UKRAINIAN DEFENSE REVIEW

№3 [JULY-SEPTEMBER 2016]

UDR

Defense express

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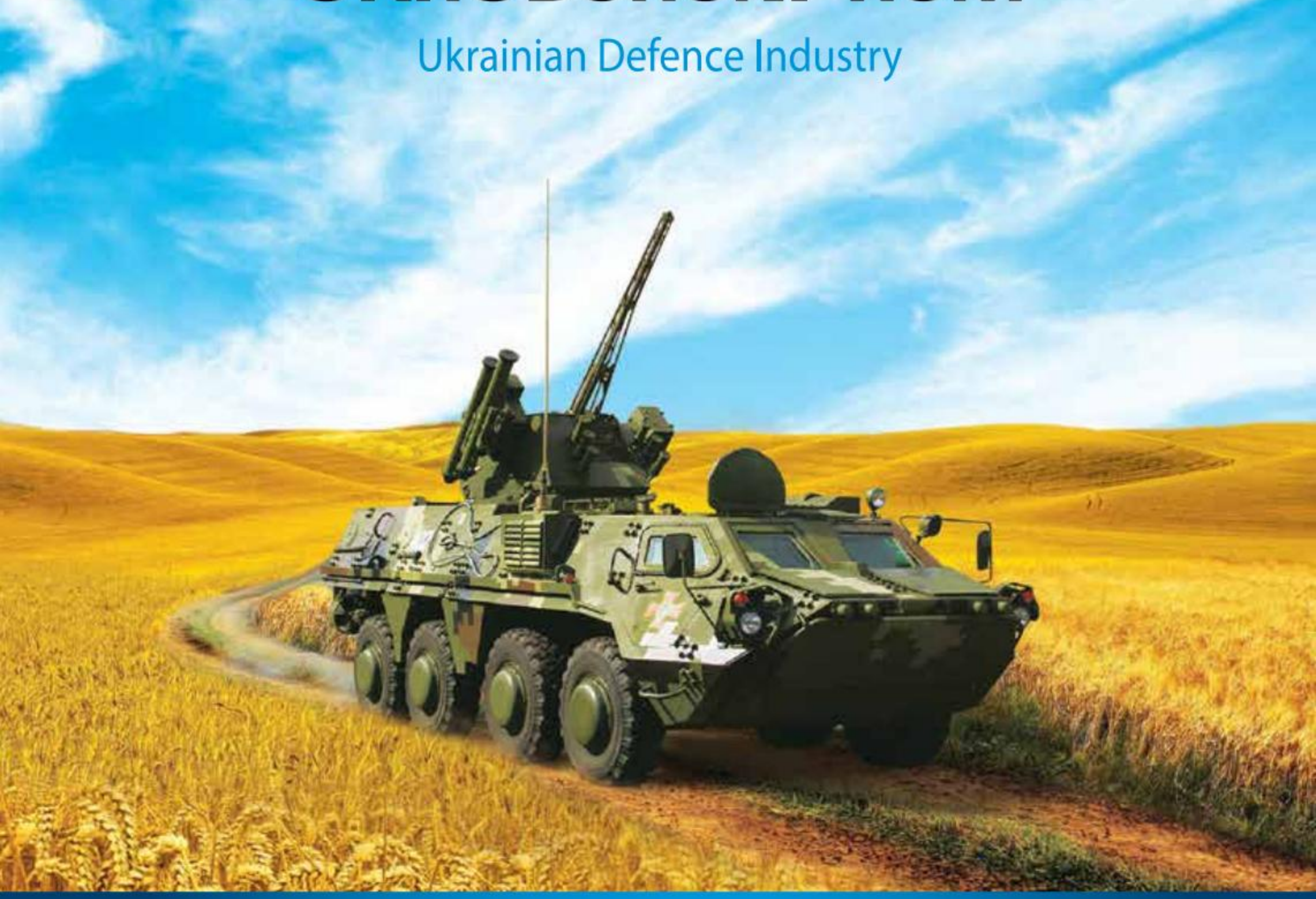

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summing up

DEFENSE EXPRESS
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SERHIY ZGURETS – head&editor-in-chief defense express media & consulting company, zgurets@gmail.com, **VALERII RIABYKH** – director of development defense express media & consulting company, defence_2@meta.ua, **ANTON MIKHNENKO** – deputy director – editor-in-chief of «Ukrainian defense review» magazine, mikhnenko_av@ukr.net, **IGOR FEDYK** – deputy editor-in-chief of «Ukrainian defense review» magazine, **MARK KANARSKY** – art director, **SERGEY POPSUEVICH** – photographer, **JANNA DYOMINA** – translator

OUR ADDRESS

10 Illinska str, of.5,
Kyiv, Ukraine, 04070
phone: +38 (044) 425-42-10,
+38 (044) 425-16-22
ukr.defense.news@gmail.com

Center for Army Conversion & Disarmament Studies
cacds.org.ua

VALENTYN BADRAK – Founder & Director of Center for Army Conversion & Disarmament Studies
VOLODYMYR KOPCHAK – Deputy Director
MYKHAILO SAMUS – Deputy Director for International Affairs

UKRAINE'S ARMED FORCES TOOK DELIVERY OF 3,300 PIECES OF MILITARY WEAPONS AND EQUIPMENT SYSTEMS IN 2016

The Armed Forces of Ukraine have been delivered 3,300 pieces of arms and military equipment in 2016 to date, the Ministry of Defense reported.

"In the period from the beginning of 2016, the Armed Forces of Ukraine have taken delivery of 3,300 pieces of military weapons and equipment systems, inclusive of armored military vehicles, automobiles, military engineering vehicles, ground radars, navigation systems, unmanned aircraft systems and ground flight support facilities", press officer for the Defense Ministry of Ukraine, Oleksiy Chornobay told a news briefing on July 6, 2016.

Following successful completion of the State Trials process, six new types of arms and military equipment have been officially added to the Armed Forces' inventory, he said.

The National Arms Modernization Program 2016 has a budget of UAH 6.875 billion (US$ 280.6 million), Mr Chornobay said.

As reported at the time, the Ministry of Defense of Ukraine concluded about UAH 4.5 billion (US$ 184 million) worth of master contracts and collateral contracts so far in 2016, under defense logistics acquisition programs.

THE U.S. HAS SHIPPED FIREFINDER RADAR SYSTEMS TO UKRAINIAN MILITARY

On July 2, 2016, the U.S. Army delivered four AN/TPQ-36 couterbattery radar systems and 10 AN/TPQ-49 countermortar radar systems to the Ukrainian military.

The delivery was celebrated in a ceremony at the Boryspil International Airport, attended by Ukrainian President Petro Poroshenko and U.S. Ambassador to Ukraine Geoffrey Pyatt.

Poroshenko said, speaking to the ceremony, "We are getting a new aid package from our American partners. These are most advanced counterbattery radar systems with which the Ukrainian military is already well familiar. The systems are very helpful for our soldiers defending their homeland".

The United States previously approved a USD 335 million aid package to Ukraine in 2016, and the U.S. Congress is considering providing another aid package worth USD 500 million.

UKRAINIAN ARMY TAKES DELIVERY OF TEN DOZOR-B ARMORED CARS

Ten armored vehicles «Dozor-B» have been delivered to the Ukrainian Army, a defense industry official has said.

The vehicles were delivered in a ceremony held at Ukroboronprom's Morozov Machinery Design Bureau in Kharkiv, Roman Romanov, CEO of Ukroboronprom defense industries holding group said on July 20, 2016, at a news conference on the outcome of work done by Ukroboronprom's top managers over the past two years.

«We have met all the requirements put forward by the Customer; following successful commissioning trials, the vehicles were accepted by MoD officials», Mr Romanov said.

The Dozor-B is a current-generation ten-seater armored military car. The armored hull is designed to protect the crew, passengers and internal equipment from NBC attacks, the effects of small arms fire, shell fragments and mine threats (7.62mm bullets fired from 30 meters, and fragments of 150mm HE shells detonated 50 meters away).

The vehicle is armed with a turret-mounted 12.7mm NSVT-12.7 antiaircraft machinegun which is aimed and fired remotely from within the armored hull. The targets that can be engaged with this machine gun are hostile armored vehicles as well as subsonic aerial targets (helicopters), at ranges up to 2,000 meters, at day or night.

Special operations units of the Armed Forces and internal security services can use the Dozor-B as a transport vehicle or a mounting platform for different weapons systems and military equipment.

Powered by DEUTZ four stroke turbocharged 190hp diesel engine mated to Allison automatic transmission, the Dozor-B is capable of speeds of up to 100 km/h.

Ukroboronprom has the capacity to produce 100+ armored vehicles Dozor-B per year.

UKROBORONPROM WILLING TO MANUFACTURE RADAR SYSTEM KOLCHUGA UPGRADES

Ukroboronprom defense industries holding group is willing to manufacture and supply upgraded and advanced versions of the Kolchuga-class long-range surveillance radar system, the Company said.

Ukroboronprom is ready for the task, with the appropriate funding. This is not about the [base-line] version of the Kolchuga system, but about the Kolchuga-2 upgrade that uses more advanced microelectronics hardware», Roman Romanov, CEO of Ukroboronprom said on June 30, 2016.

Ukroboronprom has already selected the factories and component manufacturers for this project, he said.

Kolchuga was designed and previously manufactured by Topaz Company located in Donetsk, Eastern Ukraine. After the city was seized by Russia-backed terrorists, production facilities and design and operating documentation for the Kolchuga system were evacuated from Donetsk to secure localities in other regions of Ukraine. Kolchuga-M» is a Ukrainian design of a long-range direction finding electronic support measures (ESM) receiver system. It is a passive radar that doesn't emit any radiation, but instead analyses radiation reflections from other emitters, such as radio and television stations, to detect objects. Kolchuga can detect and identify emitting sources at ranges up to 600 km on the ground and up to 800 km in the air. Its memory contains an extensive library of data on various potential targets.

PRESIDENT OF UKRAINE CEREMONIALLY HANDED OVER TWO GIURZA-M-CLASS ARMORED BOATS TO THE UKRAINIAN NAVY

The President of Ukraine Petro Poroshenko handed over two newly built armored gunboats named «Berdyansk» and «Ackerman» (Project 58155 «Giurza-M) to the Ukrainian Navy, in a ceremony held on July 3, 2016.

The two are the first indigenously built armored gunboats equipped with ISTAR assets and a capability to destroy surface and air threats.

Berdyansk and Ackerman are the first but not the last vessels to be added to Ukraine's Navy. «This is just the beginning. More production gunboats have already been laid down at domestic shipyards, and soon will be added to the Navy's combat fleet. Plans for the future include completion of other vessels, the addition of requisite types of ships and craft, and missile attack systems to the Navy's inventory, as well as the addition of an indigenous maritime patrol aircraft to the Navy's air arm, Poroshenko said at the ceremony.

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PALADA SHIPYARDS STEPPING UP EXPORT OPERATIONS

Kherson-based Palada Shipyards, a company incorporated with State-owned Ukroboronprom defense industries holding group, has delivered the newly built floating drydock "DORMAC DOC 1» to a customer in South Africa, Ukroboronprom reported in a press statement released on July 18, 2016.

The delivery is part of an UAH 250 million (USD 10 million) contract. «Palada is currently focused on export operations. It completes contracts with export customers on schedule and with a high quality, thus providing foreign currency revenues for the Ukrainian government. The money is then used for funding procurement programs for the Ukrainian military. With completion of this contract Palada has gained new opportunities in terms of further growth, production modernization and the provision of the Armed Forces of Ukraine with advanced armaments and equipment", Roman Romanov, CEO of Ukroboronprom has said.

The South African customer is considering purchasing another floating dock from Palada. DORMAC DOC 1 can carry loads of up to 8,500 tonnes; it has the maximum length of 155 m and a width of 32.4 m. The hull of the dock-ship is made of heavy reinforced seawater proof concrete, and the wingwall is built of ship steel. Such a combination of materials will reduce operating costs by 2.5 times compared with conventional steel docks.

In July 2016, Palada signed a contract to build and deliver a floating drydock to a Cypriot customer. One more drydock is now being developed for a customer in Kazakhstan.

Palada Shipyards was founded in 1936. It has a history of exporting dock-ships to Russia, Japan, Korea, Bulgaria, Finland, Croatia, Latvia, Estonia, Angola, Vietnam, Nigeria, Algeria and other markets worldwide.

UKRAINE, INDIA AGREE TO EXPAND COOPERATION IN DEFENSE TECHNOLOGY

Ukroboronprom defense industries holding group and Indian companies are negotiating a pattern for defense-industrial relationships between the two countries, Ukroboronprom said in a press statement released on June 30, 2016. The Indians show interest in Antonov products, and already have an experience operating the aircraft. They are showing most interest in the An-148/158/178 series of passenger and cargo airplanes. Other aircraft types of interest to the Indian party are An-188 and An-124, Denis Hurak, Deputy CEO for Export/Import Operations, said as quoted by the press statement. «Initially, it is planned to establish a joint venture that will work on a joint project through the provision of funding, search of markets, market research etc. But the ultimate goal is the production of airplanes», the statement reads. UDR note: At DefExpo India in March 2016, Ukraine signed 15 memorandums of understanding on cooperation with India's leading defense manufacturers and customers. In particular, Reliance Group of India and State Corporation Antonov of Ukraine agreed to cooperate on dual version transport aircraft for military, paramilitary and commercial use in India. The partnership between Reliance Group and Antonov envisages the design of medium-lift dual use turbofan aircraft configured for use in tactical as well as strategic roles. Also at DefExpo India, State Company Zorya-Mashproekt, based in Mykolayiv, signed two deals to supply naval equipment to the Ministry of Defense of India.

Ukrainian advanced research project agency

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For Ukrainian market we can offer complete engineering support and formal military-project management.
For international market we can provide advanced military technologies and products tested based on modern warfare's experience.

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UKROBORONPROM: RESULTS – ORIENTED MANAGEMENT

Just 2 years ago most of UKROBORONPROM (UOP) enterprises were economically inefficient. Facilities in critical condition, high level of corruption, zero innovation, lack of teamwork and communication within the system and non-motivated staff demanded wise and timely management decisions.

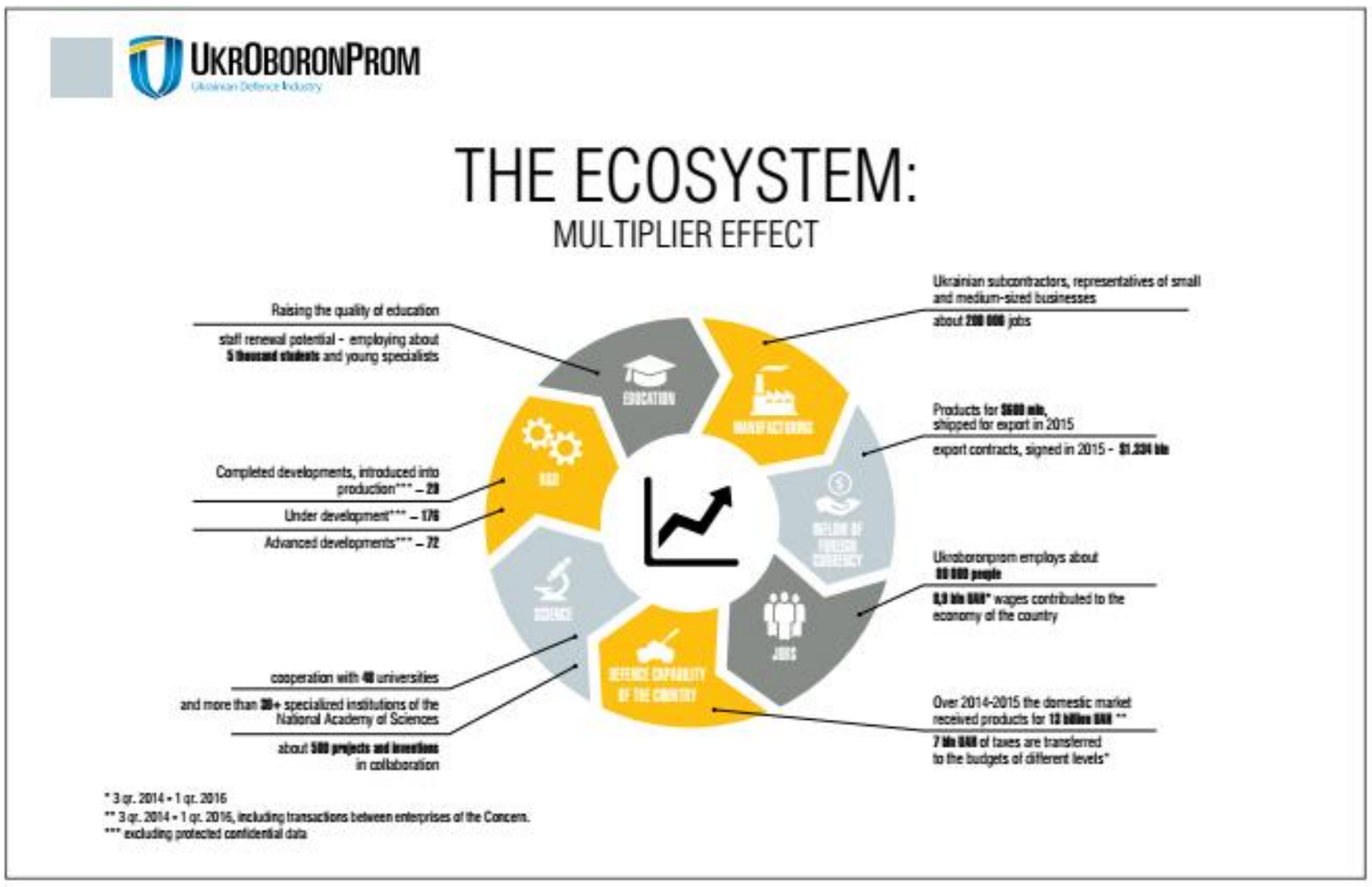
UOP management came up with a solution: internal transformation of the SC «UkrOboronProm» by «small number» principle, top management replacement, changing the principles of work performance: change of operational and business models; result-oriented management; fiscal accounting centralization; electronic document flow; package proposal.

To achieve the results, mentioned above, UOP team came up

with the key areas to work on, most notably: qualified personnel; transparency and system-based management logic; manufacturing and innovations; operating activity; integration into the world community.

Each of the areas, mentioned above, demanded work and efficient management decisions, to turn the military-industrial complex of Ukraine into a real economic powerhouse for national economy.

Replacement of corrupt officials, attracting professional managers and improving existing personnel potential by training practices contributed to efficient management of UOP enterprises-participants.



