2A4 Main Battle Tank ► p. 159

PCO S.A.

CONTACT Jana Nowaka-Jeziorańskiego 28 03-982 Warszawa, Poland

pcosa.com.pl e-mail: pco@pcosa.com.pl tel.: +48 22 515 75 01



PCO S.A. is a company with over 45 years of experience. It is the biggest Polish producer of optoelectronic devices with use of night vision, thermal imaging and laser technology. All products are a result of research and development activities of the company.

PCO SA produces a wide range of optoelectronic observation and aiming devices with laser, night vision and thermal vision technologies to military personnel and uniformed services. These include night vision goggles and monoculars, aviator's goggles, as well as day-night thermal imaging and night vision aiming sights, collimator sights.

PCO produces also observation systems for various armoured vehicles, including night vision and thermal imaging systems, as well optoelectronic heads with various sensors (NV, IR, TV cameras, laser rangefinders), flight parameters display systems, fire control systems, and laser warning systems. It also modernises periscopes and observation systems for armoured vehicles.

Nowadays the company employs over 600 skilled employees.

PCO S.A. is a member of the Polska Grupa Zbrojeniowa S.A. (PGZ S.A.) consolidating polish defence industry. Main Services and Products

-

SCT Shooter Thermal Sight

PNL-3M Aviation Night Vision Googles

- MODULAR NVG SYSTEM -
- MU3 NIGHT VISION MONOCULAR
- NPL-1T THERMAL IMAGING BINOCULARS
 - Anti-Aircraft Missile System POPRAD > p. 46
 - BYSTRA Mobile 3D Short Range Rada p. 47
 - OSU-35K Naval Armament System > p. 137
 - PILICA Anti-Aircraft Missile and Artillery Systems > p. 52
 - MT-1 THERMAL IMAGING MONOCULAR ► p. 171
 - MU-3ADM MODULAR NIGHT VISION GOGGLE SYSTEM ► p. 171

PIT-RADWAR S.A.

CONTACT pitradwar.com Poligonowa 30 e-mail: office@pitradwar.com 04-051 Warszawa, Poland tel.: +48 22 540 22 00

PIT-RADWAR S.A. is one of the leading suppliers of professional electronic devices for the Polish Armed Forces.

The company, which had its origins in the 1930s, has been conducting research and development in the fields of radiolocation, radio reconnaissance systems, automation and command support systems, and related weapons systems, especially anti-aircraft systems, for decades. Products of PIT-RADWAR S.A. are used in armaments of all kinds of the Polish Armed Forces, as well as in the equipment of foreign armies.

PIT-RADWAR S.A. handles the full cycle of product supply, from the definition of requirements, through research and development, design work, production to the logistical support offered to users.

Main Achievements

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- The company has for years remained one of the most important suppliers of solutions for the Polish Armed → Forces, and is also a major exporter
- Cooperation with renowned foreign partners
- -Development of a number of new radar systems, including the first Polish radar with an AESA antenna Continued development of anti-aircraft and command systems
- Numerous awards and distinctions including the Award of the President of the Republic of Poland for the Passive → Location System and the Lider Bezpieczeństwa Państwa [State Security Leader] distinction in the Innovative Product category for the OSU-35K Naval Armament System

Main Services and Products (authorised for export)

- **BYSTRA Radiolocation Station** OSU-35K →
- → SOŁA Radiolocation Station

- → Poprad
- Anti-Aircraft Missile System POPRAD ► p. 46 ■ BYSTRA – Mobile 3D Short Range Radar > p. 47
- OSU-35K Naval Armament System > p. 137
- PILICA Anti-Aircraft Missile and Artillery Systems > p. 52

🔊 PGZ


Polskie Zakłady Lotnicze Sp. z o.o (PZL Mielec)



CONTACT	www.pzlmielec.pl
Wojska Polskiego 3	e-mail: pzl.lm@global.lmco.pl
39-300 Mielec, Poland	tel.: +48 17 74 31 900

Polskie Zakłady Lotnicze Sp. z o.o. (PZL Mielec) is presently one of the largest aircraft manufacturer in Poland and the largest production site for Lockheed Martin outside the United States. For over 86 years, PZL has been designing, manufacturing and servicing various types of aircraft and helicopters.

PZL Mielec has a fully functional airframe production facility, a final assembly production line, a completion centre and a flight operations center. Currently the company employs 1600 people as well as a further 5,000 jobs in the Polish supply chain, many of which are located in Poland's Aviation Valley.

Its flagship products include the S-70 Black Hawk helicopter and M28 fixed-wing short takeoff and landing aircraft in civil and military version. In addition, PZL Mielec is a proud supplier of aerostructures to worldwide customers including cones and pylons for UH-60M helicopters. Starting in 2022, the Company's portfolio has been enriched by the production of major components for the global F-16 Block 70/72 program such as rear fuselage, centre fuselage, cockpit structure, cockpit side panels and forward equipment bay.

Additionally, PZL performs after-sales service at the customer's location. Global sustainment and product support include repairs, overhauls, modifications, integrations and retrofitting of platforms with specialized mission equipment dedicated to the profile of performed air operations as well as training of flying crew and technical personnel.

The company is of particular economic and defence importance as a part of the National Security System and is mostly contributing to the high export value of Polish arms.

Most important achievements

- → 100 Black Hawks produced at PZL since 2007 including the Polish Police and Polish Special Forces.
- → Start of production of major components for F-16 Block 70/72.
- → New modernized aircraft paint facility for the VIP painting class.
- → Launch of Aircraft Research & Test Centre, Completion Centre and Composite Centre.

Main services and products

- → S-70 Black Hawk multi-mission helicopter in civil and military configuration
- → M28 05 utility aircraft
- → M28B Bryza aircraft
- → MRO & Aftermarket support
- → Production of F-16 major components
- → Aviation Training Centre
- → Aviation cooperation: engineering, composites, tooling, anodizing, paint shop

M28 05 aircraft > p. 28

PONAR Wadowice S.A.

CONTACT Wojska Polskiego 29 34-100 Wadowice, Poland www.ponar.pl e-mail: export@ponar.pl tel.: +48 33 488 28 20-29



PONAR Wadowice S.A. products are used in many devices and applications for the defence industry. We offer complete special versions, designed to work in combat conditions, in extreme temperatures, high dustiness or humidity. Our offer includes solutions tailored to the individual needs of our customers. We manufacture products based on documentation provided by the Customer or developed by our own design and construction department.