As of today, on its innovative personnel reserve platform, online, UOP has 1264 resumes of qualified professionals, of which 23 PhDs., 7 doctors of sciences, 408 specialists with 2 diplomas, 771 candidates have 1 diploma and 75 - specialized secondary education.

Approximately 80,000 highly skilled people work for UKROBORONPROM, many of which have high academic degrees in engineering, applied mathematics, physics, etc.

The State Concern cooperates with KMBS and MIM-KYIV business schools: Employees with MBA and those, who are still obtaining their diploma, have better chances to be hired for top position.

KMBS act as consultants within the framework of the State Concern's strategy development. Joint program with Johns Hopkins School of Advanced International Studies and Thunderbird School of Global Management for the heads of the enterprises contributes to efficient management of the enterprises of military-industrial complex.

The key points of manufacturing and innovations involve the following:

- Investment into R & D;
- Collaboration with universities NASU (import substitution, ideas, projects);
- Investment in production planning;
- Development of mass production;
- Attracting businesses to Ukraine, aiming for import substitution.

More than 60 of the State Concern enterprises are collaborating with universities and secondary education institutions on training and exchange of scientific and technical information. Collaboration with educational institutions resulted in 475projects, of which armored vehicles – 40 projects, aviation – 34, shipbuilding -2, rocket and artillery -20, EW – 86, military medicine -11, special equipment -106.

Examples of recent projects in aviation technology, special weapon systems, and military equipment: training and combat airplane; multifunctional reactive UAVs of «Mini - flight» type; multipurpose unmanned aircraft of convertiplane type; powerful military laser systems.

Besides, at the expense of the Concern enterprises, the following developments were manufactured innovative three-dimensional surveillance radar, short-wave band communication systems radio monitoring device, counter sabotage sonar, 30 mm automatic gun, communications jamming complex, collimator sight for small arms.

As of today, UKROBORONPROM has 10+ design bureaus, engaged in development, design and research, enabling the State Concern to implement new solutions and innovations.

Initiative UOP developments are 120-mm self-propelled mortar for BTR-4E; Ra-

dioelectonic and target condition control station; 155-mm self-propelled howitzer on chassis of the main battle tank «Oplot» with exterior artillery units; unmanned tactical class aircraft complex; guided anti-tank missiles PK-3 , PK-2M, complex «Corsar», helicopter missile «Alta»; modernization of T-72 tank to the NATO standards (PT-91 Polish Army).

The State Concern co-operates with 90+ countries and is working on the joint projects with the worlds' leading companies. UKROBORONPROM is winning export markets. In 2015 the State Concern export ted products for 600 mln USD and signed contracts for $1,3 billion. Export ensures stable currency inflow to the state budget.

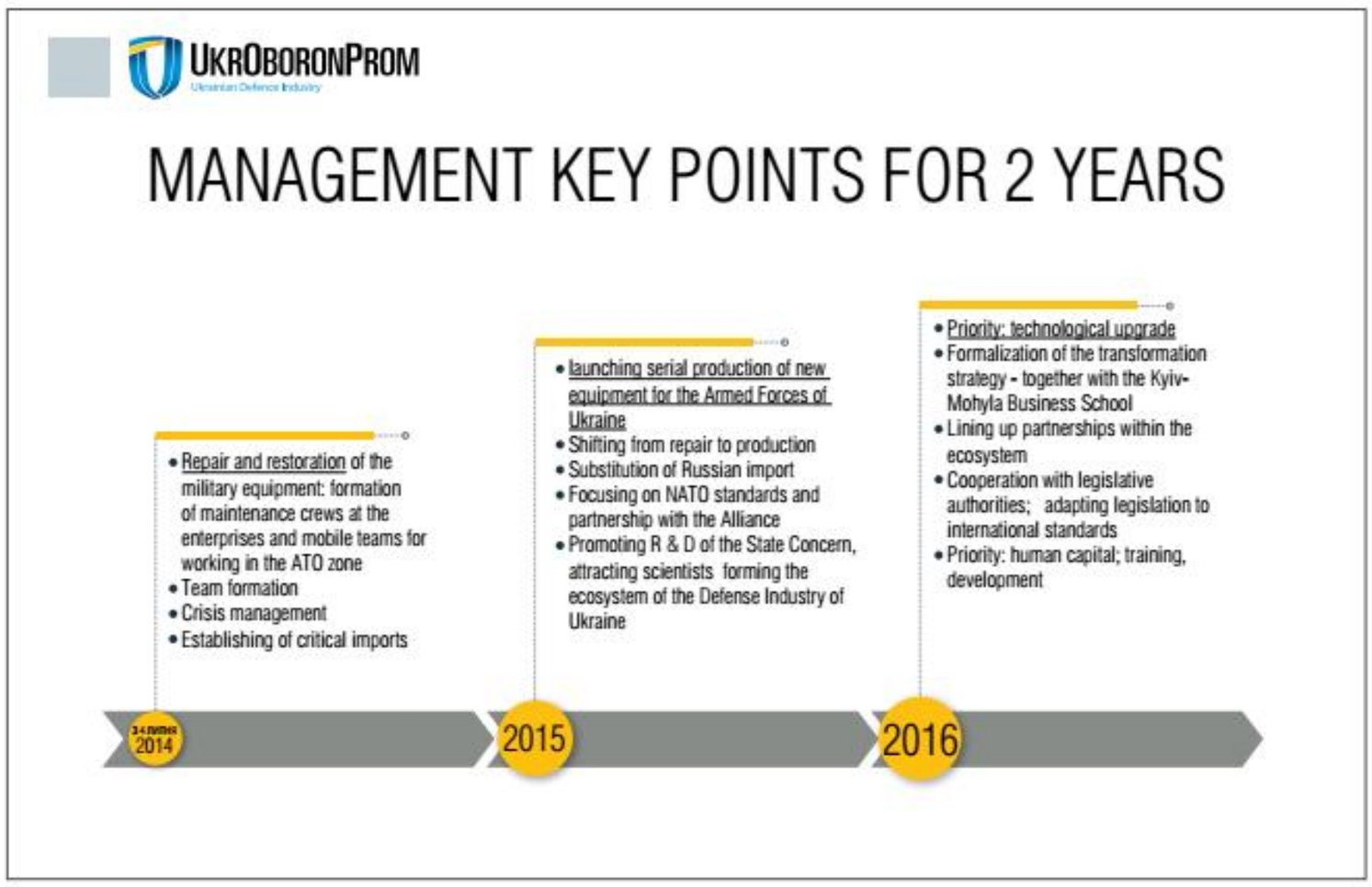
The recent project - UOP is developing on the model of the world leaders, such as BOEING and AIRBUS with the leading aviation companies - is AN-132 for Saudi Arabia. At the same time, more than a half of components will be produced by domestic enterprises; world's best companies will deliver the remaining spares. In particular, Pratt & Whitney Canada PW150A will provide turboprop engines and British Dowty Propellers will supply with propellers R-408. The aircraft will be powered with avionics and power supply system by American Honeywell, and air preparation system by Liebherr.

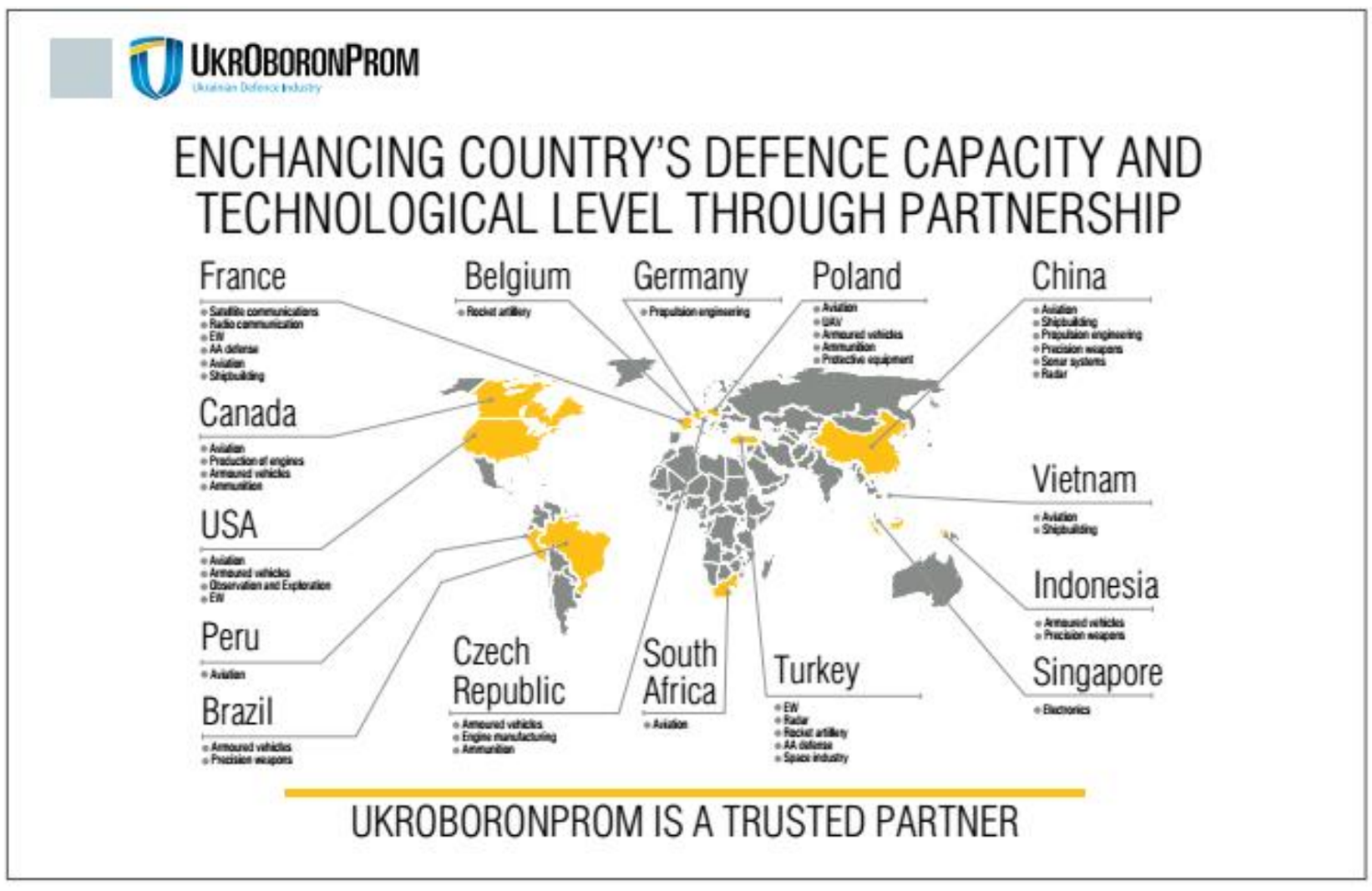
The State Concern is a trusted partner, negotiating with international companies in the military-technical sphere almost daily, creating joint ventures with the world's leading companies, implementing promising projects. This way of development allows bringing Ukrainian defence industry to world best practices, creating new jobs and increasing contributions to national budget.

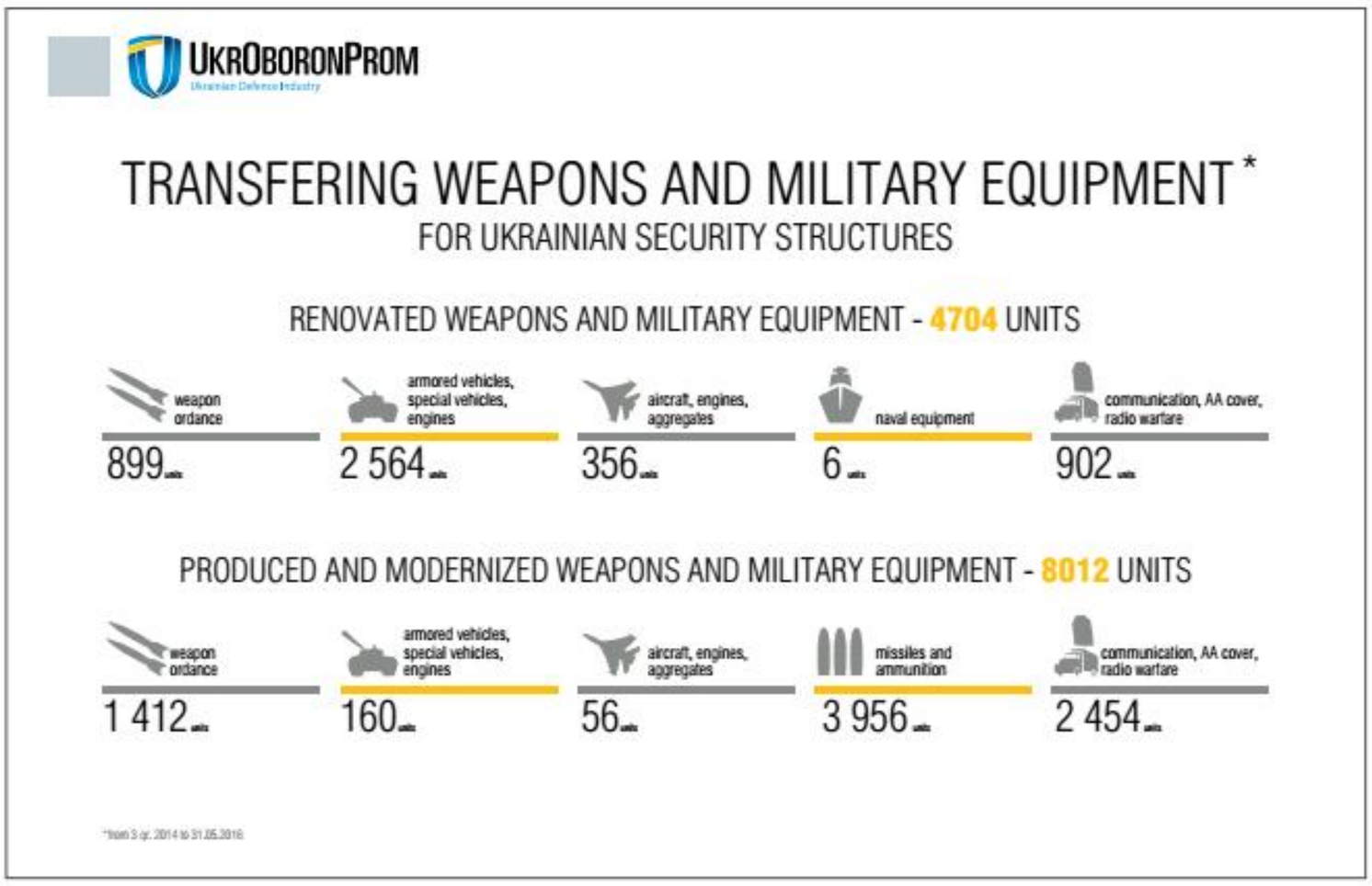
UKROBORONPROM is strengthening internal cooperation of Ukrainian manufacturers. Within memorandums with 14 state administrations, cooperation is established with about 300 industrial enterprises of Ukraine, having substituted 900 products.

AN-178 is a good example of import substitution: in 2015 Ukraine produced 48%, Russia – 41% and other countries – 11% of components and units, while in 2016 - 78% of those are domestically manufactured and only 22% components are imported.

In order to make Ukraine more attractive to international partners, to improve internal cooperation, establish international distribution and build a system of effective governance, UKROBORONPROM management decided to create aircraft cluster – Ukrainian Aircraft Corporation.







Ukrainian Aircraft Corporation is the first example of defence industry reform. The Corporation will cooperate with private sector companies - the enterprises that are not part of the State Concern - in order to speed up the process of import substitution, give new impetus to advancement in science and technology and development of the national economy in general.

UOP is strengthening both internal and external cooperation by:

- collaborating with regional state administrations and creating regional and national industrial clusters;
- establishing and cooperation with technoparks;
- cooperation with IT sector: automatization, software, cybersecurity, C4I;
- • partnership with small and medium business, solution providers;
- logistics operators;
- partnership with world leaders of military-industrial complex.

UKROBORONPROM is developing within the frameworks of the strategy "Ukrainian shield," focused on high-tech production, transition to international standards (NATO) and supplying the army with modern types of armaments. The State Concern extends cooperation with NATO and EU member countries, as defined by the strategic course of the state.

The State Concern representatives – together with representatives of the Ministry of Defence of Ukraine - regularly participate in the Conference of National Armaments Directors (CNAD, 2014-2015) and its groups: NAAG, LCMG, JCG UAS, JCG GBAD, NIAG.

UOP is implementing NATO standards by monitoring of standardization in defence industry, implementation of NATO standards test-system regarding quality assurance (AQAP 2000 series) in the State Concern, participation in the Smart Defence Project «Harbour protection». Moreover, 28 enterprises of the State Concern received temporary access to the main directory of NATO defence products and more than 60 UOP experts received certificates on NATO standardization.

UOP enterprises are also working on renovation and modernization of weapons and military equipment for defence and law enforcement agencies of Ukraine. In total, 4704 units of renovated weapons and military equipment, 8012 units of new and modernized military equipment were transferred to the military. Among which missiles and ammunition (3956 units), weapon ordnance (1412 units), communication, AA cover, radio warfare (2454 units), aircraft equipment and engines(56 units), armored and special vehicles and engines (160 units).

Also, for this time military received 4704 units of repaired weapons and military equipment. Among which: armored and special vehicles (2564 units), aircraft equipment, engines and aggregates (356 units), WO (899 units), communication, AA cover, radio warfare (902 units), naval equipment (6 units).

The State Concern goes the extra mile, working already on further tactical and technical characteristics improvement, providing the vehicle with the latest weapons complex and the possibility to overcome water obstacles by swimming.

In two years Ukrainian defence industry moved to a new level. UKROBORONPROM management do their best in strengthening internal cooperation of Ukrainian manufacturers, working on the promising projects with international partners and producing modern weapon and military equipment, engaging the most brilliant minds and experience of Ukrainian engineers.

Ukrainian military equipment is already winning its positions as the international brand; the Trident has already become a sign of quality. UDR

[direct speech]

PAVLO BUKIN

CEO OF STATE COMPANY
UKRSPECEXPORT

WE WISH TO INTENSIFY COOPERATION WITH INTERNATIONAL PARTNERS

October 9, 2016 will mark the 20th anniversary since State Company Ukrspecexport was established. Over the time of its extensive business operations, the Company and its employee staff have been able to bring Ukraine to a leading position in terms of the domestic arms exports and to make it known worldwide. The following is an interview conducted with Pavlo Bukin, CEO of Ukrspecexport, by Defense Express on the Company's achievements and plans for the future.

– For twenty years now, the Company has been operating in the world arms export market. What has been achieved during these twenty years?