The most important achievements

- \rightarrow almost 60 years in the industry
- → polonisation of SH KRAB howitzer
- → delivery of hydraulic systems for radar stations
- → hydropneumatic rocker arms for tracked vehicles

Key products and services

- → hydropneumatic suspension for tracked vehicles
- → oil hydraulic systems for tracked and wheel vehicles
- → hydraulic systems for missle defence vehicles

- → hydraulic cylinders (incl. special coating)
- → spool valves (incl. special versions for extreme temperatures, humidity, sea fog, etc.)
 - Directional Spool Valves for Extreme Environmental Conditions ► p. 62
 - Hydraulic System for Anti-Aircraft Defence Vehicles > p. 64
 - Hydropneumatic Suspension for Tracked Vehicles ► p. 64
 - Oil Hydraulic Systems for Tracked and Wheel Vehicles > p. 69

Przedsiębiorstwo PREXER Sp. z o.o.

CONTACT Kilińskiego 16 90-209 Łódź, Poland prexer.com.pl e-mail: prexer@prexer.com.pl tel.: +48 42 632 10 28

PREXER company is a manufacturer of products for the national defence and security.

We offer:

Target sights for anti-aircraft artillery: thermal, night vision and daylight, working as an autonomous fire control system. Observation devices – periscopes (glass and acrylic) equipped with a heating system and anti-laser filters, to be in-

stalled in armoured vehicles, including day-night periscopes with a night vision module and a thermal imaging module. Unmanned aerial vehicle jamming systems.

9 mm WIST 94 and WIST 94L military pistols.

Electronic and optoelectronic assemblies: laser rangefinder components, night vision and thermal imaging assemblies. PREXER Sp. z o.o. specializes in the production of devices and systems tailored to the customer's requirements, used in all types of armed forces, at home and abroad. Our offer is very flexible, offered solutions could be easily adapted to the individual requirements of the customers.

Main services and products

- → Observation devices (periscopes) installed in armoured vehicles.
- → Modernization and renovation of observation devices (periscopes).
- → Thermal imaging target sights for anti-aircraft guns, e.g. CKE-1T sight.
- → Night vision target sights for anti-aircraft guns, e.g. CKE-1N, CKE-2N sights.
- → Day target sights, including: CP1-SP sight for the PZRA PILICA anti-aircraft artillery system.
- → DJ-25 unmanned aerial vehicle jamming system.
 - CKE-1T thermal target sight for anti-aircraft gun and missile system ► p. 49
 - DJ-25 Jammer Unmanned Aerial Vehicle (UAV) jammer system > p. 50
 - Heated observation devices OPO-120F, OPO-125F, OPO-130F ► p. 63

REKORD Hale Namiotowe

CONTACT Mazowiecka 17 50-412 Wrocław, Poland halenamiotowe.com.pl e-mail: rekord@halenamiotowe.com.pl tel.: +48 71 34 38 388 HALE NAMIOTOWE Sp. 2 0.0.

PREXER®

Rekord Hale Namiotowe Sp. z o.o. is a supplier of modern tent halls recognized on the Polish and European markets.

We offer rental and sale of seasonal and year-round tents. Our tent constructions will suit wherever there is a need to quickly cover a large area. In the offer, our contractors will find warehouse, trade halls, event, spherical and sports halls.

The most important achievements

- → Global Certified ISO 9001:2015, ISO 3834-2:2007, PN-EN 1090-2+A1:2012
- → Quality Management System ISO 9001:2015; AQAP 2110:2016; AQAP 2131,
- → Winner Gazela Biznesu 2018

Key products and services

- → Rental and sale of year-round and seasonal tents
- Our offer includes warehouse, trade halls, event, spherical and sports halls
- → Comprehensive sanitary facilities

- → Rental of power generators, heaters, set lights, air conditioners
- → Rental of mobile kitchens, laundry
- → Car washes



Remontowa Shipbuilding S.A.



CONTACT Swojska 8 80-958 Gdańsk, Poland www.remontowa-rsb.pl e-mail: djaguszewski@remontowa-rsb.pl tel.: +48 58 309 72 00

Remontowa Shipbuilding S.A. established in 1945 is the prime supplier of naval vessels for the Polish Navy. Thanks to many years of tradition and experience, Shipyard offers a wide range of products while the ships built in it stand out in the market due to cutting-edge technology and high level of automation meeting the Owners' requirements as well as the latest industry trends. Cooperation within Remontowa HOLDING Group gives the ability to offer comprehensive technical solutions whose final products are fully equipped, modern vessels. For more than ten years Shipyard actively participates in the program for technical modernization of The Polish Armed Forces. The experience gained during construction of over 600 modern naval ships and special vessels is a guarantee of reliability and successful execution of new orders. **Most important achievements**

- → 3 mine hunters type Kormoran II have been delivered to the Navy in the last five years and the construction of the next 3 ships of this series has been already started;
- Ongoing construction of two SIGINT (signal intelligence) type radio-electronic reconnaissance ships for the Polish Navy
- → 6 navy tugs prepared to perform a very wide range of tasks under the programme: "Technical security and rescue operations at sea pk. "HOLOWNIK"
- → Sail Training Ship for Algerian Navy

Main services and products

- → Naval vessels (minehunters, corvettes, guided missile boats, patrol vessels, minelayer-landing ships, training ships, logistic support ships, hydrographic ships, salvage and rescue ships, intelligence ship, multi role vessels)
- → Special vessels
- → Offshore vessels
- → Car Passenger Ferries
 - Minehunter Kormoran II ► p. 136

ROSOMAK S.A.

CONTACT Powstańców 5/7 41-100 Siemianowice Śląskie, Poland rosomaksa.pl e-mail: rosomaksa@rosomaksa.pl tel.: +48 32 228 57 51



We are specialists in manufacturing and servicing combat vehicles. Our products have been tested in military missions, the quality of designs incorporated by our solutions contribute to the safety of the modern soldier.

We provide solutions based on the latest technology backed by extensive knowledge and research. We also provide comprehensive training, development and support services at each stage of use of our products. Thanks to our commitment our customers can feel at ease at every stage of the product life cycle.

Our clients must face the challenges of the modern battlefield, they are aware that at every stage they can count on our support and that we are a partner who understands the challenges they face. With years of experience we have learned precisely how to tackle the problems at hand, flawlessly providing solutions for success in every mission. Our professionals provide high quality service, extensive technical knowledge and creative approaches to problem solving.

Quality and trust are the values that guide us in our work. Our customers can rely on the commitment, support and expertise of our professionals who will not disappoint them in the course of achieving new objectives. We are aware that the environment in which our customers use our products, often there is no second chance – which is why we provide solutions that work first time – always.

Main Services and Products

- → IFV Rosomak intergrated with ZSSW-30 turret
- → Medical Evacuation Vehicle Medevac
- → Reconnaissance Vehicle
- → Armoured Recovery Vehicle
- → Fire Command Vehicle
 - ROSOMAK 8x8 APC ► p. 72
 - UST-2 Training Device for PIORUN MANPADS ► p. 55

Scanway S.A.

CONTACT Strzegomska 140A 54-429 Wrocław, Poland scanway.space e-mail: space@scanway.pl tel.: +48 71 733 62 64

Scanway is a Polish SME operating in the field of vision systems and optoelectronics. It creates solutions in the fields of optics, electronics and software. The company's business is divided into two branches – industrial (Industry) and space (Space). Within the industrial business, the company specializes in developing proprietary vision systems for quality control. The company's solutions contribute to the implementation of the Industry 4.0. philosophy by automating and optimizing quality control process in industries such as automotive, printing and packaging, food, medical, etc. Scanway's vision systems allow quality control of finished goods, raw materials and the manufacturing process. Meanwhile, within the space branch, the company offers optical payloads for space vehicles. These are designed for observation, imaging and image analysis. Earth observation telescopes offered by the company are characterized by scalability, modularity and the ability to tailor imaging results to the user's purposes. The second type of payloads are vision systems that operate in space and study the condition of orbital infrastructure and monitor in-space service and production processes.

Scanway is the only one in Poland and one of a dozen companies in the world to have developed full technology for Earth observation and self-diagnostics of satellites and space vehicles. At the beginning of 2023, the Company obtained the so-called Flight Heritage, confirming the readiness and functionality of its telescopes and diagnostic instruments as part of the STAR VIBE mission, and obtaining the best space imagery ever obtained by Polish research instruments. The Company is also a key consortium member in the largest space projects carried out in Poland (EagleEye and PIAST). The most important achievements

- → Proprietary STAR VIBE in-orbit demonstration mission
- → Member of the largest Polish satellite projects (EagleEye and PIAST)
- → TRL 9 products offered

Key products and services

- → Scanway's Optical Payload (SOP)
- → Spacecraft Health Scanner (SHS)
- → Modular systems for quality control temperatures, humidity, sea fog, etc.
 - Scanway's Optical Payload (SOP) ► p. 38
 - Spacecraft Health Scanner (SHS) > p. 39

SecureVisio

CONTACT Hoffmanowej 19 35-016 Rzeszów, Poland securevisio.com e-mail: kontakt@securevisio.com tel.: +48 564 421 963

SecureVisio is a major EU-based and the largest Polish cybersecurity software vendor established in 2010 offering an automated cybersecurity management platform.

Our platform integrates 9 critical cybersecurity solutions within security operations, risk, compliance and data protection. Our suite of cybersecurity capabilities include asset discovery, risk management, vulnerability management, data protection, threat intelligence, XDR, SIEM, SOAR and UEBA solutions.

Having collaborated with over 100 clients across various sectors including healthcare, telecommunications, manufacturing, energy, and banking we have established a strong presence in both the public and private sectors.

We have developed network of over 30 certified implementation partners in Central Europe, Asia and Africa ready to support platform implementations.

Most important achievements

→ Deloitte Technology Fast 50 2022 Central Europe Impact Stars

Main services and products

→	Asset discovery	→	XDR
→	Risk management	→	SIEM
→	Vulnerability management	→	SOAF
→	Data protection	→	UEBA
→	Threat intelligence		





SILTEC Sp. z o.o.

CONTACT Parzniewska 12 05-800 Pruszków, Poland www.siltec.pl e-mail: biuro@siltec.pl tel.: +48 22 572 18 00

SILTEC Sp. z o.o. is a privately held Polish company with 40 years on the market. We provide reliable, trusted products and services for defence, security and civilian customers mainly in the EU & NATO. Experience, technical proficiency and over 150 highly qualified employees sets us apart of many other market players.

Our portfolio includes:

- → equipment and services for classified and sensitive information protection (TEMPEST);
- → customized power supply systems;
- → systems and solutions for military and governmental entities.

Our headquarters include offices, production lines, laboratories and testing rooms. We design, manufacture, test and hold full scope of project management. We are a leading TEMPEST manufacturer and tester with EU & NATO certification. Our expertise in this field enable us to provide full scope of related trainings and support in creation of necessary technical environment in new locations.

Key products and services

- → TEMPEST NATO SDIP-27 and EU IASG 7-03 compliant IT equipment
- → Mobile Data Centers
- → Armoured Observation Container
 - All-in-One Zero Client Terminal SIL720 L/T ► p. 90
 - Armoured Observation Container (OKO) ► p. 120
 - Portable VTC System SIL788 MVTC/WRB ► p. 98
 - Servers Room ► p. 101
 - Shielded Cabinet SIL720-SzE19xx Series > p. 102
 - Small Intelligent Light satellite terminal SilPack series ▶ p. 147
 - TEMPEST Filter SIL-TFS16A > p. 103
 - TEMPEST NATO SDIP-27 and EU IASG 7-03 compliant IT equipment > p. 103

SpaceForest Sp. z o.o.

CONTACTwww.spaceforBolesława Krzywoustego 1Be-mail: space81-035 Gdynia, Poland+48 58 770 56

www.spaceforest.pl e-mail: spaceforest@spaceforest.pl +48 58 770 56 46



SpaceForest specializes in microwave techniques, artificial intelligence, advanced electronics and rocket technologies. The company provides services in the field of design, prototyping and production of microwave equipment, precision mechanics and electronics, as well as launching experiments on board of internally developed experimental rockets. SpaceForest implements technologies applied in aerospace systems, radars, autonomous tracking and communication system for flying vehicles, or Filter Tuning Solutions for manual and automatic cavity filters tuning.

Main achievements

- → Contribution in EU projects: DEWI (Wireless Sensor Network for launchers) and SALTO (Reusable strategic space Launcher Technologies and Operations)
- → Several projects for European Space Agency (Frequency generators, Solid State Power Amplifiers)
- → Implementation of AI-based filter tuning software to the companies in Europe, Asia and America

Main products and services

- → HUSSAR The HUSSAR portable X-band radar, which can be connected to the drone, allows you to scan the terrain and manage the space within your range. The radar can be used to monitor security areas, e.g., by border authorities, police, and fire brigade, for detection and tracking of suspicious and unauthorized drones and cars, but also for land surveying and mapping, land monitoring and surveillance, illegal clearing or trenching backwaters.
- → PERUN is a single stage guided suborbital launch vehicle powered by a hybrid rocket engine which can be used as a TBM imitator in supersonic flight. Two-way communication link provides monitoring of the rocket's parameters during flight, as well as sending the control command. Made of lightweight composite structures. The rocket head is transparent to the radio signal for communication. The thrust vector control (TVC) allows the rocket to change direction during flight.