– Overall, our company — now a component part of the Ukroboronprom national defense industrial group – has achieved much. The key achievement is that Ukraine is now known in the global arms export market. A robust marketing policy that we pursue has brought a return that can be seen from different world rankings, where Ukraine is placed among world's biggest arms suppliers. Ukrspecexport has significantly expanded the range of services offered to the market, effectively having moved from individual operations on repair, upgrading and marketing of military weapons and equipment systems to the implementation of national and international programs on defense industrial cooperation. We have gradually grown up and are now moving away from markets for Soviet-built arms and toward markets for products developed and produced by Ukrainian companies and factories.

Due to intensive efforts by all members of the Company's employee staff, new pieces of military weapons and equipment systems have been produced, inclusive of the passive electronic monitoring radar system Kolchuga-M, the armored personnel carriers BTR-3E and BTR-4, a wide range of anti-tank weapons systems, the optronic countermeasure system Kashtan-3, as well as upgrade packages for the MiG-29 fighter aircraft, Mi-24 helicopter and more others.

Due to highly professional and consistent efforts by Ukrspetsexport's employee staff,

Ukrainian arms trade businesses are present in over 70 country markets across the globe. Ukraine is now seen as a strong competitor as well as a partner; this is due particularly to Ukrspetsexport, who has grown into a diversified exporter of products and services for military and special applications.

Indeed, since the beginning of Russia's aggression against Ukraine, we have to adapt ourselves to new realities and to be intent, inter alia, on the importation of products from foreign markets to meet the needs of our military and security agencies, because our domestic laws don't allow sensitive products to be purchased and acquired other than through government-authorized arms dealers. In 2015 alone, some 100 import contracts, worth more than what was imported over all the previous years of Ukrainian independence, were concluded for the benefit of the Defense Ministry of Ukraine, due to active involvement of our Company among others.

– What is your assessment of the outcome of the work done by the Company in 2015, and of the outcome expected for this year?

– Despite the complexity of the current domestic situation, the outcome of the work done by the Company in 2015 looks very good. In terms of products, works and services, the Company chalked up sales of almost UAH1.8 billion, which is 2.7 times up compared with 2014 (UAH670.86 million). Even taking into account the declined value of the hryvnia against the US dollar, the Company was able to earn 1.46 times more money — USD82.387 million compared to the USD56.438 million earned the previous year. The result is that net income grew correspondingly to UAH91.874 million (USD4.2 million) from UAH37.650 million (USD 3.167 million) in 2014. At this point, I cannot forecast the outcome for this year. Operations on our traditional markets are proceeding, our partners are trusting us, and we are expecting at least the same outcome as we had last year.

– On which of the domestic products does Ukrspetsexport

now rely, when it comes to selling to export customers?

– First of all, these are products, which have proven their worth. Regarding armored military vehicles, it is about the already successful product line of the BTR-3 APCs. We have exported over 200 vehicles so far, the number of complaints due to quality not exceeding ten, which is record low. The APC is intended for use in a variety of combat environments, inclusive of NBC environments. As of the beginning of 2015, domestic industries were able to manufacture and supply 90% of parts and components for the BTR-3 APC. The vehicle has got its baptism in combat as it has seen extensive use in theater in East Ukraine. Following twelve months of intensive use in combat, almost 740 improvements have been made to the vehicle's design to remove known imperfections, improve its combat effectiveness and manufacturability.

We have extensively demonstrated the armored vehicle Dozor-B, which is sometimes subjected to not quite justified criticism. Even though the vehicle was developed a long time ago, it's only now that it is being prepared to be launched into production by Ukroboronprom. Following lengthy trials conducted for the defense department, we opted for a version that suits the requirements of the Ministry of Defense. Furthermore, the vehicle holds promise in terms of marketing for the export market. It is suitable for a wide range of combat missions assigned to various purpose military units, while being at the same time, reasonably priced; it can be acquired far cheaper than competitors.

Here I cannot omit the mention of the main battle tank "Oplot" – indeed, one of the best tanks in the world. The tank's design incorporates a host of modern technical solutions. One such is a guided weapons capability allowing the tank to fire laser-guided missiles (ATGM) "Kombat" that can pierce through 750 mm of RHA behind ERA, at ranges up to 5 kilometers. The future of the tank, however, lies more in the domain of politics rather than technology. Presently, tanks will find markets in those countries where active contracts are supported politically by governments.

Regarding other industry sectors, we have a lot of interesting initiatives. This is about jamming equipment, counter-UAV systems, unmanned aircraft and much more. We see much promise in regard to market promotion of UAVs, such as the domestically produced A1-C "Fury", for example. The Fury has seen extensive combat use in Eastern Ukraine, and it has proved to be fairly effective.

Furthermore, we traditionally offer repair and upgrade services to our export customers. Aircraft maintenance, repair and overhaul (MRO) is an important focus, given that Ukraine possesses a good deal of robust industries dealing with aircraft MRO operations.

– In recent years, the An-178 aircraft has been extensively demonstrated in potential export markets. What future do You see for it?

– Ukrspecexport has been closely involved in promoting this aircraft for export. State Company Antonov definitely has an upper hand in this endeavor, but our Company, too, has some ideas regarding market promotion of this product, which is highly promising, in all aspects. This is a very good aircraft that could fill the current gap in military transport. The An-178 incorporates the traditional features the Antonov aircraft are renowned for, including being maintenance friendly and the ability to take-off from and land on various surfaces, in different weather conditions. The An-178 certainly holds great market potential.

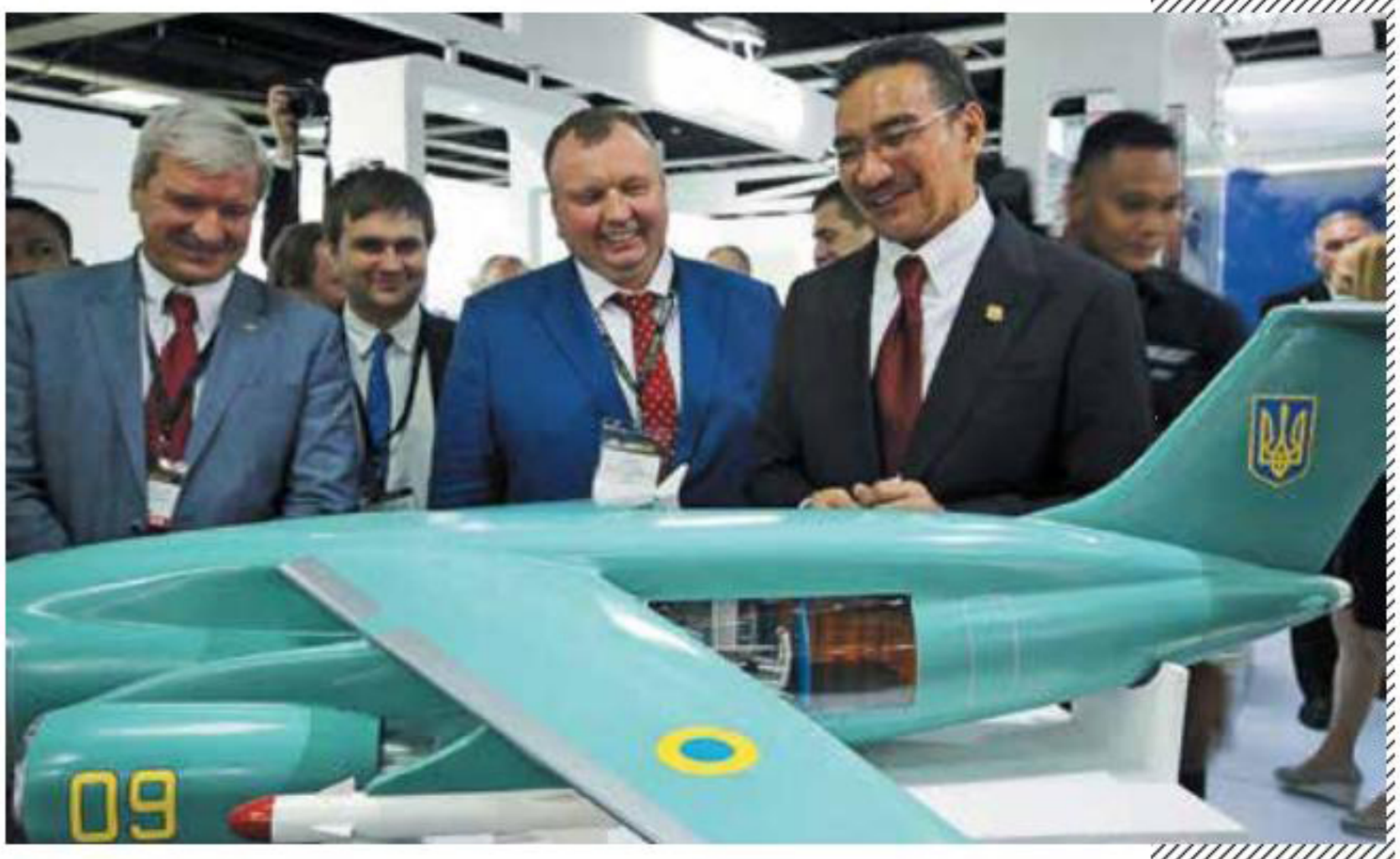
Our aircraft industry experts estimate the potential market for the An-178 at several hundred units during the next 10 to 12 years. Even today Antonov

has a good chance of winning contracts to export the aircraft to Iraq, Azerbaijan, China and several other countries. During his most recent visit to Baku, Ukrainian President Petro Poroshenko secured agreements that envision joint-venture production of the An-178 aircraft, in addition to export of ready-made aircraft. Ukraine and Azerbaijan agreed to launch joint-venture production of An-178 aircraft in the near term.

Upgrades and improvements are now being made to the aircraft's design. It's no secret that State Company Antonov has re-designed and is re-designing many of the aircraft parts and components that used to be supplied by Russia previously. My information is that this process of import substitution, the search for new suppliers of parts, components, systems and assemblies for the AN-178 in Europe, is proceeding fairly well.

– As the Europeans are experiencing problems with the engine for the A-400M, JSC "Motor Sich" offers its same-class counterpart that equips the An-70 [military transport]. Has the Ukrainian engine been considered as a potential replacement?

– Certain steps have been taken toward that end. Here, it is important to appreciate that the key issue is certification of Ukrainian engines in Europe, which is directly related to control of the market and access to it. It's not just a question of technological and technical superiority or superiority of some other kind, but a question of support by the European Union of its own industries or industries in non-EU countries. This is indeed a very complicated question. We are working to that end; this work is still in progress, but we do hope that Ukraine will eventually gain EU certification, sooner or later.

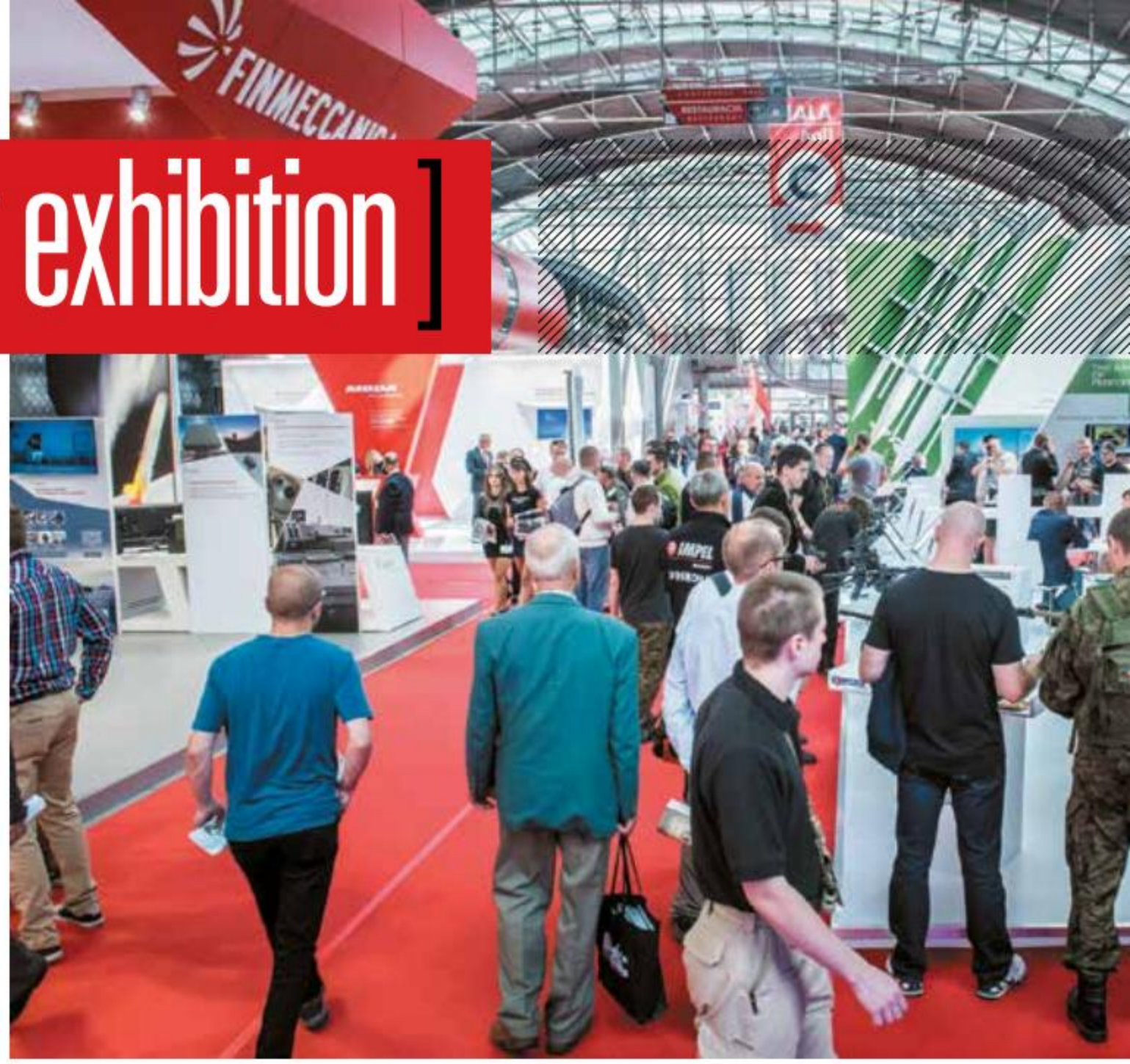


– Two similar military armored vehicles – Dozor-B and Oncilla -– are now offered to the market. Do you think these two vehicles belong to same design or not?

– With regard to Oncilla, Poland, at the time, purchased engineering documentation and manuals for the Dozor-B; it produces the vehicle independently, using proprietary design solutions. There are presently Polish and Ukrainian modifications of the vehicle, named "Oncilla" and "Dozor-B" respectively. Indeed, there are some external similarities, but each of them incorporates differing design features. But I think that our proposals will be more appealing to potential customers, not only in terms of price tag.

– What are your plans for the future?

– Focus will, indeed, remain on our principal areas of expertise as specified by the Company's Charter. The highest priority will be given to promoting the growth of the domestic industries through, inter alia, the importation of essential products for Ukraine's military and security services, as well as businesses; market reach expansion, and the creation of favorable conditions for the growth of Ukraine's international cooperation in military technology. The removal, in March 2016, of sanctions imposed on Ukrspecexport by the U.S. Department of Commerce under the Export Administration Regulations (EAR) in March 2013 will have positive implications for the growth of business. The sanctions significantly complicated the company's global transaction banking operations, reduced its ability to attract loans in the US money market and to conduct cooperation on defense industrial programs with the United States. The issue is now removed from the agenda; it became a thing of the past. This opens to us broad vistas in terms of intensification of cooperation with a wide range of international partners. For example, we have significantly stepped up our defense industrial cooperation with the United States; the value and level of contracts concluded with that country are constantly mounting. UDR



MSPO

Paris' Eurosatory, London's DSEI and Kielce's MSPO. These are Europe's most important defense industry trade shows. And although defence-industry has seen new expos, the Republic of Poland's Armed Forces Head – President Andrzej Duda believes that the Kielce event enjoys strong reputation. The upcoming MSPO is again held under the auspices of the Republic of Poland President, Mr. Andrzej Duda. 2016's MSPO welcomes it guests from 6 to 9 September.

MSPO 2016 – THIS SEPTEMBER IN TARGI KIELCE

The International Defence Industry Exhibition is the Europe's most important exhibition of the defense industry. Targi Kielce is well prepared to organise and host the event. MSPO delivers tangible results. – said President of Poland Andrzej Duda in the interview with Radio Kielce, .

The MSPO's supreme position has been demonstrated by its exhibitors – the world's leading defense industry companies. The expo importance is also attributed to strategic contracts signed during the

Kielce event. Every year MSPO is the showcase for, inter alia the companies of the Polish Armament Group and multinationals such as Boeing, Lockheed Martin, BAE Systems, Raytheon, General Dynamics, Finmeccanica, Thales, MBDA and Saab.

– No one needs to be persuaded that Kielce's defence expo is an important meetings place as well as Poland's defense industry's global getaway. Kielce is the only exhibition that exhaustively showcases Poland's industry offer; therefore MSPO is the chance for multinationals to obtain a comprehensive picture of Poland's defence industry. Polish companies can at the same time benefit from innovations and important technological developments offered by global concerns – says

Andrzej Mochoń PhD, Targi Kielce President of Board.

The event has enjoyed an always-increasing number of exhibitors; they fully recognise MSPO significance for defence business.

– We have participated in the MSPO for many years and therefore observed its growth and advancement. The interest our products generate results in trade cooperation. What is particularly important for us is the fact that MSPO provides the opportunity to meet Polish partners and the cooperating companies. This may give rise to joint projects, these in the future may translate into new job-openings and further development of technologies and technology-transfer to Poland – said John Neilson, Director of Communications at Lockheed Martin Corporation .

A LONG-STANDING TRADITION

MSPO is held in Kielce already for the 24th time. When asked by foreign visitors why Kielce is the stage for the defense industry exhibition, Targi Kielce President talks about the rich traditions of the Central Industrial District, the ideas promoted by Stanis aw Staszic in the nineteenth century. This historical aspect was also pointed out by President Andrzej Duda. President emphasizes the fact that Kielce and Radom region is defence industry's heart.

– I feel that both the International Defence Industry Exhibition and Targi Kielce are worthy heirs of the tradition. Kielce exhibition and congress centre is a good place to host the army, military services as well as the police, customs officers and border, paramedics and fire-fighters. MSPO is held simultaneously with the LOGISTICS expo; every other year in June Targi Kielce is the stage for "fire-protection" expo -EDURA.

Kielce is therefore the showcase for the latest specialist equipment and solutions for the uniformed services. This year's MSPO is expected to focus more on territorial defense units – announces President Andrzej Mochoń.

ALL CORNERS OF THE WORLD EXPO

For 24 years Targi Kielce has developed the exhibition which has become one of Europe's leaders. The expo enjoys global recognition, therefore every year it hosts almost 20 000 business-insiders. The guests list includes ministers of defense, official parliamentary and government delegations, representatives of embassies and senior military staff-members from home and abroad. The expo has gained extra splendour owing to the visits of Polish Presidents – Andrzej Duda and Bronisław Komorowski. Last year the exhibition hosted the official delegations from 58 countries, including representatives of the United States, Russia, China, Britain, Germany and France. Kielce saw representatives of distant countries – Brazil, Bangladesh, Thailand, the Philippines, Indonesia, Korea, Oman and the United Arab Emirates. National exhibitions have become a tradition during MSPO. Turkey, Norway, Italy, France, Germany, Israel, USA, Sweden, the V4 Members and the United Kingdom have boasted their military potentials. This year's lead-exhibition is the Armed Forces Exhibition – it is held under the banner of "Objective – Innovativeness". UDR

[cooperation]

NEW REALITIES CREATE NEW OPPORTUNITIES

UKRAINE-POLAND MILITARY TECHNOLOGY COOPERATION PROSPECTS FOLLOWING NATO WARSAW SUMMIT

Russian aggression in Ukraine – which is rooted into the eternal confrontation between Eastern and Western civilizations -- and its perception by the Euro-Atlantic community as being a threat to its interest, create a new environment, along with a prospect for Ukraine to win new positions in the global division of labor, especially in the production of military and dual use technologies generally, and particularly in terms of a further, more diversified cooperation with Poland in defense-industrial production and technology development.

Ukraine's and Poland's Defense Minis-ters, Stepan Poltorak and Antoni Macierewicz, on the second day of NATO Warsaw Summit, signed a protocol between the Cabinet of Ministers of Ukraine and the Government of the Republic of Poland amending the Agreement on Military Technology Cooperation between the Government of Ukraine and the Government of the Republic of Poland. The protocol includes the creation of a bilateral working team on military technology cooperation affairs. It is expected that this will reduce the time it takes to work out joint initiatives and decisions, and to get them officially agreed at the bilateral level. The working team will operate under the aegis of the Ukrainian-Polish Intergovernmental Commission on Economic Cooperation. In particular, the signing of the Protocol "will effectively streamline the activities on military technology cooperation, which will help identify promising bilateral projects in this area."

For Ukrainian and Polish arms companies, cooperation prospects look even more promising in the light of a long, positive history of bilateral partnership.

AEROSPACE AND AVIATION – FACETS OF MUTUAL TECHNOLOGICAL ENRICHMENT

Polish customers have recently shown a great deal of interest

in high-tech defense technologies produced in Ukraine (both to meet their own needs and improve their technological base), and their interest is most keen for aerospace and aviation industry products.

Particularly in January 2016, officials from Warsaw Instytut Techniczny Wojsk Lotniczych (Air Force Institute of Technology, ITWL), which is now developing light multi-purpose military aircraft Grot-2 for the Polish Air Force, reported that the AI-222-28F engine developed and produced in Ukraine by Ivchenko Progress Design Bureau and JSC Motor Sich air engine factory has been selected to equip the projected Polish aircraft. The use of the Ukrainian engine will make the aircraft highly competitive in terms of performance and capabilities.

Among the promising joint initiatives proposed by the Ukrainian party recently is a cooperative project between the Antonov aircraft maker and PZL-Mielec among other Polish partners. Ukrainian aircraft markers, in addition to already well known aircraft projects such as An-148 and An-158, offer cooperation on a new maritime patrol airplane to be known as An-148-300MP. The An-148-300MP is planned to be fitted with a set of advanced surface target identification and data processing equipment, as well as radar and other systems to be supplied by Polish companies such as PIT-RADWAR and PCO. Two such airplanes will be built for each of Ukraine and Poland. It is believed that successful completion of the project would pave the way to exporting the aircraft to third markets.

Antonov could offer Polish partners, among them PZL Mielec, cooperation in a project aimed to upgrade the An-28 airplane to the extended An-38 configuration equipped with Honeywell powerplant. The An-38 provides several significant advantages over the baseline technology, especially in terms of passenger capacity increased to 27 compared with 17 in the An-28, and it could be used as the basis for a lineup of multi-purpose special-mission aircraft, including a version tailored for patrol operations, which could hold much promise in terms of export to third markets worldwide.

Another area where cooperative initiatives in the aircraft industry could be mutually beneficial and appealing to the Polish party is repair, maintenance and overhaul of Polish Air Force's fleet of MiG-29 fighter planes, in which Ukrainian factories could be partners. Moreover, Ukrainian companies could supply individual components and aircraft armaments for Poland's Air Force fleet that still operates a significant proportion of Soviet-built planes.

Consideration should also be given to using fully the potential of cooperation between Ukraine and Poland in bringing the helicopters Mi-8, Mi-17 and Mi-24 up to date, particularly by replacing engines with current-generation counterparts developed and produced in Ukraine. Cooperation on Mi-8, Mi-17 and Mi-24 helicopter upgrades could additionally cover radar equipment, navigation aids, and communication systems.

There is a great potential for Ukrainian-Polish cooperation in the aerospace sector. In these new realities, as repeatedly stressed by CEO of Poland's Space Agency (POLSA), Marek Banaszkiewicz, joint development and production of aerospace technologies could be one of the most promising areas of bilateral cooperation between Poland and Ukraine. The areas of particular interest in the context of further cooperation between Ukraine and Poland include optical and radar equipment for surveillance satellites as well as space launch technologies.

Ukraine and Poland could work together in space development and exploitation projects, especially in the context of Poland's membership in the European Space Agency, and under the aegis of the EU's framework program called "Horizon 2020". The contributing factors here are the creation of a joint working group on space cooperation affairs as part of the Polish-Ukrainian Intergovernmental Commission on trade and economic cooperation, as well as the potentialities for setting up joint-venture operations in the aerospace sector.

The Polish party believes that Ukrainian rocket technologies and research capabilities could come in handy in the light satellite launch vehicle project proposed for cooperation between Polish Institute of Aviation and Ukraine's Pivdenne (also known as Yuzhnoye) Design Bureau.

Other contributing factors to a further, more diversified cooperation between Ukraine and Poland in the aerospace sector is a MoU on space development and exploitation for peaceful purposes, signed in Warsaw on April 20, 2015 by the CEOs of Ukraine's State Space Agency and Poland's POLSA, and the creation, on 3 March 2016, of a bilateral working group tasked to explore opportunities for joint collaboration.

LAND WARFARE EQUIPMENT AND ARMAMENTS

Opportunities for bilateral cooperation between Ukraine and Poland in the development, production, repair, maintenance and overhaul of land armaments are looking equally promising. This cooperation could cover the following main areas:

- development and production of armored military vehicles;
- anti-tank armaments and precision weapons systems;
- development and production of self-propelled artillery systems;
- development and production of UAV capabilities for ground and special-operations forces;

Significant achievements accomplished by Ukraine and Poland in armored vehicle building could contribute to mutual technological enrichment by implementing joint initiatives in this particular area of expertise. Future projects could deal with co-development and co-production of new armored vehicle types, repair and maintenance equipment, and the export of Ukrainian-built powerplants, transmissions, and explosive reactive armor systems to Polish armor factories. Cooperation in this sector could proceed along the two lines:

– Further upgrades to the T-72-series main battle tanks (PT-91 Twardy and PT-72U) re-motored with Ukrainian-built 1200 hp powerplants 6TD;

– Co-development of a new lineup of armored military vehicles in different weight categories, based on a unified platform.

Ukrainian partners in the future projects could include Malyshev Plant, Kharkiv Morozov Machinery Design Bureau and Kharkiv Engine Design Bureau, and Polish partners could include Huta Stalowa Wola, Bumar- ab dy, OBRUM, Wojskowe Zak ady Mechaniczne and other specialist companies in this field.

In the context of armored military vehicle building, a potential area of bilateral cooperation that is looking most promising involves the transfer of Polish technologies for integration onto main battle tanks and armored personnel carriers built in Ukraine. The technologies in question include particularly a PCO S.A.'s optronic fire control system based on the KLW-1 ASTERIA thermal camera that enables firing in reduced visibility environmental conditions. Cooperation in this area, which has already got underway, is looking pretty promising. High combat effectiveness of the system, combined with an affordable price would give Ukrainian tank crews enhanced capabilities in terms of improved situational awareness at longer ranges, and accuracy of target classification and identification.

Zhytomyr Armor Plant is a natural partner for PCO S.A in this project. Potential partners from Ukraine could include Kyiv Armor Plant, Kharkiv Armor Plant and Kharkiv Malyshev Plant. Polish-produced optronic equipment could be outfitted to T-72 and T-64 MBTs, and BMP-1 and BMP-2 APCs, which opens broad vistas for massive use of these technologies in Ukraine, and for building upgraded versions of the aforementioned vehicles fitted with the Polish equipment. In this context it is important to note that PCO SA would be willing to transfer the whole set of works to Ukrainian partners, including the assembly, installation, refinement and service support of the equipment.

Ukrainian companies, for their part, have an interest in purchasing from Polish partners materials and components for armored military vehicles. We are talking particularly about steel plates Armstal produced by Huta Stali Jakociowych.

Regarding anti-tank and precision-guided weapons, the Ukrainian party is showing interest in intensifying and expanding cooperation with Polish partners under multinational projects, particularly those using new anti-tank guided missiles Falarick 90, Falarick 105 and Falarick 120 (90mm, 105mm and 120 mm, respectively), all developed by Kyiv Design Bureau Luch. The Falarick-series missiles are designed to be fired from guns developed by Belgian company Cockerill Maintenance & Ingenierie (CMI) Defence. CMI's CT-CV turrets integrated with Ukrainian-built gun-fired missiles are compatible with light-armored vehicles of all types, and are offered to armored military vehicle suppliers interested in an enhanced firepower for their ve-

hicles. One such is the Polish APC vehicle Rosomak.

Another initiative that potentially could bring benefit to both partners is a Polish project to develop a lineup of self-propelled mortar systems optimized to fire Ukrainian-built precision-guided munitions. In particular, the use of an advanced Ukrainian-designed 120mm semi-active laser guided munition has the potential to greatly improve combat effectiveness of the 120mm mortar system called Rak, which is produced and supplied by Poland's Huta Stalowa Wola (HSW). Separate mention should be made of a collaborate initiative involving Ukrainian research and design institutions and the Polish company Mesko, aimed to develop an ATGW system to be known as "Pirat", and a 152mm/155mm semi-active laser guided gun-fired munition.

Co-development and co-production of self-propelled artillery systems is one more potentially highly promising area of cooperation that could work towards enhancing and improving warfighting capabilities of the Ukrainian military. The experience gathered by Polish companies with the self-propelled artillery system KRAB and self-propelled mortar system RAK could come in handy here. The Polish party, in turn, could be interested in using the Ukrainian experience with the development and production of self-propelled vehicles, both tracked and wheeled.

Much promise is held out with respect to cooperation between Ukraine and Poland in the development and production of unmanned aircraft systems meeting the requirements of the Armed Forces, National Guard and State Border Guard Service of Ukraine. In particular, the Fly Eye UAS developed by the Polish company WB Electronics showed high combat effectiveness during investigation trials by the Ukrainian military. Furthermore, much promise is held by Warmate UAS developed and produced by the aforementioned Polish company. It could be used to support ground operations or integrated onto the attack UAS being developed by Kyiv-based Civil Aviation Plant 410 by upgrading the An-26 airplane. PJSC CheZaRa, which has launched a repair and maintenance facility for the unmanned aircraft systems Fly Eye, is poised to launch production of Fly Eye UAS and Warmate UAS, under licenses from respective Polish design authorities, and it offers its proprietary upgrades that could improve significantly performance and capabilities of the Polish-designed UAS technology.

NAVAL COMPONENT OF COOPERATION

In the context of Ukraine's effort to restore its naval capabilities lost due to the Russian annexation of the Crimean Peninsula, both for countering naval threats and securing national interests at sea, there is a great potential for cooperation in joint shipbuilding programs between Ukraine and Poland. Here, the focus should be on providing the requirements of Ukraine's Navy.

Ukraine's naval forces have a keen requirement for mine warfare ships, given the high vulnerability of shallow-water regions of the North-Western Black Sea to potential mine attacks. So, there are possibilities and also opportunities for bilateral Ukrainian-Polish initiatives in the area of co-development and co-production of naval ships.

Poland has an extensive experience with naval research, and with developing and building mine warfare ships. Particularly noteworthy are Polish accomplishments and developments on mine warfare technologies, including ships with non-magnetic steel or plastic hulls.

Great promise is held in cooperation between Ukrainian and Polish companies in the field of underwater robotics and remote mine clearance. This could have practical value, as those technologies could be used for equipping mine warfare vessels, both newly-built and upgraded.

There are possibilities for jointly building Komoran-class mine warfare ships (similar to those currently being built for Poland's Navy) to meet the requirements of the Ukrainian Navy. Relevant equipment for the ships could be built in Ukraine or Poland, or manufactured under joint-venture agreements, which would help reduce significantly the costs involved. Alternatively, for a transitional period,

Ukraine could lease several mine warfare ships fitted with advanced equipment from Poland. This option looks realistic and economically sensible given that the Polish Navy is planning to phase out a number of its aging mine sweepers as construction of Komoran-class counterparts is nearing completion.

Another potential cooperation area of interest to the Ukrainian party is in landing ship building. Under certain conditions, Ukraine would be interested in procuring at least three new medium landing ships from the domestic market, but other options – including leased use of the Polish ships by Ukraine for a transitional period, or the procurement of Lublin-class (Project 767) landing ships by Ukraine – should not be ruled out. Poland's Navy operates a fleet of five Lublin-class landing ships since the 1990s, which is excessive in the current circumstances.

Subsurface shipbuilding is another area of potentially effective cooperation between Ukraine and Poland. Under its Orka program, Poland intends to procure three new submarines equipped with advanced air-independent powerplants and armed with strategic cruise missiles. The Polish government has already issued relevant requests for proposals to German, French and Swedish suppliers. Potential contract winners are supposed to transfer relevant technology and blueprints, and help build a submarine maintenance facility in Poland.

So far, it's too early to talk of any deal on Ukraine's participation in the future submarine contract under a joint program, and especially as there is no money available for it. However, Ukraine's potential involvement – as a minor partner or subcontractor, or even as an observer – holds promise of some day winning access to advanced submarine technology and beginning building submarines – on its own or jointly with Poland.

The Polish party could offer its participation in upgrading the Ukrainian Navy's flagship, the Frigate "Hetman Sahaidachny". The planned upgrade particularly includes the addition of the latest indigenously designed anti-ship cruise missiles "Neptune".

Along with this, it would be appropriate to cooperate with Poland in building naval electronic warfare systems and naval aircraft, both manned and unmanned, where both parties have certain unique capabilities.

CONCLUDING REMARKS

The given analysis of the current status and prospects for Military Technology cooperation between Ukraine and Poland indicates the presence of a wide range of opportunities, both for Ukraine and for Poland.

Joint collaborate efforts by a Ukrainian-Polish partnership could produce potent, multi-functional weapons systems that could contribute significantly to combat capabilities of the Ukrainian and Polish militaries, and offer great promise in terms of exports to third markets globally.

There is every reason to expect increased cooperation and the appearance of new areas for cooperation following the investment forum "Invest & Trade in Ukraine '16". The Forum is planned to be held on the sidelines of the 24th International Defense Industry Exhibition MSPO that is scheduled to take place from September 6 to 9, 2016 in Kielce, Poland. The Investment Forum, sponsored by the Ministry of Defense of Ukraine and co-sponsored by A7 CONFERENCES and Ukroboronprom, will bring together Ukrainian private-sector companies involved with the defense and security sector, Ukrainian and Polish government officials, and potential Polish investors interested in working together with Ukrainian partners in export and investment projects related to defense and security. This would open new opportunities, both for Ukraine and Poland, and, also, for security and sustainable development of the entire Euro-Atlantic area. UDR

Valery Ryabykh,
Volodymyr Zablocki,
Defense Express

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[cooperation]

KYIV & BAKU –

CHARTING A COURSE OF CLOSER RELATIONSHIPS

Igor Fedyk,
Defense Express

Azerbaijan has always been friendly to Ukraine, and relationships with that country have never been burdened with conflicts or tensions. Relationships between Ukraine and Azerbaijan could until recently be described as good, with a great potential for improvement and expansion, but this potential, however, has not been used to its full capacity. Following President Poroshenko's recent visit to Baku, and the statements made by the two heads of state there, it is hoped that relationships between Kyiv and Baku in all fields would continue to be intensified and expanded. This article analyzes the current status and the future of the Ukrainian-Azerbaijani relationships following President Poroshenko's visit to Baku.

ECONOMY

Post-Cold War history of bilateral relationships between Ukraine and Azerbaijan dates back to November 19, 1991, when an agreement on interstate relationships between Ukraine and Azerbaijan was signed in Kyiv. During an official visit to Ukraine by the then President of Azerbaijan Abulfaz Elchibey on December 9, 1992, an intergovernmental agreement between Ukraine and the Republic of Azerbaijan was concluded and subsequently ratified by Verkhovna Rada in 1993 and the Parliament of Azerbaijan in 1994.

Partnership in energy transportation and economy was proclaimed to be the priority area of bilateral cooperation. Taking into account Ukraine's advantageous geopolitical location for energy transportation from the Caspian Sea and Central Asian regions to the EU countries, partnership with Azerbaijan in building an energy transit corridor running from the Caspian Sea through South Caucasus and Ukraine and to Central and Eastern European markets became a project of strategic importance for Kyiv.

To this end, Ukraine initiated the construction of a pipeline from Odesa to Brody in the latter 1990s, and completed it in 2001. These prospects, however, didn't suit the book of Moscow and, in 2002, it began fighting for control of the oil pipeline to prevent its intended operation in the averse direction.

Now that Russia has lesser abilities to influence political decisions in Ukraine than it had previously, rejuvenation of Ukraine-Azerbaijan energy projects that were initiated but never completed, is again becoming the order of the day of bilateral relationships.

In particular, following a Ukrainian Presidential visit to Baku in the middle of July 2016, the Azerbaijani party expressed an interest in using the Odessa-Brody pipeline for transporting its crude oil to the EU markets and Eastern Caspian Sea countries. The revival of this project will provide a good pipeline infrastructure for connecting the Caspian Sea to the Black Sea and the Baltic Sea, the President of Azerbaijan, Ilham Aliyev believes.