- → RASEL The fully autonomous tracking and data transmission system is used to allow for reliable, longdistance communication with a rocket or other flying vehicle. It provides comprehensive tools for tracking and tracing airborne objects like rockets, drones, or satellites, with possibility to implement 2-way communication with the flying object.
- Filter Tuning Software (FTS) is a computer aided powerful software suite for manual and automatic cavity filters tuning. This unique software is based on artificial intelligence algorithms and novel computational methods. SpaceForest manufactures microwave filters and other devices on behalf of customers, with FTS support during design, optimization and tuning.
- Services SpaceForest provides a wide range of services in the field of design, prototyping and manufacturing of microwave devices, precision mechanics and electronics. In the mechanical department design, precise mechanical components for the space industry like housings or microwave filters are developed and manufactured. The company conducts the projects from the concept and design through the analyses and simulations to the manufacturing and tuning.
 - Filter Tuning Software ► p. 95
 - HUSSAR PORTABLE X-BAND RADAR ► p. 20
 - Rasel Autonomous Tracking And Data Transmission System ► p. 36

Spectre Solutions Sp. z o.o.

CONTACT	https://spectre.solutions
Aleje Jerozolimskie 85/21,	e-mail: franciszek.milczarski@spectre.solutions
02-001 Warszawa, Poland	tel.: +48 881 005 129

Spectre Solutions is an innovative drone company that was founded in 2014. For ten years, the organisation has been designing and producing drones for special purposes. Spectre Solutions' flagship products are the SPECTRE-1 and SPECTRE-2 drones, which can transport or monitor critical infrastructure. These drones have a wingspan of 3.5 m and can reach speeds of up to 140 km/h. Depending on the order specifications, they can fly up to 700 km and 6.5 hours. At the MSPO2023 in Kielce, Spectre Solutions showcased a joint military project with the Polish Armaments Group. Also the firm has a lot of experience in research and development projects. With Polish funds' support, it developed the first civilian drone project, SPECTRE-1, in collaboration with the Warsaw University of Technology. The company is now working on its next project – a system for measuring vehicle speed – a mobile speed camera. In 2024, Spectre Solutions won another EU-funded project and will carry it out in an international consortium. The organisation team consists of 50 people who have extensive skills and experience in the drone and aviation industry.

Most important achievements

- → At the MSPO2023 in Kielce, Spectre Solutions showcased a joint military project with the Polish Armaments Group.
- → The firm has much experience in research and development projects. With Polish funds' support, they developed the first civilian drone project, SPECTRE-1, in collaboration with the Warsaw University of Technology. The company are now working on its next project a system for measuring vehicle speed a mobile speed camera. In 2024, Spectre Solutions won another EU-funded project and will carry it out in an international consortium.
- → Spectre Solutions has been a leading drone company for 10 years, with a team of 50 experts in the drone and aviation industry.

Main services and products

- → SPECTRE-2 drone, which can transport various medical supplies or monitor critical infrastructure.
 - SPECTRE-2 ► p. 40

SZCZĘŚNIAK Pojazdy Specjalne Sp. z o.o.

CONTACT Bestwińska 105A 43-346 Bielsko-Biała, Poland www.psszczesniak.pl e-mail: biuro@psszczesniak.pl tel.: + 48 33 827 3400; fax: + 48 33 818 2614

SZCZĘŚNIAK Pojazdy Specjalne Sp. z o. o. is a private company established in 1992 and it's one of the leading producer of vehicles for fire services, police, army and civil services. Over 280 vehicles are manufactured yearly, of which 80% represents vehicles for fire services and remaining 20% – military or special vehicles. They are being operated in 30 countries.



SZCZEŚNIAK

Since 2006, the company is in possession of concession No. B-046/2006 of the Ministry of the Interior and Administration to conduct business activities in the fi eld of manufacturing and trading: explosives, weapons, ammunition, products and technology for military or police purposes. It has implemented the management system compliant with AQAP 2110 and the Internal Control System according to the Act of November 29, 2000 on Foreign Trade in Goods, Technologies and Services of Strategic Significance for State Security and for Maintaining International Peace and Security, (Dz.U. 2000 nr 119 pos. 1250, with later changes) enabling to provide deliveries for armed forces. Moreover, the company received the NATO Code of National Economy Entity (NCAGE) 1798H, issued under the NATO Codification System.

In 2019 the company was included in the group of enterprises of special economic and defence importance by the Ministry of National Defence. By decision of the MoD the company has assigned tasks for Polish Armed Forces. **Most important achievements**

- → An enterprise of special economic and defence importance for Polish MoD
- → Restricted information office
- → Concession of the Ministry of Interior and Administration No. B-046/2006
- → AQAP 2110 implemented
- → NCAGE code granted
 - Heavy wheeled recovery vehicle > p. 63

Tech Robotics

CONTACT Lindleya 16 02-013 Warszawa, Poland www.TechRobotics.pl e-mail: office@techrobotics.pl tel.: +48 798 737 246



We are a provider of cutting-edge unmanned ground vehicle (UGV) drone technologies. We utilize the latest advancements to develop best-in-class lightweight mobile platforms. Our expertise lies in battlefield-oriented robotics. Our team consists of experienced engineers and service veterans. We specialize in designing, developing, manufacturing, and delivering ground robots and drones.

The most important achievements

- → Development of an innovative training system OSCAR[™], which utilizes robotic technology for simulating moving targets
- → Implementation of the proof of concept the HALNY[™] Tactical System (defensive and offensive) with proprietary software for autonomous navigation, location, and perception

Key products and services

- → Mobile shooting Robotic Target[™] 2WD
- → Mobile shooting Robotic Target[™] 4WD
- → Shooting target Dummy 3D TechFlex[™]

■ Mobile shooting target: Robotic Target[™] 2WD, Robotic Target[™] 4WD > p. 155

TELBUD S.A.

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Since 1987 we have been providing telecommunications, facility protection, automation and supervision and control solutions. We specialize in designing, developing, implementing and maintaining comprehensive security systems with dedicated communication and supply systems of various manufacturers. The invented and developed by us platform ARGUS featuring computer supervision and control system is based on our own, proprietary software of PSIM (Physical Security Information Management) class. We are an engineering company, in 100% owned by Polish shareholders. We have the license from the Ministry of Internal Affairs and Administration to run business operations consisting in property security services (technical security of facilities), and in particular in the area of the installation of electronic devices and alarm systems signalling threats to any protected persons or property items as well as in the area of their operation, maintenance and repairs on site.

The rights granted to us enabled us to implement many important projects for military units, mainly in the area of technical security devices, telecommunications networks and supply systems. We focus mainly on the provision of design and installation services in the area of technical security devices, including burglar alarms, access control systems, CCTV,



fire alarms and fire safety systems with the entire infrastructure of telecommunications and supply networks. We provide the services of integration of these systems with the use of our major product - ARGUS PSIM (physical security information management). At present, we are working on many comprehensive technical security systems and security management systems for our key clients, in particular PSE, PERN, The Polish Border Guard Headquarters and other military units."

Protection of classified information:

- → IT system security accreditation certificate,
- → first degree industrial security certificate, secret clause,
- → first degree industrial safety certificate, NATO clause,
- → first degree industrial safety certificate, SECRET EU clause.

The most important achievements

- → integration of technical protection of PSE SA power stations
- → construction of an electronic barrier on the border with the Russian Federation
- → implementation of CNS Device Monitoring System for Polish Air Navigation Services Agency
- design and construction of technical protection systems for PERN facilities; design and construction of a security management centre for all PERN facilities

Key products and services

- → service: designing, developing, implementing and maintaining comprehensive security systems with dedicated communication and supply systems of various manufacturers
- product: ARGUS PSIM the physical security information management class platform, integrating technical security systems

■ ARGUS PSIM ► p. 91

TELDAT

CONTACT Cicha 19-27 85-650 Bydgoszcz, Poland

teldat.com.pl e-mail: teldat@teldat.com.pl tel.: +48 52 341 97 00

TELDAT is the only Polish company specializing in the field of military ICT (including wide-area command and communication battle and crisis management systems) that has been dynamically and effectively operating in the security and defence area for nearly 30 years. TELDAT core product is the Network Centric Data Communication Platform JASMINE which is an automated system that supports military and communication activities. Our hardware and software solutions have been successfully used and tested in the majority of Polish Armed Forces units and institutions, NATO, European and American research laboratories and largest military exercises such as Combined Endeavor, NATO CWID / NATO CWIX, Bold Quest and many others.

Most important achievements

- → long-term cooperation with the Polish Ministry of National Defence;
- delivery of software/multidomain Combat Management System of Systems JASMINE and ICT Nodes in a container and portable version with system and management software to the Polish Armed Forces;
- → delivery of routers with system software for the PATRIOT system to Raytheon Technologies;
- → numerous prizes and honours awarded by the Ministry of National Defence and Raytheon Technologies.

Main services and products

- → Network Centric Data Communication Platform JASMINE Multidomain Combat Management Systems along with its subsystem:
 - C3IS JASMINE software / Multidomain Combat Management System of Systems dedicated to all command echelons and combat operations,
 - HMS JASMINE Headquarters Management System for Operational and Tactical Level,
 - BMS JASMINE Battlefield Management System for Battalion, Company, Platoon & Section,
 - VIS JASMINE Vehicle Intercom System,
 - DSS JASMINE Dismounted Soldier System,
 - JFSS JASMINE Joint Fires Support System,
 - CID JASMINE Combat IDentification Server,
 - CMS JASMINE Multilevel Crisis Management System;
- ICT Nodes in shelter and portable versions;
- → Tactical Terminal Tablets.

■ BMS JASMINE ► p. 78

- C3IS JASMINE ► p. 80
- Tactical Terminals > p. 84





THORIUM SPACE S.A.

THORIUM

CONTACT Bierutowska 57-59 51-317 Wrocław, Poland thorium.space s r e-mail: ewa.polawska@thoriumspace.com tel.: +48 789 254 610

Thorium Space, is a leading technology company from EU, providing electronically steered, active antenna solutions and flexible (software defined) telecommunication satellite payloads, supported by R&D founds from EU and Polish MoD and by European Space Agency (ESA) for latest generation, innovative, flexible RF payloads in Ku and Ka band for GEO telecommunication satellites, company also providing ground innovative ground segment flat panel terminals in Ku/Ka bands. **Most important achievements**

Thorium Space, the Polish technology company, is known for several key achievements in the fields of space and communication technologies. Here are some of their most important accomplishments:

Development of Phased Array Antenna Technology:

Thorium Space specializes in the development of modern phased array antennas, which are crucial for satellite communication. These antennas enable more efficient and precise beam management, which is essential for increasing the bandwidth and reliability of communication systems.

Innovative Miniaturization of Space Equipment:

The company works on technologies that allow the reduction of size and weight of space equipment, translating into lower launch costs and increased efficiency of satellites.

International Collaborations and Projects:

Thorium Space engages in numerous international research and technological projects, collaborating with other companies and research institutions worldwide. These collaborations provide access to the latest technologies and global markets.

Projects Related to 5G Satellite Communication:

The company is working on integrating satellite technology with 5G networks, a key component of future communication systems. The development of these technologies will enable faster and more reliable connections in remote areas. Work on Innovative Space Communication Systems:

Thorium Space is developing communication systems that can be used in various space missions, both commercial and scientific. These technologies include systems for communication between satellites and Earth. **Recognition and Awards:**

The company has received numerous awards and recognitions, both nationally and internationally, for its innovative approach and achievements in space technologies.

Thanks to these accomplishments, Thorium Space is gaining increasing recognition in the global market as an innovator in space and communication technologies.

Main services and products:

- → Aurora Satellite Terminal
- → Thorium Space chipsets

■ Aurora Satellite Terminal ► p. 8

TRANSBIT Sp. z o.o.

CONTACT Łukasza Drewny 80 02-968 Warszawa, Poland www.transbit.com.pl e-mail: biuro@transbit.com.pl tel.: +48 22 550 48 00

Transbit is a leading producer of communications equipment in Poland, supplies the Polish Army with top-of-the-line military equipment and is a partner of the Polish Armed Forces in several major operational programs of the Technical Modernization Program. Transbit is a well-established private entity in the Polish market with over 35 years of experience in the design and manufacture of military equipment.

The main business of Transbit Company is the design and manufacture of communications devices and software systems for defence and security, and in particular for the Communications and Command Forces, Air Defence Forces.

We supply complete, integrated for both a stationary communication system and for field facilities along with cable, fiber-optic and long relay links ICT equipment for special systems and public networks. Devices designed at Transbit are consistent with the Software Communication Architecture (SAC) concept, this allows the device to be adapted to new user needs.