Alongside this, agreements were reached to enhance cooperation in other areas, especially in the transportation and machine-building sectors, and in defense industrial production and technology development.

POLITICAL DIALOGUE

In addition to economic relations, political support for each other on the international arena is another important area of bilateral relationships between Ukraine and Azerbaijan. The two countries have to deal with similar challenges as they both have become subjects of Russian aggression against them. While this aggression is more than evident in Ukraine, in Azerbaijan, it is mostly of a hidden, hybrid nature, but it makes a threat to national security of Azerbaijan equally dangerous. Russia will ignite the "frozen" Nagorno-Karabakh conflict by the hands of the Armenian military, at any time it dooms necessary or appropriate.

Alongside exploiting the Nagorno-Karabakh conflict for the sake of neutralizing a strong competitor in the South Caucasus region, Russia resorts to other methods. Acting, on the one hand, as an intermediary in the conflict resolution by peaceful means, Russia, at the same time, provides generous supply of arms and military equipment to both sides of the conflict. Moreover, it does so in contravention of the Collective Security Treaty that forbids it from exporting weapons to Azerbaijan.

To destabilize the country, Russia's secret services use radical elements and different underground political forces. Even as the Russian propaganda machine and agents of influence are seeking to mislead the international community into thinking that Armenia and Iran are involved here, Russia will be the one to win most from a weakening of Azerbaijan.

Under these circumstances and in the current situation with relationships between Ukraine and Azerbaijan where both countries are facing similar challenges in terms of being subjects of a Russian aggression, enhancing a political dialogue between Kyiv and Baku assumes a special relevance. The statements on mutual support for each other's territorial integrity, made by the Presi-

dents of Ukraine and Azerbaijan during the recent Ukrainian Presidential visit to Baku, give reason to hope that this will be just the beginning of the dialogue that will only deepen further. Such a dialogue will make the two countries into strategic allies, and will contribute to an effective resolution of the problems imposed on them from the outside.

DEFENSE-INDUSTRIAL PRODUCTION AND TECHNOLOGY DEVELOPMENT

Despite a certain reduction in national revenues due to plummeting oil prices, Azerbaijan's defense industry and its international military technology cooperation (MTC) continue growing dynamically, and Ukraine is a priority partner country in this cooperation.

According to the UN Register of Conventional Arms, Ukraine, in 2006-2007, exported 14 MiG-29 fighter aircraft along with relevant replacement parts and armaments to Azerbaijan. The contract is noteworthy in that, for Ukraine, it was the first export deal involving MiG-29 fighter aircraft overhauled and upgraded without the involvement of Russian companies. Also in 2007-09, Azerbaijan bought from Ukraine a new cockpit-procedure trainer for the MiG-29 fighter plane, in addition to 48 T-72AG MBTs.

Ukrainian-Azerbaijani MTC was growing most rapidly during 2008-2013, when Azerbaijan was among the largest arms importers from Ukraine. A good testament of the high level of bilateral MTC at the time is contained in a statement made by President Ilham Aliyev, who said ahead of his official visit to Kyiv in 2010, "... there are good traditions in the defense industry sector. For many years now Azerbaijan has bought arms and military equipment from Ukraine. We are very satisfied with this collaboration, which holds good prospects for growth ... We have launched effort to build a domestic defense industry here in Azerbaijan, and its products are already displayed at international exhibitions and supplied for export. I have to say that this is partly due to assistance from our Ukrainian partners. There are joint-venture operations in this field, and we intend to expand and enhance collaboration further".

Regarding Ukrainian arms exports to Azerbaijan at the time, the country bought a large quantity of BTR-70 APC vehicles (some were exported with turret weapons dismounted), BTS-5B (BREM-1 configuration) multi-purpose truck vehicles, 2S1 "Gvozdika" and 2S3 "Acacia" self-propelled artillery systems, MiG-29 and MiG-29UB fighter aircraft, R-27 missiles and "Skif" ATGW systems, in addition to a large quantity of small arms weapons. Ukraine, in partnership with South Africa, overhauled a number of attack helicopters Mi-24 for the Armed Forces of Azerbaijan, which is seen as one of the best examples of MTC with Azerbaijan.

The helicopters, which received the designation Mi-24G (where «G» – Gec , stands for "night" in Azerbaijani), have been overhauled by the South African company Advanced Technology and Engineering and Ukraine's Aircraft Repair Plant "Aviakon." The Advanced Technology Engineering Hind Mk IV, a NATO-compatible design, provided the pattern for the MiG-24G upgrade which features NATO-compatible avionics and communications, as well as an improved cockpit. The main weapon on the Mi-24 Super 'Hind' is the new Ukrainian Baryer-V ATGM system produced by Luch Design Bureau. It fires RV-2-type ATG missiles to ranges of up to 7,500 meters, and it is capable of penetrating through 800mm+ core armor behind ERA protection. Another Ukrainian contribution to the project is electronic optical IR jamming system Adron Adros.

The first Mi-24 prototype upgrades were demonstrated to the top leaders of Azerbaijan in June 2010.

The beginning of Russian aggression in Ukraine in 2014 changed course of things for Ukraine's international MTC, including with Azerbaijan. The level of arms exports from Ukraine has reduced, and the range of

products exported has narrowed. Recently, however, MTC between Ukraine and Azerbaijan has been given a second wind to run again. Particularly in May 2015, Azerbaijan's Silk Way Airlines agreed to buy a number of An-178 cargo airplanes from Ukrainian aircraft maker Antonov. The preliminary agreement included construction of a production line for An-178 airplanes in Azerbaijan. Based on this agreement, Antonov signed a contract in June 2016 to deliver ten An-178 cargo planes to State Company Azal for subsequent operation by Silk Way Airlines.

Under the terms of the contract, the first two airplanes will be delivered by mid 2018, and the remainder eight will be assembled at a factory in Azerbaijan (at a production line to be built with Antonov's technology). For Antonov, this is the largest advance-paid contract so far.

J. Askerov, a top manager at Azal, said that the 10 An-178 aircraft is just an initial procurement, and other government agencies in Azerbaijan are interested in buying aircraft from Ukraine.

Other potentially promising areas of MTC between Ukraine and Azerbaijan would cover repair, maintenance and overhaul of Azerbaijani Armed Forces' military equipment systems, including air defense systems, and service maintenance of radar equipment at Ukrainian factories. Ukraine could additionally offer a variety of explosive reactive armor packages and active protection systems for integration onto armored military vehicles. Azerbaijan could be definitely interested in procuring precision-guided weapons developed by Kyiv-based Luch, and even more so in joint-venture production of Luch munitions at its own factories. Alongside this, Ukraine could do repairs and overhauls of the Azerbaijan Armed Forces' aircraft fleet (Mi-8 and Mi-24 helicopters, MiG-29 fighter aircraft, L-39 primary trainer aircraft, and Su-25 fighter bombers), and provide it with related simulation facilities produced by "Market-Mats" company.

Despite traditionally friendly relations between Kyiv and Baku, and generally positive results of the Ukrainian Presidential visit to Azerbaijan, Ukraine-Azerbaijan relations will remain under permanent scrutiny by a third party. Keeping this in mind, the governments of the two countries need to understand that they have to secure their own national interests. And these interests demand that Ukraine and Azerbaijan be strategic partners, as they mutually depend on one another in critically important areas for both. UDR

NEW LIFE FOR «IRON BIRDS»

UKRAINE RETAINS SUBSTANTIAL CAPABILITIES TO REPAIR AND UPGRADE HELICOPTERS AND AIRCRAFTS

The most successful enterprises of aircraft industry in Ukraine are named "Konotop Aircraft Repair Plant 'Aviakon'", Lviv state aircraft repair plant, Zaporozhye State aviation repair factory "MiGremont" and Lutsk repair plant "Motor" from the State Concern Ukroboronprom.

Konotop Aircraft Repair Plant "Aviakon" is one of the top companies in Ukraine in the area of helicopter overhaul repair and upgrade. Core Activities of the Plant Up-to-Date refurbishment and re-equipment of Mi-24, Mi-35, Mi-8, Mi-17, Mi-26, Mi-2 helicopters of all modifications, overhaul of components of airframe, instruments, special and radio-electronic equipment, fitting of up-to-date avionics equipment onto the helicopters flying on international routes, investigation of helicopters technical status on their operation site, overhaul and on-condition repair of Mi-17, Mi-35 helicopters and their modifications by field teams on the helicopter operation site, and many others.

The Company has some achievements related to Mi-24 helicopter upgrades for the Ukrainian Armed Forces. In 2011, the Mi-24 upgrade program was split into two phases. The first phase, dubbed as "minor" upgrade, involved domestic companies only, while the second (or "major") phase of the upgrade included the installation of equipment and systems provided by French Sagem.

In terms of its mission capabilities, the new Mi-24 is almost three times as effective as the original configuration, this despite the fact that the "minor" upgrade did not include the installation of the new domestically designed "Baryer-V" ATGW missile system in place of the Soviet-vintage counterpart, "Shturm-V".

Upgrade project for the workhorse helicopter - the Mi-8 and its various modifications — (as is the case with the Mi-24) involves Sagem as supplier of night fighting capabilities and current-generation avionics. The upgraded helicopter will have improved performance due to the integration of more potent "Motor-Sich" TV3-117-VMA-SBM-1V power plant.

A good example of the Company's cooperation with foreign partners was a contract from Azerbaijan. In 2010, "Aviakon", jointly with the South African company Advanced Technologies and Engineering and the Ukrainian State Enterprise "State Kyiv Design Bureau 'Luch'" remanufactured a number of Azerbaijan Armed Forces' Mi-24 attack helicopters to the Mi-24G standard using the Mi-24 Super Hind Mk.4 upgrade package developed by the South African partner.

Ukrainian-built upgrades of the Mi-8 and Mi-24 helicopters have considerable market potential, considering that the choppers were delivered for export worldwide during Soviet era. For example, of the 8,200 Mi-8-series helicopters produced in 1996, about 2,800 were delivered to export customers in over 40 countries worldwide, including Algeria, Angola, Afghanistan, Bangladesh, Bulgaria, Vietnam, Egypt, India, Iraq, Canada, the PR of China, Pakistan, the USA, Poland, Romania, Cuba and Japan etc. Given the capabilities present in Ukraine, it would be much more cost effective for operators to have these fleets overhauled and updated than to acquire new helicopters.

In 2015 SE "Aviakon" transmitted almost 14 repaired Mi8-Mt and Mi-24V to the Ministry of Defence of Ukraine. In the first quarter of 2016, Konotop Aircraft Repair Plant repaired and modernized 14 Mi series helicopter: seven for the Ministry of Defense of Ukraine and seven for foreign customers.

According to the Director General of the State Concern "Ukroboronprom" Roman Romanov, "Aviakon" in 2016 coped with all it the tasks.

ENHANCEMENT OF COMBAT POSSIBILITIES OF AIRCRAFT MIG-29

- Enhancement of functional possibilities of aircraft navigation system by installation satellite navigation system CH-3307-01 and integration with standard navigation complex of aircraft MiG-29;
- Improvement of performance characteristic of radiolocation complex H019, namely improvement of target range detection at the expense of development of generation and processing signals' units.
- modernization of units «BPK-88 series ZKM» with solid-state storage device;
- modernized recorder «Tester UZ-L» with emergency solid-state storage device;
- modernized system of «Ekran-13M-4» with electronic indicator and flash cassette;
- change of information-control cabin field at the expense of installation of indication unit and control panel of satellite navigation system CH-3307-01;
- replace of aircraft re-sponder CO-69 of air movement control system by aircraft responder of type A-511 with additional working modes A, C of standard ICAO; etc

The SE "Lviv state aircraft repair plant" is specialize on repairs of the aircraft MiG-21, MiG-23, MiG-27 and MiG-29. It's replacement of aggregates and equipment, including the works on renovation of overhaul service life and life time; repairs aggregates and airframe systems; development and delivery of designing documents for the mastering of the repairs of aggregates and airframe systems; training of the specialists in the technological processes of aviation equipment repairs, consulting in the repairs of aviation techniques using the plant's production base; producing and delivering of the non - standard technological equipment developed for aviation techniques repairs by plants specialists and many others.

In the period of independents of Ukraine, the Lviv State Aircraft Repair Plant (LGARZ) carried out the repair and modernization of multi-role fighters not only for Ukrainian Air Forces, but also for Bangladesh, Sri Lanka and many other countries.

By the end of 2014 the SE "Lviv State Aircraft Repair Plant" has completed the works for repair of two MiG-29. After beginning of Russian aggression against Ukraine plant repaired two military aircraft MiG-29 for Ukrainian Air Forces in 2015. In 2016 it also has obligation to repair two MiG-29. However, production capacity allowing to repair at least 12 military aircraft a year

The state enterprise «Lutsk repair plant «Motor» is specialize on overhaul of aircraft engines AL-21F-3 (installed on the aircrafts Su-17, Su-20, Su-22, Su-24 (M)), AL-31F (installed on the aircrafts Su- 27, Su-30), RD- 33 (installed on the MiG -29), D-30KP (KP-2) (installed on aircrafts IL-76 , IL-78) and all the component aggregates and units for them. The State Enterprise Lutsk Repair Plant "Motor" - is the leading enterprise of Ukraine and former USSR countries specializing in overhaul and maintenance of aircraft turbojet engines of the third and fourth generations. By the end of 2014 the Lutsk repair plant «Motor» has completed the works for repair of 6 RD-33 engines, 7 AL-31F and 8 AL-21F-3T under the contracts with Ministry of Defense of Ukraine .

In April 6, 2015 the Ministry of Defense of Ukraine has allocated 43.97 million. Hryvnia ($1.7 million) for overhaul and re-equipment aircraft engines on «Lutsk repair plant «Motor» .

In March 2016 the plant has signed a contract for the overhaul of 50 engines (AL-31F, AL-21F-3T and RD-33) for the Air Force of Ukraine on 135.43 million. Hryvnia ($5.4 million)

Zaporozhye State aviation repair factory "MiGremont" specializes on repair of aviation technical equipment. It is the enterprise which is carrying out repair of aircrafts Mig-25, Su-27, Su-17, Su-25 all updating, their units and systems. The basic directions of modernization are increase in service life, increase of reliability, expansion of tactical technical opportunities, increase of accuracy of work of systems and complexes. Currently the factory loaded with work on the repair and modernization of combat aircrafts Su-25 and Su-27 for the needs of the Air Force of Ukraine.

In October 2015 President Poroshenko during a working visit to Zaporozhye region examined samples of aircraft, which have been renovated Zaporizhia State aircraft repair plant "MiGremont." The President conveyed to representatives of Air Force units Ukraine in two forms repaired Su-27 aircraft (Su-27 and Su-27UB), upgraded in accordance with the NATO standards in order to enhance the combat capabilities and improve the efficiency of solving military tasks. President took part in the test flight on one of the fighters in place of the second pilot. UDR

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[missiles capabilities]

AIR FIGHT

«AIR-TO-AIR» GUIDED MISSILES WILL PROVIDE DOMINATION

Vladimir TKACH
Defense Express

Ukraine has a serious scientific, technological and industrial potential for the upgrading of existing, as well as for the creation of new designs of missile armament. But to a great extent, this missile base, established in Soviet times, had been used for a long time by Ukrainian design bureaus and enterprises only to implement export contracts on behalf of foreign clients. Now Military Department set a task to local design bureaus and enterprises of Ukraine to provide the combat capability maintenance of guided air weapons arsenal until 2030. The presence of respective aircraft guided missile armament is of vital importance for the defence of the country.

A special place among "Air-to-air" aircraft missiles, created in Soviet times, is taken by intermediate-range and long-range R-27 missiles (NATO classification - AA-10 Alamo), that are part of the K-27 aerial launching platform. The family of R-27 modular missiles designed on GovDBM "Vympel", was putted into service in 1987-1990. Currently, such missiles are equipped on all modifications of MiG-29 and Su-27 fighters.

R-27 missiles are designed to intercept and destroy aeroplanes and helicopters of all types, unmanned aerial vehicles and cruise missiles in a aerial fight at intermediate and long distances, during autonomous and group actions of carrier aircraft, day and night, in visual and bad weather conditions, from any direction, against the background of earth and sea, with active information, firing and maneuvering enemy countermeasures.

The R-27 is produced in several modifications. These modifications are characterized by the use of two types of seekers-semi-active radar (SAR) and infra-red (IR) (aka "heat") seeker; as well as two types of powerplants - with standard and increased power loading. Modifications of SAR seeker are designated as R-27R and R-27ER, and of IR seeker as R-27T, R-27ET. In control system of all missiles, in addition to seeker, an inertial navigation system with radio-correction is included. Also a modification of the R-27AE missile with active radar seeker (inertial guidance with radio-correction and active radar homing in the final phase of flight) is developed. As is known, using of rockets with SAR seeker the target is exposed from radar of aeroplane that conducted the launch. The emanation source of missiles with active radar seeker of is placed on the rocket.

The "E" letter in the R-27 rocket designation index indicates that the missile has increased powerplant power landing, "energetic" and has increased operating range. So, for R-27R missiles (inertial guidance with radio-correction and semi-active radar homing in the final phase of flight), the declared operating range is 80 km, and for the R-27RE - up to 130 km. For the R-27T (all-aspect passive infra-red self-direction) operating range of up to 70 km, and for the R-27TE - up to 120 km. So in fact the R-27 missiles pretend to be simultaneously assigned to the missiles of an intermediate and long range. Also it should be noted that developers and manufacturers of guided aircraft armament in the product brochures usually specify missile operating range in ideal conditions, which disorients in some ways. The effective operating range of the missile depends on many factors: the launch and the target altitude, speed of carrier aircraft and target, launch angle relative to the target and carrier aircraft position. When launching at low altitude effective operating range of the missile may reach only 20-25% of the maximum. If the target is actively maneuvering or missile is launched into the rear-hemisphere of a leaving fast-moving target the effective operating range may be reduced even

more. This dependence is inherited in all "air-to-air" missiles in full measure.

All-aspect R-27 missile attacks the target in any of its initial position in the 50 targeting angle field for SARS and 55 for the IRS. Target lock-on is conducted in an altitude range from 25 m to 25 km with a maximum overage (detraction) of 10 km at targets speed up to 3500 km/h and G force up to 8 g. The combined use of R-27 missiles in aircraft ammunition, with a variety of seekers increases ECM protection and effectiveness of armament plan of aircraft system in general. By now, the R-27 modifications with active and semi-active radar and thermal seekers are used in almost 20 countries around the world.

The R-27 missiles are produced at the facilities of the State joint-stock holding company "Artem" (Kyiv) - aircraft missiles series assembly headquarters plant in the former Soviet Union. At this stage the company is included in SC "Ukrobornprom" and is solving tasks of the maximum R-27 production localisation in Ukraine. SJSHC "Artem" partners are other companies of the concern - in particular, the State Enterprise "Scientific-Production Association" Pavlograd Chemical Plant", which is responsible for the creation and production of composite propellants for missile engines.

Ukraine is quite a major supplier of the R-27 guided aircraft missiles to the foreign market. The main customer of the intermediate and long range guided missiles are countries where Su-27 and MiG-29 fighters are put into service. For the last seven to five years, until 2013, Ukraine exported more than 3 thousand missiles in different modifications.

As for seekers, for the equipping of R-27R missiles in Ukraine JSC "Kyiv factory" Radar" produces semi-active radar seeker RGS-27 (industrial index 9B1101K), a seeker target lock-on range is 25 km. "Radar" R-27 modifications are homed by radiation reflected from the target, emitted by airborne radar (RLS) N019/N019M "Sapfir-29/29M" radar aiming system RLPK-29 (manufactured by Ukrainian State Enterprise "Novator", located in the Khmelnitsky city) on lightweight MiG-29 fighters or airborne radar N001 "Mech" type (also produced by "Novator"), that is part of the radar aiming system RLPK-27 of Su-27 heavy tactical fighter.

R-27T/ET rockets subfamily are equipped with heat/infrared seeker (IRS) "Mayak-80M" (MK-80M) with a single-channel monoblock photosensor designed and manufactured by Ukrainian State Enterprise of Special Instrumentation "Arsenal". An important advantage of MK-80M compared with most of the "classic" (non-thermal-imaging) IRS is also the possibility of long-term (up to three hours) reliable system operation. Moreover, with some reduction of lock-on range, infra-red seeker "Mayak-80M" is able to well-function for a prolonged period even in the absence of coolant.

In addition, on The International Airspace Exhibition "Aviasvit-XXI", which took place in Ukraine, two SESI "Arsenal" IRS potentially adaptive both to the R-27 and new models of guided missiles were exposed. For two-spectral IRS MR-2000 such OPC were declared: target lock-on range - up to 30 km; field of view - ± 50 degrees; targeting angles - ± 40 degrees; angle rate of target autotracking - no more than 40 deg/sec. caliber - 200-230 mm. As for IRS with the A3-10 designation is stated that the product has two-spectral multielement photodetector that uses digital data processing methods by microprocessors, there is a possibility of rebuilding ECM protection algorithms. The standard target lock-on range - in the front hemisphere - up to 30 km, in the rear-hemisphere - up to 100 km; tracking/aiming angles - ± 60/± 50 degrees; angle rate of target autotracking - no more than 40 deg/s.. Perspectives of these seekers will be formed by future projects and orders.

Also, Ukraine is the actual monopolist in the production of checkout equipment for the R-27 missile exploitation and other types of aircraft guided armament. Such unique military armament is manufactured by a state enterprise "Kiev State Design Bureau "Luch". Automated control systems of the "Gurt" type are able to provide monitoring of aircraft guided armament condition,

make his diagnosis, on-time service, and, if necessary, repair of complex and expensive aircraft armament. Also directly in the deployment places of aircraft parts . Also GovKDB "Luch" (Kiev) produces improved and modernized "Gurt-M" system. "Gurt-M" system performs control, diagnostics and preparing to the use of more than 50 modifications of aircraft armament. We are talking about almost all types of aircraft "air-to-air" and "air-to-surface" missiles and guided bombs of the Soviet, Russian, Ukrainian-Russian production, as well as prospective aircraft weapons. "Gurt-M" is exported to countries which have aircraft armament of the Soviet and post-Soviet production in the arsenal. Along with the R-27 missiles. UDR

MAIN SPECIFICATIONS OF «AIR-TO-AIR» GM OF R-27 TYPE

Designation	R-27R (R1)	R-27ER (ER1)	R-27T (T1)	R-27ET (ET1)
All up weight, kg	253	350	245.5	343
Missile length, m	4.080	4.780	3.795	4.495
Body diameter, m	0.23	0.26	0.23	0.26
Wing spread, m	0.77	0.80	0.77	0.80
Fin spread, m	0.97	0.97	0.97	0.97
Maximum flight elevation of intercepted target	25	27	24	30
Possible g-loads of the target (MiG-21 fighter type, conducting a flying at a speed of 900 km / h), g	up to 8	more than 7	more than 8	about 7,5
Maximum engagement range (according to the energetic capabilities of GM)	80 (72)	130 (100)	72 (65)	120 (80)
Minimum engagement range (from rear-hemisphere), km	0.5	0.5	0.5	0.5
Guidance system	Inertial with radio-command correction + SARS	Same + SARS	Same + IRS	Same + IRS
Warhead weight (fragmentation/ continuous rod with RLV), kg	39	39	39	39

Aerotechnica

НПП «Аэротехника-МЛТ» представляет модернизацию ЗРК С-125М1 «Печора-М1» и ЗРК 2К12М1 «Квадрат-М1» до уровня ЗРК С-125-2Д «Печора-2Д» и ЗРК 2К12М1-2Д «Квадрат-2Д», которая позволяет улучшить технические характеристики и расширить функциональные возможности ЗРК за счет реализации новых алгоритмов обработки и отображения информации устройствами, использования цифровой обработки сигналов на современной элементной базе, с цифровой (программной) селекцией движущихся целей и автоматическим съемом и обработкой информации.

RPF «Aerotechnica-MLT» is offering modernization of S-125M1 «Pechora-M1» and SAM 2K12M1 «Kvadrat-M1» to the level of the S-125-2D «Pechora-2D» and SAM 2K12M1-2D «Kvadrat-2D», which allows to improve the specifications and extend the functionality of SAM through the implementation of new algorithms fordata processing and display devices, the use of digital signal processing built using modern element base, with a digital (software) moving targets identification and automatic readout and information processing.

ПРЕИМУЩЕСТВА

- способность обнаруживать и уничтожать воздушные цели, включая малоразмерные цели, выполненные по технологии «СТЕЛС»;
- повышение помехозащищенности комплекса от различного вида активных и пассивных радиопомех, а также отражений от местных предметов за счет применения новых аппаратных технологий, методов защиты от помех и способов обработки сигналов;
- автоматизация процессов:
  - управления с вышестоящего командного пункта;
  - сбора и обработки разведывательной радиолокационной информации;
  - обнаружения и сопровождения целей;
  - выбора оптимальных режимов работы для конкретных условий стрельбы;
  - подготовки и пуска ракет;
  - контроля технического состояния средств комплекса;
  - документирования боевой работы;
  - тренировки расчета;
- увеличение зоны поражения и повышения вероятности поражения целей в простой помеховой обстановке и при влиянии интенсивных радиопомех за счет введения нового метода наведения ракет, оптимизации методов и алгоритмов обработки радиолокационных сигналов, повышения дальности обнаружения и сопровождения цели;
- введение возможности автоматического сопровождения целей оптическим/тепловизионным каналом;
- сокращение времени реакции, цикла стрельбы;
- восстановление эксплуатационного срока службы комплекса до 15 лет;
- повышение технической надежности модернизированных элементов комплекса до 1500 часов наработки на отказ за счет замены аналоговой аппаратуры на цифровую, изготовленную на современной элементной базе;
- введение навигационной системы GPS для топографической привязки средств комплекса;
- использование современных методов передачи голосовой информации;
- введение в состав комплекса средств телекодовой связи для приема-передачи данных между элементами комплекса, вышестоящим КП и другими внешними источниками информации;
- возможность совместной работы (стыковка) с широким парком средств обнаружения целей и системами управления при оснащении их специализированными средствами сопряжения;
- оценка результатов боевых действий благодаря средствам регистрации информации и ее обработки;
- возможность тренировки полного боевого расчета путем создания воздушной обстановки любой сложности и действий своих средств;
- стандартизированная и модульная конфигурация аппаратуры ЗРК;
- существенное сокращение объема технического обслуживания составных частей комплекса;
- уменьшение энергопотребления комплекса;
- улучшение эргономики.

S-125-2D «PECHORA-2D»

	before upgrade до модернизации	after upgrade после модернизации
Maximum detection range (tactical fighter) at 7 km altitude Максимальная дальность обнаружения цели типа истребитель на высоте 7 км.	39 km	46 km
Maximum speed of engaged approaching targets Максимальная скорость поражаемых навстречу целей	700 m/s	800 m/s
Maximum engagement altitude Максимальная высота поражения цели	18 km	21 km
Maximum course parameter Максимальный курсовой параметр цели	16 km	24 km
Single-round kill probability of a small-size target (cruise missile) Вероятность поражения малоразмерной цели (крылатая ракета) одной ЗУР	0.04-0.48	0.35-0.85
Time to acquire target Время захвата цели на автоматическое сопровождение	10-15 s	2.5-3 s
Deploy/stow time at site of operation (standard mode) Время разворачивания/сворачивания комплекса (стандартный режим)	2 h 10 min	35 min
MTBF, not less than Среднее время наработки на отказ, не менее	45 h	1500 h

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	before upgrade до модернизации	after upgrade после модернизации
Maximum detection range (tactical fighter) at 7 km altitude Максимальная дальность обнаружения цели типа истребитель на высоте 7 км.	50 km	60 km
Maximum speed of engaged approaching targets Максимальная скорость поражаемых навстречу целей	600 m/s	600 m/s
Maximum engagement altitude Максимальная высота поражения цели	14 km	14 km
Maximum course parameter Максимальный курсовой параметр цели	±18 km	±18 km
Single-round kill probability Вероятность поражения одной ЗУР	0.6-0.8	0.85
Time to acquire target Время захвата цели на автоматическое сопровождение	6-12 s	3-6 s
MTBF, not less than Среднее время наработки на отказ, не менее	55 h	1500 h

2K12M1-2D «KVADRAT-2D»

ADVANTAGES

- capability to detect and destroy low-flying targets, cruise missiles, including very low observable (VLO) («stealth»);
- improved jamming resistance to all kinds of active and passive jamming, clutter due to application of new hardware technologies, jamming resistance and signal processing techniques;
- automation of:
  - control from superior command post;
  - acquisition and processing of surveillance data;
  - detection and tracking of targets;
  - selection of optimal modes for particular missile launch conditions;
  - missile preparation and launching;
  - monitoring of technical status and operability of system components;
  - recording of all data on operation of the ADMS major elements;
  - crew training;
- expansion of kill envelope, enchancement of target kill probability in conditions of passive interference and intensive jamming due to introduction of new missile guidance method, optimized radar processing techniques, increased detection and tracking range;
- capability of fully automatic target optical/thermal imaging tracking;
- reduced response time and firing cycle;
- extended service life – up to 15 years;
- improved reliability and MTBF (1500 hours) due to new component base;
- GPS-based automatic topographic reference and alignment of system components at site of operation;
- advanced techniques for voice transmission;
- digital data exchange between system components, superior command post and other consumers;
- interfacing capability with a wide range of surveillance sensors and control systems;
- evaluation of combat results due to recording and processing of all data on system operation;
- crew training capability by simulating air situation of any type and friendly actions;
- standardized, modular configuration of equipment;
- notably simplified maintenance of system;
- reduced power consumption;
- improved ergonomics.

HEAD OFFICE: 12 Janusz Korczak (Baumana) str., 03190 Kyiv, Ukraine
Tel: +380 44 591-15-75 /// Fax: +380 44 591-15-76 /// E-mail: info@aerotechnica.ua

ЦЕНТРАЛЬНЫЙ ОФИС: 03190, г. Киев, ул. Януша Корчака (Баумана), 12
Тел. +380 44 591-15-75 /// Факс +380 44 591-15-76 /// E-mail: info@aerotechnica.ua

MANUFACTURING FACILITIES: 150 Dimitry Rostovsky (Frunze) str., 08000 Makariv, Kyiv region, Ukraine

ПРОИЗВОДСТВЕННЫЕ МОЩНОСТИ: 08000, Киевская обл., г. Макаров
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[invulnerability]

PROTECTION OF YOUR FLIGHT

Ukrainian company Adron R&D Ltd has designed optical-electronic jamming systems that defend helicopters and airplane from all of the currently-existing infrared-homing threats, including MANPAD missiles, by confusing or 'blinding' missile seekers and therefore diverting these from their courses. The system is designed to equip MI-24, MI-8/MI-17, as well as Mi-8MSB and MI-2MSB helicopters.

MODERN REALITY

Protection of both military and civil aircraft from IR-guided MANPAD weapons like Sidewinder, Red Eye, Chapparel, Piton, Xiuning-5 or Stinger is normally provided using false thermal targets and electronic-optical active jamming systems. Operation of electronic-optical active jamming systems for the protection of military and civil aircraft depends on the principle of modular jamming of infra-red radiation. This type of protection does better than the elimination of false thermal targets, as the latter implies an expendable protection reserve which is limited. Conversely, electronic-optical active jamming systems provide reliable protection as long as the flight continues, while remaining virtually non-sensitive to the target discrimination devices employed by IR seekers. Field testing and the use of electronic-op-

tical active jamming systems in combat operations demonstrated their high performance and operational reliability. The systems effectively defeat a few types of IR-guided missiles, providing an adequate protection against multiple threats flying from many directions all at once, and eliminating the need for the use of special missile attack warners. The systems are easy to operate and suitable to maintain even in field conditions. Light and compact, these are easy to integrate onto helicopters from various manufacturers.

UKRAINIAN SOLUTION

Electronic-optical jamming systems are designed and manufactured in the U.S. and some European nations, as well as Russia and Ukraine.

Ukraine offers potential buyers the Adros-KT-01AVE electronic-optical jamming system, intended for active protection of helicopters and Adros-KT-03-UE for protection of An-26 and An-32 aircraft from IR-guided missiles. The system's operation depends on a new electronic-optical jamming principle. The technology incorporates a newly-designed electronically-controlled modulator with programmable processors.

The mass of the existing jamming systems are known to be primarily designed for defeating the missile guidance units using amplitude-phase modulation. To mislead the missile guidance unit and divert the missile from its course, the electronic countermeasure signals generated by the system should be 1.5-2 times (sometimes even 20 times) stronger than the signal emitted by the objet under protection. The exclusive forte of the Adros-KT-01AVE and Adros-KT-03UE, according to its designers, is that they are equally efficacious against guidance devices using amplitude phase modulation, phase-frequency modulation, or pulse-position modulation of target-emitted signals, as well as against guidance units with high noisep r o o f factors. This is the first thing.

The second thing is that the Ukrainian technology, unlike its foreign-made equivalents, does not require the intensity of the electronic countermeasure signal to differ much from that emitted by the target proper. The Adros-KT-01AVE and Adros-KT-03UE are particularly efficacious against the missiles such as Stinger, Stinger-POST, Magic, Sidewinder, Mistral and more.

It should be emphasize that the design of the Adros-KT-01-AVE allows it to be adjusted to helicopters of all types. The Ukraine's research and manufacturing potential, along with an experience in maintaining the system allow it to adjust the system to military equipment and military/civilian installations of various types, as well as to develop new electronic-optical countermeasure technologies.

For maximum effectiveness for defeat air-craft it is necessary to use Engine Exhaust Shields (EES) «Adros» ASh-01V and/or combined flare dispenser «Adros» KUV 26-50 (release of decoys), which can significantly reduce aircraft infrared visibility and create a complex obstacle environment functioning infrared homing missiles of class «air-to-air» and «ground-air».

EES «Adros» ASh-01V are intended for reduce of infrared visibility of Mi-8, Mi-35 type helicopters of all modifications, equipped with turboshaft TV3-117 type engines with the purpose to decrease IR guided missile attack probability.

EES «ADROS»

«ADROS» KT-01AV optoelectronic suppression station

«ADROS» AV-26V (combined noise emission device KUV 26-50)

Needed helicopter infrared visibility decrease level is provided by multiloop gas ejector use, by screening of heated component direct visibility, by EES tract screening, by use of special materials, which decrease infrared emission.

Decrease of aerodynamic and gas-dynamic losses is provided by EES configuration change and by flow part geometry optimization.

«Adros» KUV 26-50 flare dispenser is intended for locating and dispensing 26 mm and 50 mm caliber chaff decoys and flares with the purpose to protect air-craft against guided missile attacks. Device dispenses flares under special programs to create complicated jamming situation for missiles with infrared homing heads even for those have counter countermeasure system.

Universal flare dispensing programs are developed for particular aircraft type. Salvos of two caliber flares with different and specially calculated periods provide to approaching missiles false information about target location and lead the missiles away from the attack trajectory. «Adros» KUV 2650 can be applied on all flight stages in manual or automatic (jointly with the missile warning system) modes. «Adros» KUV 2650 flare dispenser can be installed on any aircraft type.

For KUV 26-50 Adron R&D Ltd has designed flares «ADROS» PIK-26, PIK-50, PIK-50V. They are used to protect aircraft (both helicopters and airplanes) against any guided missiles equipped with infrared seekers. Flares create false infrared targets and drag approached missiles to the distance safe for protected aircraft.

Unfortunately, Adron's protection systems were not installed on all Ukrainian helicopters at the beginning of anti-terrorist operation in Donbas region. Today this situation has changed. UDR

UKRSPETSTECHNIKA

Ukrainian Holding Company

radioelectronic equipment for military and special purpose

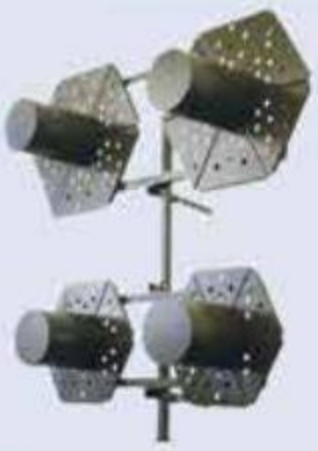
RADAR «MALACHITE»

Radar "MALACHITE" - digital, Interference-proof radar reconnaissance aircraft and surface targets provides detection, identification of the origin and tcransmission of radar information consumers automatically.

Radar "MALACHITE" provides:

- detection of high-speed and low-flying air targets;
- control of the water area and the detection of sea targets up to the radio horizon;
- an effective tool in the fight with the targets using stealth technology;
- the ability to detect targets with a small effective reflecting surface and UAVs;

Radar "MALACHITE" has the ability to mate and transfer radar information automatically to any existing and future means of automated control systems and firing.



directional antennas actions

«ANKLAV» portable jammer GPS/Glonass

Portable jammer **«ANKLAV»** provides jamming navigation receivers **GPS / GLONASS**.

It is an effective tool in combating drones and precision-guided weapons.

Portable jammer **«ANKLAV»** is manufactured in portable and stationary version with directional antennas and omnidirectional.