[■] Thorium Space chipsets ► p. 41

Transbit's most important products are:

- → R-460AM-2 digital radio relay link belongs to the latest generation of High Capacity Line-of-Sight Radios (HCLOS) in NATO IV (4.4GHz÷5.0GHz) and III+ (1350MHz 2690MHz) bands. Transmission capacity is up to 200 Mbps in Band IV in each direction with the possibility to operate in Frequency Hopping (FH) mode. Works with Switched Beam antenna.
- → Wideband Radio R-450C-01- designed to create wireless local (LAN) and wide area networks (WAN) IPv4 (IPv6) package networks, up to 120 nodes in a network using Band I (225 to 400 MHz). Self-organizing Mobile Ad-Hoc Network IP (MANET) with multi-hop functionality. Radios are highly resistant to interferences and adverse propagation phenomena
- → Unmanned Aircraft Radio Data Links (UAV Radio Data Link) widebandcapable airborn network radio design for UAV. Designed for wireless encrypted communication between Ground Control Station and UAV. It enables to transmit by radio video stream, data sensor in real-time. Radio links also provide command and control of the unmanned aircraft. Operating range of 150 km.
- → SMIKO's software system is designed for ICT network management, configuration, monitoring of equipment in the combat formation of e.g. air-defence battery.
- → VoIP terminals, phones are designed for voice connections with the use of VoIP technology.
- → Network equipment for the organization of IP networks tactical on-board routers, network switches, tactical servers.
- → Cryptographic devices, are made in accordance with SCIP standards.

All devices and software of Transbit are designed for operation in harsh environmental conditions and meet strict military standards in this regard.

A great achievement of the Transbit was the integration of the R-460A radio relay link with the IBCS air and missile defence command and control system produced by Northrop Grumman for Poland's WISŁA medium-range air defence program.

The devices produced by Transbit are among the latest generation of devices with Software Defined Radio (SDR) modulation methods, customizable to customer requirements. They are equipped with advanced algorithms for protection against interference and interception of information, and offer a high level of security and reliability. In addition, they have a built-in Frequency Hopping (FH) mechanism. Security of transmitted data is guaranteed by built-in encryption of AES 256 standard.

Transbit devices are used to create communications infrastructure of network-centric command systems at the brigade, battalion, company level. The need to build radio communications for the ICT systems used in the armies of the world and the increasing amount of transmitted data from the battlefield necessitates the use of state-of-the-art communications systems, as exemplified by the Relay Link R-460A, or Wideband Radio R-450C.

Key products and services

- → Digital radio relay R-460A
- → Wideband radio R-450C-01
- → Routing platform RP-201-01
- → VoIP gateway CV-12r-01
- ➤ Tactical server SUS-24-01/02
- RADION[®] battlefield communications system, is based on R-450C digital wideband radios, providing tactical level subunits with digital communications over an IP radio network.
 - Digital radio relay R-460A > p. 81
 - RP-201-01 Routing Platform > p. 98
 - SUS-24-02 Tactical server > p. 102
 - VoIP gateway CV-12r-01 > p. 86
 - Wideband radio R-450C-01 > p. 87

WB GROUP

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WB GROUP is the largest entirely Polish private manufacturer operating in the defence industry, with a large investment share of the State Treasury (Polish Development Fund). It employs nearly 1,700 people, more than half of whom are engineers. It is the largest national entity conducting independent research and development projects in the defence, public security and IT security industries in Poland. WB GROUP solutions are based on many years of experience in the operation of systems implemented in Poland's Armed Forces and a long-term cooperation with the most demanding customers. The Group's companies specialize in the field of communication systems, battlefield management and command systems, unmanned systems, information and communication technology and mechatronics.

WB GROUP is the largest Polish exporter of defence technologies to dozens of countries. The company is the only entity in the Polish defence industry that has sold the production license for the FONET system to the United States. The system is used by the US Armed Forces and several dozen other countries. Military radios, unmanned systems – both reconnaissance and loitering munitions, are also exported.

WB GROUP's solutions are implemented in self-propelled howitzers (Krab, Goździk, Dana and K9PL among others), self-propelled mortars (Rak), multiple rocket launchers (Langusta), as well as other artillery systems used by the Polish Army Forces. They are to be integrated with the systems recently purchased for the Land Forces, including Homar/ HIMARS and K239 rocket and missile launchers. The Group's companies are engaged in the modernization of artillery assets in other countries as well.

The key advantage of the solutions offered by WB GROUP is their modularity and scalability. This allows a great number of WB GROUP's systems' configurations, making it a comprehensive suite of tools for a multi-domain battlefield management in accordance with user expectations.

The most important achievements

- → Award of the President of the Republic of Poland
- → Special Honours of the Minister of National Defence
- → Numerous Defender awards for the Group's products
- → The award of the Interior Minister and the Police Commander in Chief
- → CIO Applications for the Top 10 Drone Tech Solutions Providers
- → Leader of the Energy award
- → Border Guard's Laurel award
- → Award of the Minister Entrepreneurship and Technology
- → Award of the National Centre for Research and Development
- Key products and services
- → TOPAZ
- → FONET
- → FLYEYE
- → WARMATE
- → PIK
- → Comp@n radio
 - COMP@N Software Defined Radio ► p. 79
 - FLYEYE mini Unmanned Aerial System ► p. 18
 - FONET Digital Communication Platform > p. 82
 - PIK MC Communication Integration Platform Mission Critical ► p. 82
 - Topaz Integrated Combat Management System > p. 85
 - UST-2 Training Device for PIORUN MANPADS ▶ p. 55
 - WARMATE Loitering Munition System ▶ p. 42

Wojskowe Zakłady Łączności Nr 1 S.A. (WZŁ-1)

CONTACT Warszawska 22C 05-130 Zegrze Południowe, Poland wzl1.com.pl e-mail: korespondencja@wzl1.com.pl tel.: +48 22 784 12 36

Wojskowe Zakłady Łączności No. 1 S.A. produce and service communication equipment for the needs of the Armed Forces and other uniformed services. The company also offers other equipment, used in command and control positions at various levels of the Polish Armed Forces. In addition, as a satellite operator, WZŁ-1 S.A. they can provide services to both the military and civilian sectors.

The Company during its activity as a main integrator and supplier, executed MOD programmes related to manufacturing and modernising mobile field communication systems as well as programs of mobile digital communication systems for the Polish Telecommunications.

Most important achievements

- Company takes part in many contests, latest awards:
 - POLSECURE Award for Mobile Forensic Platform 2022



- Award of the Commander of the Armed Forces, Lieutenan General Tomasz Piotrowski, for the Digital and Transmission Communication Shelter – 2022
- Defender 2023 for Mobile Communication Center 1

Main services and products

- → Tactical Radio Router 8 (Taktyczny Router Radiowy 8)
 - Tactical Radio Router 8 ► p. 83

Wojskowe Zakłady Uzbrojenia S.A. (WZU S.A.)

CONTACTwzu.plParkowa 42e-mail: wzu@wzu.pl86-300 Grudziądz, Polandtel.: +48 56 64 462 00

Wojskowe Zakłady Uzbrojenia S.A. operates in the field of defence missile technology, support safety and maintain technical condition of weapons and military equipment at the level of full technical efficiency by providing modifications, modernizations and maintenance of missile technology and tube and rocket artillery. WZU S.A. offers deliveries of, among others: elements of radar systems for initial target detection and missile guidance, optoelectronic systems, training simulators for anti-aircraft missile systems and vehicles to transport missiles for anti-aircraft missile systems.

WZU S.A. is a stable and developing company with over 60 years of tradition. Our cooperation with largest armaments companies in the world enabled achieving significant position in the international group of companies dealing with modernizations of missile weapons and being recognized as one of the leaders in the field of refurbishment and modernization of anti-aircraft missile systems in the European and American markets.

As a member of Polska Grupa Zbrojeniowa S.A. capital group, we participate in Wisła, Narew and Pilica+ Programs, considered critical for Polish Armed Forces and we are developing towards establishing cable harness production centre based on previous experience and capabilities achieved during performance of Offset Obligations in "WISŁA" Program Most important last achievements:

- → Special Mention of the Minister of National Defence for PGZ Narew consortium (WZU S.A. is responsible for integration, assembly and disassembly of EMADS missile launcher with vehicle chassis)
- → Defender Award for the product SPECIAL VEHICLES OF WISŁA SYSTEM wheeled special platforms with logistic trailer

Main services and products:

- Repairs, modernizations, modification, integration, maintenance at the depot level
- → Cable harnesses

- → Electro Optical Systems
- Training simulators

- CABLE HARNESSES ► p. 48
- ELECTRO OPTICAL SYSTEMS ► p. 51
- Repairs, modernizations, modifications, integration, maintenance at the depot level > p. 54
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XY-Sensing Sp. z o.o.

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XY-Sensing sp z o.o. is a spin-off company of the Warsaw University of Technology. The mission of XY-Sensing is to provide high level solutions in widely understood microwave sensing technology. The experience of XY-Sensing staff in development of advanced radar signal processing techniques includes imaging radars e.g. synthetic aperture radars, surveillance and tracking radars, passive and noise radars, among others. XY-Sensing staff have more than 30 years experience in developing digital signal processing methods in radar and telecommunications field.

The most important achievements

- → Participation in EDF 2021 ed. project Arturo
- → Participation in EDF 2023 ed. bidding process with two projects
- → Participation in MSPO Exhibition and Trade in Kielce since 2020





Key products and services

- → XY-PCL Radar is the novel passive radar solutions dedicated for surveillance of the demanding airborne targets like very small and slowly moving targets, high speed objects, rotary and fix-wing planes and unmanned airborne vehicles. The Passive Coherent Location Radar system does not emit any electromagnetic spectrum so it is not recognizable be the enemy detection systems.
- → XY-DemoRad is an FMCW (High-resolution Frequency-Modulated Continuous-Wave) radar with LFM (Linear Frequency Modulation) waveform. XY-DemoRad allows for accessing the raw IF signal data, which may be stored on the PC hard drive for further processing or processed online. The XY-DemoRad can use one of two exchangeable RF front-ends for 24 GHz or for 120 GHz. High resolution enables imaging of small targets on the ground and detection and tracking of moving targets in a continuous mode.
- ➤ XY-SAR Sensor three compact SAR radars operating in C-, X-m and K-band are in offer. All radars are also equipped with a real-time SAR processor with options to process the data onboard the radar carrier (UAV or plane) or at the ground station. The K-band radar is characterized by power consumption (up to 40 W), and low weight (0.5 kg) allowing you to mount the radar onboard, e.g., a drone with a load capacity of about 0.8 kg. This is an essential feature of this innovative product since most imaging radar sensors on the market are large and expensive solutions for the installation, mainly on manned aircraft or huge unmanned platforms. The X-band radar has been developed in cooperation with SpaceForest company in Poland.
- → XY-Active Echo offers advanced solutions in designing customized active reflectors for radar calibration purposes. The devices can operate in different radar bands – from VHF up to X-band. The family of XY-Sensing active reflectors are offered as ground-based systems mounted on the masts or tripods or as independent devices with their own power source mounted on a flying platform as e.g., drones or aircraft. An active reflector, named XY-ActiveEcho, is a device designed to emulate a radar target with a significantly larger radar cross-section than the actual dimensions of the device.
- → Radar Signal Processor for C-band Radar for drone detection Radar Signal Processor for C-band Radar for drone detection is the project ordered by the XY-Sensing customer to design and implement a real-time processor for the C-band radar. Within this project, XY-Sensing also designed the hardware for the C-band FMCW radar.
- → RF signals Directional Finder Processor RF signals Directional Finder Processor is the project ordered by the XY-Sensing customer to design and implement a real-time processor for the RF signals Directional Finder.

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Zakłady Chemiczne "Nitro-Chem" S.A.

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The company's history reaches back to 1940s, with the key date being the year 1948, when the Chemical Factory was founded and first TNT production started. Other years important to us are 1958, when the Chemical Plant in Bydgoszcz was created. The late 80s were the period of deep transformations in Poland. It was the time that the central planned economy started to change into the free market economy. The partition of Chemical Works "Organika-Zachem" on 1-st January 1992 into two firms was the result of these changes. One of them, knows as Chemical Works "Nitro-Chem" was finally transformed in 1994 into the joint stock company.

Today, Zakłady Chemiczne "Nitro-Chem" S.A. is part of Polska Grupa Zbrojeniowa S.A. (Polish Armaments Group), a leader in the Polish industry and one of the largest defence concerns in Europe. Main objects of the Company:

- production of high explosives and their compositions and chemical products for the armaments and chemical industries,
- manufacturing medium and high caliber ammunition for military customers and providing elaboration services for other companies in the arms sector,
- production and sale of products for the civilian market: civilian blasting agents for companies in the rock mining, geophysics and road works sectors as well as the production of plastic films for the packaging industry.

Over the past decades, Zakłady Chemiczne "Nitro-Chem" S.A. has successively modernized production technologies, increased production capacity and gained new markets for its products. Today our customers are countries located on six continents. One of the most important achievements in recent years is our entry into the US market, through which we have expanded our existing military cooperation. We are expanding the activities of "Nitro-Chem" S.A. in Africa and the Middle East, and we are also continuing to work with European customers, steadily increasing our order portfolio. Since 2015, over 80 percent of the plant's production has been succesfull exported.

More than 75 years of experience in the production of explosives and the provision of ammunition elaboration services gives us an extensive knowledge of their production technologies and the needs of the defence and mining markets.