It is an effective tool in combating drones and precision-guided weapons.
Portable jammer **«ANKLAV»** is manufactured in portable and stationary version with directional antennas and omnidirectional.

Jamming range:

40 км. with directional antennas
20 км. with omnidirectional antennas

«JAB»

Mobile complex of surface recognition "JAB" is intended for detection, classification and identification of surface moving targets as well as low-speed low-flying air targets, target pointingwith the aim to provide performance of tasks on security of wide areas and reconnaissance.

Complex provides:

- automatic detection (with radar) and receiving detail information (with visual channel) about surface moving targets geographically referenced and with output of the information to command center;
- automatic affixment of the complex on the terrain with the help of satellite navigation systems; calculation and record route traffic at PC;

RADAR «BARSUK-A»

"Barsuk-A" is surface portable radar mounted on a rotating support (on a tripod or statioinary) and provides detection of persons, surface land and sea vehicles. It can be used to provide security of land and sea areas of state borders, for the protection of military, administrative and service buildings (warehouses, nuclear power plants, residences of important people, etc.) in all weather conditions in the absence of optical visibility. Detection and identification of the target is carried out in automatic mode. At the same time on the screen of the portable computer displayed a mark of the target which data is automatically stored in the log with the number, range, azimuth, speed and signature with reference to a map. Also it is possible to unite multiple radars in one system connected with TV and IR cameras for identification of detected targets.

JSC «HK «UKRSPETSTECHNIKA»
03022, UKRAINE
Kiev, M. Maksymovycha str., 2

www.ust.com.ua
office@usptech.kiev.ua
tel.: +38 (044) 257 99 22
+38 (044) 257 99 24

[saving lives]

ARMOURED MEDICAL VEHICLES

During task performances in the ATO area the demand for armoured medical vehicles sharply increased. Defence plants, both public and private, in 2014-15 presented a number of developments both on wheeled and tracked base. Some of the samples were used in ATO area, but in general military AMV needs by the end of 2015 were not filled.

AMV BTR-3

Armoured four-centrelined, eight-wheeled, amphibian medical vehicle BTR-3 developed on base of well known AMV BTR-3, developed once on Kharkov Design Bureau of Machinery named after A. A. Morozov. The vehicle is designed to search for, collect, evacuate the wounded from the battlefield and from the mass sanitary loss centres and providing them with first aid treatment. Currently produced by the SE "Zhytomyr armored plant". The vehicle is able to follow the combat units, overcome in move the trenches, ditches and water obstacles.

By appointment and location of machinery and equipment the vehicle is conventionally divided into three compartments: driving compartment, medical compartment and engine compartment.

BTR-3 shows high mobility and trafficability, equipped with seats for placing 6 minor wounded (in the "sitting" position) or 4 critically wounded (on the stretchers), as well as crew members (commander, driver, paramedic).

AMV "MEDIK"

The vehicle is created on the SE "Zhytomyr armored plant" in 2004 by alternation of standard IFV-1 into a medical version – by increasing the height and size of the aft body. After producing a medical version of the IFV it was offered to the Defense Ministry, but didn't interest the military. In 2014, the vehicle was transferred to the ATO. AMV "Medik" can carry 6 "standing" or 4 "lying" wounded. Uploading

and loading-out the wounded in the squad compartment is carried out via two after hatch which is very difficult. Ideal solution for such problems is a ramp.

How it is done in a medical version of the BTR-4.

AMV-4C/ACEV-4K

AMV-4C based on BTR-4 is designed to provide pre-hospital care and transport the critically wounded from the fighting zones. AMV-4C is capable of carrying up to 4 critically wounded on stretchers or 2 critically wounded and 8 minor wounded in the seating places. The developer is KDBM named after Morozov (Kharkov) In 2014, two UAF vehicles under the name of ACEV-4K (armoured casualty evacuation vehicle) were transferred to the ATO area. The minimum requirement of Ukrainian Armed Forces units of the battlefront, according to experts of the military-medical department UMD, is 54 medical armoured vehicles of AMV-4C level.

AMV-70

By the beginning of 2014 the only new armoured casualty evacuation vehicle that passed into UAF service, was a medical armoured personnel carrier called "Kovcheg". AMV-70 (or BTR-70CM) developed on base of BTR-70D by SE "Nikolaev

armored plant". Work on the development of the vehicle was started in 2008. After passing into UAP service AMV "Kovcheg" was presented to the troops in a single copy. In 2014, 6 AMV-70 was manufactured, 2 more were ordered. 3 crew members (driver, doctor, medic). The vehicle is capable of carrying 4critically wounded on a stretcher, and 5 minor wounded on the seats. But because of the rear engine placement to upload the wounded to "nurse" it is necessary to use a load/unload device. This is

quite difficult and risky under enemy fire.

MT-LB S "ESKULAPOCHKA"

Research and production company "VK System" (Vasylkiv) developed armoured medical vehicle based on the MT-LB. The order from the Ukrainian Armed Forces – more than 20 vehicles. Landing compartment of standard MT-LB has taken the main alteration. In order to place the wounded on stretchers in two tiers, the height had to be significantly increased. Wounded transportation capacity: lying on a stretcher – 4 (+1) people; sitting – 8 people. UDR

COMBAT MODULE "VIY"

Remotely controlled Combat Module

Can be mounted onlight armored vehicles (LAV) such as "DOZOR-B" and intended to destroy medium armored targets, firing points, manpower and enemy air targets. LAV with CM "Viy" are designed for patrol, reconnaissance and combat missions.

CM "Viy" has a simple steel constructions without stabilization, which significantly reduces its cost. The structure of CM "Viy" is based on commander hatch of the tank T-64, which ensures the reliability of the structure of CM "Viy", simplifies the manufacture and therefore reduces its cost

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"DB "Caliber" Ltd.

+380444830379
designbureaucaliber@gmail.com

CM "Viy" SPECIFICATION:

GSh-23L specification:

CALIBER
23 mm

RATE OF FIRE
3..3400 rounds/min

MUZZLE VELOCITY
700 m/s

DESIGNED RESOURCE
4000 shots

FIRE CONTROL
electric, 27 V

WEIGHT	ANGLE OF ROTATION
50 kg	**Y:-5⁰ – 60⁰ X: 360⁰**

OVERALL DIMENSIONS (not more, mm)

Length	width	height
1387 (1537)	**165**	**168**

Tank hatch is equipped with vertical and horizontal targeting drives, bracket for mounting gun carrier and other mechanisms and electric equipment.

For storage and loading of ammunition CM "Viy" is quipped with box-type ammunition mechanism with capacity of 250 pcs of 23mm ammunition. It has a rigid welded construction and is attached to the back wall of the CM "Viy".

For collection of used cartridge belts CM "Viy" is equipped with a box type cartridge belts collector.

23 mm double-barreled aircraft gun "GSh-23L" designed for firing at air and ground targets with fragmentation high-explosive, armor-bursting and armor-piercing incendiary shells.
Automation work is based on usage of energy of powder gases. GSh-23L is equipped with a localizer, which are used for the directed removal of powder gases and reduce recoil force.

PROTECTION TECHNOLOGIES

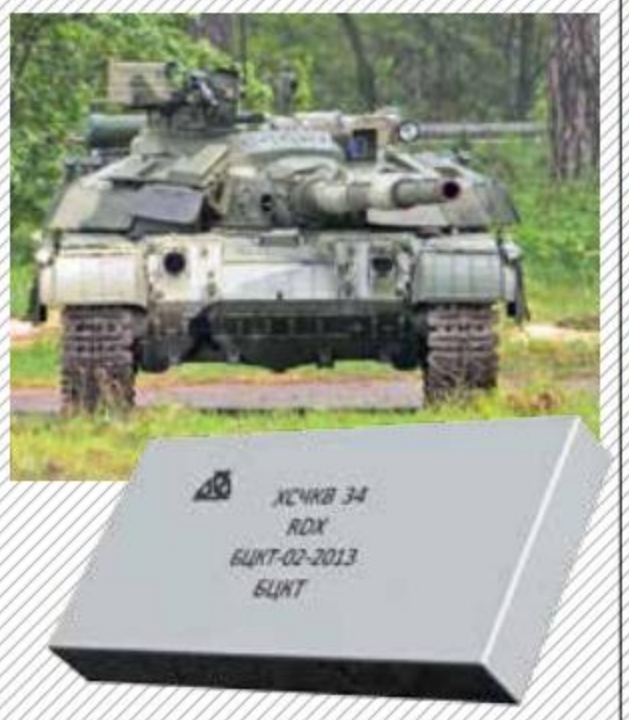
The Microtech Base Center for Critical Technologies, a State-owned company based in Kiev, is renowned both in and outside Ukraine for its innovative product designs. The Company has achieved significant accomplishments in the area of active protection and explosive reactive armor (ERA) protection technologies for heavy armored military vehicles and, recently, lighter weight armored vehicles. The R&D and technological solutions implemented in Microtech's production-standard and experimental equipment demonstrate a high potential for effective protection of military armored vehicles.

Microtech designs for the military market, elements of the new-generation explosive reactive armor (ERA) system Nozh (or "Knife") and Duplet family of APS elements for protecting AFVs against tandem-warhead threats have been designed, developed and approved for the Ukrainian Armed Forces' service, and have been supplied to both the Ukrainian MoD and export customers. Particularly the ERA system Nozh has been integrated into the T-64BM/Bulat main battle tank (MBT) upgrade package, and Duplet has been adopted for the new indigenously developed MBT Oplot. Nozh secures the host tank against all known armor piercing threats, including subcaliber armor-piercing penetrator projectiles, non-tandem-type hollow-charge rounds or striking-nucleus-type impact munitions. The ERA system Duplet reliably shields the host armored platform from tandem-warhead shaped-charge weapons -- which have recently received huge development effort -- in addition to the range of threats defeated by Nozh. Both Duplet and Nozh designs are so far unique in the world. In addition to this, we have developed active protection system Zaslon which has been qualified for service with the Ukrainian Armed Forces. Zaslon is designed to protect an armored combat platform against anti-tank weapons of all types, including armor piercing grenades with unitary or tandem shaped charges which are fired from handheld or mounted grenade launchers, as well as from antitank guided missiles, gun fired armor-piercing rounds and shaped-charge artillery projectiles approaching at 70 to 1,200 m/s. It is so far the only APS design in the world capable of intercepting high-velocity armor-piercing threats approaching at 750 m/s or faster.

The Company's product portfolio additionally includes motion platform trainers for MANPAD weapon systems, motion simulators for training drivers of armored fighting vehicles BRDM-2, BTR-70/80, BTR-80UP, BMP, main battle tanks T-72, T-55, T-62 and others.

Microtech has also developed the passive ballistic/acoustic protection system designated "Akustik". Designed specifically to improve survivability of mounted infantry on wheeled AFVs, the Akustik is most effective in protecting against 7.62mm/12.7mm armor piercing munitions of the B32 type, as well as secondary shrapnel, and it will also provide a 200 to 300 pct reduction of acoustic load on the crew and passengers. In addition to ERA protection, Microtech is working intensively in the field of active protection for AFVs. Specifically for MBTs and light AFVs, the Company has developed the active protection systems called "Zaslin" and "Shershen", respectively. Both employ non-launched-type counter-munitions for intercepting incoming threats at short ranges. UDR

ERA SYSTEM *NOZH*



The Nizh modules are mounted on the tank's turret, upper forebody and sides – integral or add-on, or both at once. Each ERA block contains counter-HEAT devices KhSChKV-34P, KhSChKV-19 and KhSChKV-19A, as well as ballistic components, a damping unit and a container. The ERA system "Nizh" equips the T-84, BM "Bulat", T-64BV1M, T-64BV-1, T-72AG and T-72B1 MBTs. Full set of the Nizh equipment for one MBT weighs about 3,000 kg

ERA SYSTEM *DUPLET*

The "Oplot" MBT is offered equipped with the ERA protection system "Duplet" to counter tandem-charge threats. Each ERA block is comprised of counter-HEAT devices KhSChKV-34P, KhSChKV-19, KhSChKV-19A, as well as ballistic components, a damping unit and a container. Each KhSChKV-34 device is made of 29 component parts, and KhSChKV-19 of 46 component parts. The ERA protection is mounted on the tank's turret, upper forebody and sides.

ACTIVE PROTECTION SYSTEM *ZASLON*

Illustrated here in "transport" and "deployed" configurations, the active protection system "Zaslin" was approved for Ukrainian Army service on 4th December 2009. It is suitable for integration in both heavy and lighter weight AFVs (infantry fighting vehicles and armored personnel carriers). Sample arrangements of "Zaslin" equipment on the BTR-70DI APC, Poland's "Anders" light tank and "Rosomak" APC (combined with "Nizh-L" ERA modules)

PASSIVE BALLISTIC/ ACOUSTIC PROTECTION SYSTEM *AKUSTIK*

A BTR-80UP APC vehicle outfitted with "Akustik" ballistic/acoustic protection equipment

ERA SYSTEMS *RAKETKA*

Specifically for light AFVs, Microtech has developed the ERA systems designated "Nizh-L" and "Raketka".

ACTIVE PROTECTION SYSTEM *SHERSHEN*

A BMP-2 vehicle is seen here equipped with active protection equipment "Shershen" mounted on the forebody and sides

80K6M radar was designed in 2012

MR. V. TRAILIN

DEPUTY DIRECTOR
OF SCIENCE
OF SE SPC "ISKRA"

«ALL-SEEING EYE» FROM UKRAINE: UP-TO-DATE RADAR

Ukraine is a top-ten country in the world engaging in developing and producing radar systems. In the country there are research schools maintained for the above activities, there are national manufacturers of corresponding elemental base and components, as well as manufacturers capable to propose their own, state-of-the-art solutions with a view to ensuring air space control. The correspondent of Defense Express had an interview with the representative of the leading Ukrainian enterprise – developer and manufacturer of ground-based radar equipment, Deputy Director of Science of State Enterprise "Scientific and Production Complex "Iskra" (SE SPC "Iskra") Mr. V. F. TRAILIN.

– Mr. V. F. TRAILIN, what is the situation at Iskra today?

– Preceding 2015 turned out to be extremely arduous not only in the area of batch production but first of all in the field of new projects. Correspondingly the amount of work to be done is increased repeatedly in the scientific and technical centre of the enterprise.

– What are the causes of the situation?

– From 2012 onwards our enterprise has been getting orders both for serial radars and for development and production of new modified versions of actual radars. Thus in 2012 we developed 80K6M radar, a high-mobile version of 80K6 radar family capable to survey in elevation sector up to 55 degrees. Followed by year after, 2013, radar 80K6K1, developed for another customer, came into service. At the turn of 2014 one of our permanent customers made a request to have the radar with antenna system installed at the tower in order to significantly detect low-flying targets. The new version has been developed within a year and by now it has already been shipped to the Customer. Now the radar has been successfully running to the Customer's full satisfaction. By the way, it should be remembered that the enterprise principal activity during last two years is focused on the order batch from Ministry of Defense of Ukraine.

– It turns out that nowadays a foreign customer can make peculiar demands to serial radars?

– Moreover, the contract future depends on the readiness to satisfy customers' requirements that is why we have to display compliance. It's good that the structure of our enterprise allows effectively and promptly developing and manufacturing such products.

80K6K1B radar with antenna system installed at the tower has been already shipped to the customer

– And what about the projects as per MR-18 metric radar and solid-state version of Digital APAR 80K6T radar represented last year?

– We are working strictly according to the stipulated schedule. Within 2016 we are to complete manufacturing samples MR-18 and 80K6T. All components of these radars are produced, adjusted and tested and the final assembling of the radars is carried out at present.

– The development and production of new radars is the process requiring considerable expenses. The concurrent manufacturing of two different radar types demands solid argumentation. May I ask about this?

– Both radar types have been designed as per analysis of requirements which are laid down by different customers, taking into account the long-term operation of our products in various climatic zones and, naturally in consideration of our own vision concerning the prospects of the branch development. We made it our aim to create the all-purpose, easy-to-use and at the same time effective radars on the basis of active phased arrays in the most perspective wavebands: metric (VHF/UHF) and centimetric (S). The core features of these radars for customers should be their reliability, capability to work at high altitudes and transportation ability by different types of transport. MR-18 is 2D high-potential omnirange radar (early warning system) able to detect the stealth targets. 80K6T is 3D high-potential omnirange radar possessing high performance capabilities to detect and calculate coordinates of variety of targets and to operate under different interference environment. The radar belongs to type GCI according to NATO classification.

– The market of S-radars is adequately represented, including foreign manufacturers. Is there any new equipment proposed by your enterprise?

– First of all, as I noted before, we have carried out the market analysis and concentrated on weak positions of competitors – our radar can offer much more capabilities in the field of detection range and, according

to our estimation it is the maximum level for such type of radar. For instance, the radar allows detecting targets RCS 2m2 at range up to 450km. At the same time the radar has been designed in such a way that allows upgrading as far as concurrent technologies will be developed. In addition, the main distinctive characteristic of our enterprise is readiness for cooperation with foreign partners in the area of manufacturing new radar versions on terms of SKD or CKD. It is a good chance for us to unload in-house facilities, the workload of which has recently been tending to 100%. For our partners it is a chance to gain access to radar design and production engineering.

– Can you outline the countries being your partners in these projects?

The metric radar MR-18 is being designed for one of South-east-Asia country. As for 80K6T radar we have rather an interesting situation. As a consequence of its development we have possibility now to participate in the tender procedure in one of the Southeast-Asia countries, which has been lasting at present. At the same time, during the last year two major countries from Middle-East region took an interest to arrange domestic manufacturing of the mentioned radar and we have already established the contractual relationship with one of the countries.

MP-18 radar. Start of tests (above)

Solid-state 80K6T radar with digital APARis of great interest for some countries of MENA region (below)

– Is it possible to use these radars as the part of Armed Forces of Ukraine?

– Absolutely, these radars are inherently the next generation of radar population, which have been added to arsenal of Ukraine nowadays and as you know, Armed Forces of Ukraine is our most important customer and initiator of the latest undisputed technologies. UDR

Interview by Valerii RIABYH, Defense Express

[means of defeat]

PORTABLE CAPABILITIES

The State Enterprise "State Kyiv Design Bureau "Luch" (hereinafter SKDB "Luch") which is part of the SC "Ukroboronprom", offers potential consumers wide spectrum of own products among them Portable antitank missile system Skif, Light portable missile system Corsar and portable rocket grenade launcher.

Skif man portable antitank missile system is intended to destroy man power, stationary and moving modern armoured targets with combined, carried or monolithic armour, including ERA (explosive reactive armour), as well as pinpoint targets like weapon emplacements, a tank in a trench, light-armoured objects and helicopters.