We have proven, efficient and constantly upgraded production facilities that are based on the best technological solutions. The quality of our products is confirmed by international standards such as MIL, STANAG, TL, GOST. Triniflex Plastic Films Division "Nitro-Chem" S.A., was established in 2011, as a result of diversification of the company's production activities. With the support of EU grants from the Innovative Economy Operational Program, the most modern production line from the German company Raifenhauser, dedicated to the production of non-oriented CAST films, was purchased. Since the beginning of our activity, we have been building and developing the Triniflex brand by investing in the most modern solutions, taking care of the highest quality of the offered products and meeting the expectations of our customers. We offer a wide range of polypropylene, polyester and polylactide films for the production of packaging, not only in the food industry, but in all market segments, where plastic films are used.

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Zakłady Mechaniczne "BUMAR-ŁABĘDY" S.A.

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Zakłady Mechaniczne "BUMAR-ŁABĘDY" S.A. with the registered seat in Gliwice is one of the companies of Polish Armaments Group (PGZ S.A.). It is an organization of strategic importance for the country's defence system. The company has been specialising in the production, overhauls and retrofitting of armoured vehicles. Modernization packages and overhaul services covering all types of armoured vehicles include MBT Leopard, MBT PT-91, Armoured Recovery Vehicles WZT-2 and WZT-3 as well as various types of T-72 family tanks. Zakłady Mechaniczne "BUMAR-ŁABĘDY" S.A. is the general contractor of Leopard 2A4 tanks modernization to Leopard 2PL/M1 version. As the only plant in Poland has its own testing ground.

More than 70-year experience both in terms of production and technology creates the company's potential. Successive generations of armoured equipment supplied to the Polish Army and foreign clients have established the company's position on the domestic as well as global equipment and armament market.

Main services and products (approved for export)

- → Overhauls and retrofitting of MBT Leopard 2A4/T-72/PT-91
- → Overhauls of Armoured Recovery Vehicles (WZT-2/WZT-3)
 - Overhauls and Retrofitting of MBT Leopard 2A4/T-72/PT-91 ▶ p. 70
 - Overhauls of Armoured Recovery Vehicle (WZT-2/WZT-3) > p. 71

Zakłady Mechaniczne "Tarnów" S.A.

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Zakłady Mechaniczne "Tarnów" S.A. has been carrying out industrial activities since 1917, making the company one of the oldest in the region. The company has been producing armaments and military equipment since the 1950s. The successive development of the company's competences now makes it possible to manufacture equipment in the fields of mechanical, electrical and electronic structures and computer systems, including software.

The company is best known for its wide range of armaments and military equipment, with a particular focus on sniper rifles and machine guns, grenade launchers, mortars, anti-aircraft artillery/missile and artillery systems, and training equipment.

Main Achievements

→ The company regularly wins awards for its products, including the Defender and Laur Bezpieczeństwa [Safety Laurel] at the International Defence Industry Exhibition MSPO, and the Commander of Territorial Defence Forces Award for LMP-2017.

- → Development of a number of completely new systems such as the LMP-2017 and LMC-2021 mortars, the MWS modular weapon system, ZSMU weapon station and components for the PILICA system.
 Main Services and Products
- → PSRA PILICA A-A ARTILLERY-ROCKET SYSTEM
- → ZU-23-2CP A-A ARTILLERY SYSTEM
- → LMP-2017 60 MM LIGHT MORTAR
- → UKM-2000P GENERAL PURPOSE MACHINE GUN
 - ZSMU REMOTE CONTROLLED WEAPON STATION
 - MWS RIFLE MODULAR WEAPON SYSTEM
- → TOR-12.7 ANTI-MATERIEL RIFLE
 - LMC-2021 60 MM Light Infantry Mortar > p. 176
 - LMP-2017 60 mm Light Infantry Mortar > p. 177
 - MWS-25 (SKW.308) Modular Weapon System ► p. 180
 - PILICA Anti-Aircraft Missile and Artillery System > p. 52
 - RGP-40 40 mm Multi Shot Grenade Launcher ► p. 182
 - UKM 2020S General Purpose Machine Gun ► p. 188
 - ZSMU ► p. 191

Zakłady Sprzętu Precyzyjnego NIEWIADÓW Sp. z o.o.



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Zakłady Sprzętu Precyzyjnego NIEWIADÓW Sp. z o.o. with a bang (literally) returns to the tradition of military production. This time the hit are smoke grenades, imitators, missiles, thermal cartridges, universal shaped charges, signal mines and others. We hope that after many years of our little share in this industry, we will re-enter the market widely. You can rest assured about the quality of the products, as the Niewiadów company has a long tradition in this matter. In 2020, it celebrated its 100th anniversary and for a long time after the Second World War it was a mainly military plant, while the production for the needs of the Armed Forces has been continued throughout the entire period of the Plant's operation.

The most important achievements

- → 100 years of continuous production for the Polish Armed Forces
- → The Bronze Leader of economic activity
- → Gold Certificate of the WAT Quality Certification Center for creating quality and building the potential of the defence industry

Key products and services

- → Rocket Launchers RPG-75M, RPG-75MP and RTG
- → Smoke screen grenades GAK-81
- → Signal mine FLAME
- → Shaped Cumulative Charges UŁK
- ▶ 155 mm artillery ammunition

- → 152 mm artillery ammunition
- → 122 mm artillery ammunition
- → Rockets S-5KO, S-5MO
- → Anti-tank weapon RPG-76 "KOMAR"
- 122 mm Ammunition with HE-462 Projectile and Reduced Charge for D-30/2S1 > p. 58
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The Polish Armed Forces, to ensure Poland's security, must have the most modern equipment and weapons. For many years, the modernization of the Polish Army has been carried out with the significant engagement of the Polish defence industry. Soldiers use a wide range of Polish products, from drones to self-propelled howitzers, which meet current requirements. The experience of our engineers and innovative approach to design and production, are transferred into high quality and reliability. I am glad that thanks to this publication, information regarding the activities of the Polish armament industry will reach a wide range of interested audience.

Władysław Kosiniak-Kamysz

Deputy Prime Minister of Poland Minister of National Defence

The Polish defence industry is widely recognized for its innovative approach and advanced technologies, which have a global impact. It is a crucial part of the state's economy influencing its various segments, including electronics, cyberspace and aeronautics, and positioning Poland as a leader in innovative defence and security solutions. The Catalogue, which contains 207 products from 61 companies, identifies the most important sectors and segments of Poland's defence and security market, and provides opportunities to explore a wide range of domestic defence products of exceptional quality.

Jacek Siewiera

Secretary of State, Head of the National Security Bureau