The system's feature lies in its possibility to aim the missile on a target from closed emplacements and shelters that reduces the risk of the gunner destruction by reply fire attack of the enemy. Another feature of the complex is the flight trajectory of the rocket. After starting it flies above the line of sight (at a height of about 10 m) and go down on the level of goal in the final section of the flight. The laser beam shines to the tail of the missile and only for a split second before impact move to the target.

Portable antitank missile system Skif

The system is completed with 130 mm and 152mm missiles in transport and launching containers with tandem hollow-charge (RK-2S, RK-2M-K) and high-explosive fragmentation (RK-2OF, RK-2M-OF) warheads. Guidance device consists

of a TV channel, guidance laser channel, an electronic control unit. It is fitted with the thermal imager (at the Customer's request). The rocket is laser-guided in the range of 100 m to 5 km and its shaped charge can burn through armor thickness of 800 mm. The tripod-mounted launcher system for the SKIF missile weighs 26kg (the thermal imaging sight included). The SKIF carries a tandem warhead consists of two separate shaped charges, one in front of the other -- with some distance between them, and the front charge being somewhat smaller than the rear one. This precursor charge disrupts explosive reactive armor or pierces through external spaced armor, thereby opening the way for the rear charge to pierce the now defenseless core armor. Jam resistance is obtained by means of installing the missile's opto-electronic sensor eye in backward direction from the target. One more advantage provided by the SKIF is that it can be fired remotely at a distance of up to 50 meters from the firing post, which reduces the risk for the operating personnel and also allows collective control of several launchers at a time.

The rockets for the Ukrainian version of the Javelin are about four times cheaper than the US counterpart, are wholly made in Ukraine, and do not have any component parts of the Russian Federation.

In 2014 SKDB "Luch" has successfully completed its test program of creating new anti-tank missile system and launcher Corsar. In its mass and size, the Corsar is coming closer to handheld anti-tank grenade launcher systems, being at the same time far superior in terms of effective range, first-round hit probability and lethality. With its 2.5-km

Light portable missile system Corsar

rage (twice as longer as that of a handheld grenade launcher), the Corsar is designed to defeat hostile armored equipment, missile launchers, hostile guns operated from fortification works or urban buildings, enemy soldiers sheltered therein, and other types of small targets - under day and night conditions. Where appropriate, the Corsar can be used to engage hovering helicopters and remotely piloted aircrafts.

The Corsar was being developed with a clear perception that infantry units in Ukraine and other countries will demand more and more precision-guided multi-target systems that are light in eight but highly lethal.

Ready to fire, the system weighs 18 kg, including the 13.5kg missile housed in a storage/ transport/launch canister. The system will operate within a temperature range of minus 40 degrees to plus 60 degrees Celsius, while its American and Israeli counterparts are not designed to operate at temperatures under minus 20 degrees Celsius.

Due to compact dimensions and low weight, the system can be configured into 'packs' for long-distance transport. The Corsar is transportable by all conventional transport facilities. When used autonomously, it is operated by two or three personnel who can carry an allowance of up to five ready-to-fire missiles (in a "packed launcher with one missile + two missiles + two missiles" configuration), in addition to their personal weapons. The system will take no longer than 15-20 seconds to go from stowed to ready-to-fire configuration and backward, and will be able to fire three to four missiles per minute. The

tandem-charge warhead of the R-3 missile perforates a 550-mm-thick core armor behind ERA when fired from 50 to 2,000 meters away. For an improved operational versatility, the missile can be configured to carry a thermobaric warhead to produce a blast effect equal to that of a large-caliber gun round. A thermobaric warhead is especially efficacious against buildings, urban constructions and field fortification structures. Sheltered targets can be defeated even without the need of penetrating the shelter, provided they are non-pressurized. The missile is also suitable for missions such as breaching safe passages through mine fields or non-explosive obstacles. The extensive tests showed that the anti-tank missile launch system Corsar is a highly lethal and highly effective multi-target offensive-defensive weapon.

The Corsar uses semi-automatic laser-beam guidance system and offers high resistance to electronic countermeasures influence. The guidance mode selected by Ukrainian designers of ATGW missiles differs from that used for the U.S. Hell-fire and Israel's Lahat semi-active laser riding missile designs. The latter two use conventional technique, in which a laser beam is aimed to the target, while the seeker directs the weapon toward the target by following the spot produced by the laser beam. However modern tanks and other moving targets are all fitted with protective systems which are activated once a laser emission is detected, and can 'blind' an incoming threat or divert it from its designated trajectory. The Ukrainian ATGW missiles are guided by a laser beam that is directed not to the target but the tail of the flying missile where the signal receiver is positioned. This is what gives the Corsar a 'low probability of intercept' capability.

Portable rocket grenade launcher

The Corsar will be much less expensive than sameclass counterparts originating in the U.S. or Israel, and low cost is what makes it particularly suitable for mass production.

One of the latest portable products SKDB "Luch" is a grenade launcher. It is intended to destroy lightly-armoured and unarmoured equipment (launchers, radars, parked aircrafts, cars and etc.), field-type constructions (such as permanent fire position, earth-and-timber emplacement) as well as manpower located outdoors, in shelters, building of stone, bricks or concrete. Use of a new electro optical sight automates and simplifies gunner work, provides high accuracy of hit at maximum firing range.

Ammunition for a grenade launcher is a rocket-propelled grenade 107 mm caliber, which can be equipped by the high-explosive fragmentation warhead to destroy bunkers and light armored vehicles. Maximum fire range - 1800 meters.

The portable grenade launcher was shown first time on military exhibition "Arms and Security 2015" in Kiev. The Ministry of Defense of Ukraine has already interested in this grenade launcher. UDR

MALYUK AUTOMATIC RIFLE

UKROBORONPROM
Ukrainian Defence Industry

MORE PRECISE
MORE RELIABLE
MORE ERGONOMIC
THAN THE KALASHNIKOV RIFLE

1. Charge handle (bilateral)
2. Sight 3. Picatinny (MIL STD 1913)
4. Red-dot 5. Sight ring 6. Case buffer
7. Semi/full selector (absent on semi-auto)
8. Magazine release 9. Trigger 10. Safety
11. Fore grip module 12. Disassembly key.

Special convection heat dissipation system integrated into the rifle

kg

3,8

Effective range of fire, *m*	Magazine capacity, *rounds*	Muzzle velocity (5.45/5.56/7.62), *m/s*	Rate of fire, *rd/min*
500	30/45	900/940/715	660

INTERPROINVEST

SE "Krasyliv aggregate plant"

Foundation date: 16.09.1968
Since 1981 has been producing Beam Holders BD3-USC and Rail Launchers APU-470M. 2011 – is the participant of State Concern " UkrOboronProm". Since 2015 – is a co-producer of man portable antitank missile system "Stugna-P".

The Malyuk rifle has a bull-pup design. The weapon features three Picatinny-style rails for mounting a different variety of optical and mechanical devices, such as sights, grip handle, bipod etc. A quick-detachable suppressor is also available.

The magazine is mounted within a dedicated shaft, which not only facilitates better fixation, but is designed so that to allow the magazine to fall down under its own weight with a press of the release button located next to the trigger, and it is easy to load into the receiver from whatever position the shooter chooses to take.

The weapon's design makes an optimal use of the energy of the combustion gases. The barrel is cooled by air convection, resulting in a longer barrel life, which is twice that of the Kalashnikov rifle.

The Malyuk automatic rifle is designed to be ambidextrous for both right-hand and left-hand shooters. The ergonomic bolt handle doesn't move when firing to preclude finger or chin injuries.

The Malyuk has had its recoil reduced by almost 50 percent as compared to that in the Kalashnikov rifle, and its design allows the key operations – unlocking, firing, removing and replacing the magazine and reloading – to be done with a single hand.

Parametric comparison of the Maluyk bullpup rifle vs similar-class international counterparts




Physical characteristic/ performance parameter	Malyuk (Ukraine)	TAVOR (TAR-21) (Israel)	Fort 221 (Ukraine)	AUG A2 (Austria)
Mass without magazine, kg	up to 3.8	3.27	3.9	3.8
Full length of the rifle, mm	710	720	645	805
Length of the barrel, mm	415	460	375	508
Caliber of cartridge used	5.45x39 mm/ 7.62x39 mm/ 5.56x45 mm	5.56x45 mm	5.56x45 mm	5.56x45 mm
Firing patterns	Single-shot/ automatic	Single-shot/ automatic	Single-shot/ automatic	Single-shot/ automatic
Rate of fire, rds/min	660	750	500	680
Muzzle velocity, m/s	900 / 715 / 940	850-900	890	970
Effective range of fire, m	500	500	500	300
Magazine capacity, rounds	30/45	30	30	30/42
Standard sight	as required by Customer	Red-dot	Red-dot	1.5 power optical
Type of sight mounting	Picatinny (length 315)	-	-	
Underbarrel grenade launcher	Mounting possible	Mounting possible	Not available	Mounting possible

INAUGURATES

In the first half 2016 the "Maliuk" rifle successfully passed state tests of the impact of adverse weather conditions, as well as being in an aggressive environment, such as water, sand and dirt. "Maliuk" automatic rifle could be also equipped with versatile suppressor in a basic mode.

A production line for the manufacture of the Malyuk rifle has been launched at Krasyliv Assembly Manufacturing Plant, which is incorporated with Ukroboronprom (Ukrainian Defense Industries) State Corporation.

The company involved advanced equipment and highly qualified and experienced specialists for the production and assembly of components and parts of the rifle. The estimated volume of manufacture of the product in 2017 will be 15 000 samples per year.

A commercial version of the weapon, that competes and even surpasses in some aspects many of the most popular domestic and international counterparts, is being prepared for production at Krasyliv Assembly Manufacturing Plant, and anticipated impatiently by sporting and hunting gun fans.

InterProInvest Ltd
is the Design Authority and
Patent Holder of the Malyuk rifle
Person of contact –

Serhiy Luhovskoy
Tel. +38 (099) 617 90 56

An engineering company, InterProInvest was founded in Ukraine in 2001. InterProInvest's key areas of expertise include design and development of firearms.

ІПІ
ІнтерПроІнвест

[fairway]

WARSHIPS FROM UKRAINE

State Enterprise "Shipbuilding R&D Center" (ShRDC) in Mykolayiv from SC "Ukroboronprom" offer for potential consumers a few perspective projects.

Mykolayiv-based Shipbuilding R&D Center (ShRDC) – Ukraine's only specialist organization in the design of naval ships, boats and support vessels for Navy and Border Guard customers in Ukraine, as well as for export customers. The organization is renowned in Ukraine and elsewhere; it has a long history of effective cooperation with customers from several NATO countries including particularly France, Turkey, Poland and Italy, as well from the PR of China, Vietnam, SAR and Kazakhstan.

ShRDC has in its portfolio a number of projects, both active and planned, aimed at potential customers from Southeast Asia, the Caspian Sea region and other regions. These include a 2,650-ton multi-purpose corvette (which is currently being built for Ukraine's Naval Forces); 1,200-ton Gaiduk-M Class corvette; a 960-ton coast patrol ship; 680-ton Monsoon Class multi-purpose corvette; 640-ton RS655 Class multi-purpose corvette; 455-ton Caracal Class missile-armed craft; 340-ton Pearl-FAC Class missile-armed craft, 300-ton Coral Class patrol boat; 1,390-ton Triton Class medium landing ship; 700-ton Beaver-class transport and landing ship; 2,000-ton Argo-2000 Class

SAR vessel; 38.4-ton Gyurza Class river-going armored gunboat; 54-ton Gyurza-M Class armored gunboat (currently under construction; two are due to be ready for commissioning with the Ukrainian Navy in 2015, and a total of nine are contracted for delivery till 2017); 54.5-ton Centaur Class assault boat (the first production boat is due for delivery in 2016), 17-ton Briz-40 Class fast patrol boat, and 900-ton towed coast guard support vessel.

ShRDC offers for consumers multi-purpose Haiduk-M Class corvette and export modification of the Caracal Class missile craft. The two vessels are designed to modern trends in terms of stealth, characteristics, performance parameters, armaments and sensor capabilities.

The 1,200-ton Gaiduk-M is designed to perform a broad range of combat missions. It is armed to engage surface, submarine, aerial and shore-base threats, with armaments that include 2x4 antiship MM40 Block 3 cruise missiles, 8x1 Mica VL vertical launch air defense missiles, a 76mm OTO Melara cannon, an Oerlikon 35mm Millenium cannon, 2 x 12.7 mm machine guns and 2 x twin 324-mm torpedo tubes, with room also provided for 2 x RBU-type antisubmarine rocket launchers. The ship has a hangar and flight deck for a single helicopter not heavier than 8,000 kg.

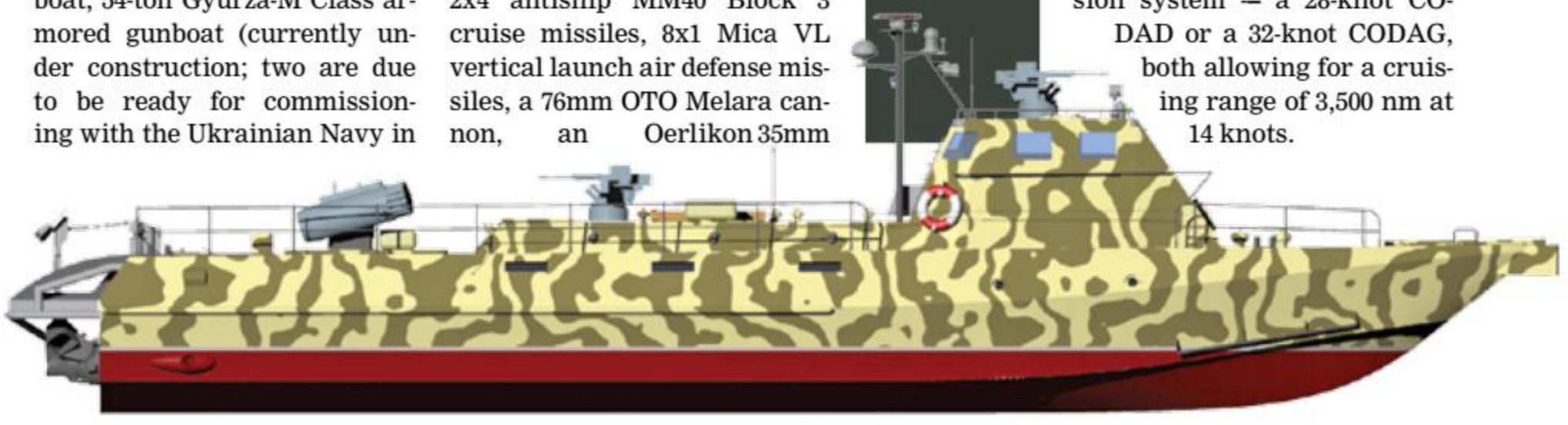
The threat detection and surveillance equipment includes a SMART-S Mk2 three dimensional, multi-beam naval search radar and an OTH search radar.

AAW weapons control is enabled through the use of STING EO weapon control system and the TACTICOS Combat Management System. Electronic warfare suite is comprised of a radar jammer and console, and a countermeasure system against laser-guided missiles. Other equipment includes a bearing gyro compass; a counter-sabotage sonar, a navigation radar and an integrated bridge system. Lean manning (52 crew) is achieved courtesy of extensive automation.

The customer can choose from two options for propulsion system — a 28-knot CODAD or a 32-knot CODAG, both allowing for a cruising range of 3,500 nm at 14 knots.

Multipurpose corvette "Gayduk-M"

Fast assault craft "Kentavr"



Displacing fully loaded 455 metric tons, the Caracal-class fast missile boat is restricted to operations in enclosed waters such as the Caspian Sea or the Black Sea. Carrying a load of 2x4 anti-ship cruise missiles, short-range air defense missiles, a 57 mm or 76 mm cannon, and a 30 mm or 35 mm gun, it is well equipped for attacks on surface and shore-based targets and for self-defense against aerial threats.

The shipboard electronic warfare suite is comprised of a combined AAW and surface warfare radar, a long-range OTH radar, radar-optical and electro-optical gun control systems, a radar-electronic warfare system, navigation radars, an counter-sabotage sonar system and an integrated bridge system.

CODAG propulsion enables travel speeds of up to 28 knots, a cruising range of 200 nm at 14 knots and endurance of 25 days at sea. The crew is set at 35.

The new armored Marine assault speedboat Centaur is designed for handling complex high-risk missions in littoral sea areas and river waters that involve Marine landing support and direct engagements with the enemy. As a further development to the lineup of armored boats developed by ShRDC for international customers, the Centaur Class boats are now also built and supplied to defense and security organizations in Ukraine. Centaur has extended functionality for special missions. Such combat craft are currently needed desperately by the Ukrainian military forces for use in the Black Sea and Azov Sea areas, as well as major river arteries.

Specifically for the Centaur was created a propulsion system using a Caterpillar diesel. The Centaur can accommodate a full platoon-size unit, which is 32 Marines. Incidentally, international counterparts have room for no more than 20 personnel with small arms. Troop dismount is possible either via the upper deck or the landing ramp, which is accessible by internal passages under protection of steel armor.

The crew consists of four or five person. Workstations of the commanding officer and helmsman/ boatswain are positioned in the control cabin, front row, where there are all the navigational instruments, communication facilities, and visual and technical monitoring systems, in addition to power plant control devices. In the conning tower, second row, there are stations for two operators of weapons modules, who in everyday terms are not only gunners, but sailors responsible for supporting troop disembarkation/embarkation operations. The boat is equipped for operation in NBC conditions: the conning tower is overpressu-rized, while the Marines are all provided with Individual Protective Gear.

Centaur will equipped with a machine-gun and grenade launcher module. To suppress enemy resistance during Marine landing operations the boat be additionally equipped with a MLR weapon. This mobile MLR system could be assembled from COTS components chambered for the air-launched S-8 unguided rocket, which is also suitable for launch from helicopters like Mi-8, Mi-17, Mi-24 and Ka-29. There is also a system allowing fire to be conducted in single, two round or three round burst modes. ShRDC intend to equip the boat with two launchers, each provided with 20 ready to fire rounds. With their pretty large engagement envelope, the weapons could be fired to certain distances – ranging from 300 meters to one kilometer or a little bit longer – when approaching the shore at a high speed. UDR

Small Corvette "Caracal"

Fast patrol boat "Briz-40M"

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Contact information:
Address: 5 Of., 10 Illinska str., 04070, Kyiv, Ukraine **tel.:** +38 044 425-42-10 **fax:** +38 044 425-16-22
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AIRA@UKRSPECEXPORT.COM
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