

UKRAINIAN DEFENSE REVIEW

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UDR

UKRAINE'S FIGHTER FLEET
CAPABILITY UPGRADE



ROCKET STRIKE

UKRAINE CREATES
THE WEAPONS
FOR DETERRENCE



**BTR-3E -
BATTLE-HARDENED**

KYIV ARMORED VEHICLES
PLANT COMPLETES
TESTING OF ITS BTR-3DA
APC VEHICLE



KOMBAT AND KONUS

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OF UKRAINE'S
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CURRENT STATUS,
STRATEGIC FRONTIERS,
AND CHALLENGES





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[close-up]

SMART ARMY

**HAS TO STAY AHEAD
OF THE ENEMY'S ARMY,
NOT TO FALL BEHIND**

On July 7, 2017, a joint session of the Military Science Council of Ukraine's Armed Forces and the Presidium of Ukraine's National Academy of Sciences took place. During the public part of the event, a report was made by the head of the General Staff and Commander-in-Chief of Ukraine's Armed Forces, Army General Viktor Muzhenko. Defense Express gives its readers some details of the report.

We now have the Armed Forces that are capable of responding to modern threats, but equipped mostly with aging armaments of the last century. But we need to create the Armed Forces of the 21st Century. In this context, the main focus should be on the development of means of destruction, high-precision weapons, robotic and information systems. We need offbeat, bright ideas allowing [us] to keep ahead of the enemy, not fall behind, using asymmetric means of warfare among other things.

VIKTOR MUZHENKO,

UKRAINIAN ARMY GENERAL,
HEAD OF THE GENERAL
STAFF – COMMANDER-
IN-CHIEF OF UKRAINE'S
ARMED FORCES



Threats to Ukraine's national security Stemming from Strategies and Actions by the Russian Federation

Russian military aggression has inspired drastic changes in the military-political and military-strategic situation both around Ukraine and on the European continent as a whole. In these conditions, not only has our Country found itself at the epicenter of substantial changes in the international security environment, but it is forced to de-

fend its sovereignty and territorial integrity from the aggressor.

Threats from Russia are multilevel.

The first and most important threat is Russia's military aggression against Ukraine and violation of its territorial integrity. Yes indeed, it's nothing more than Russian military aggression against Ukraine in the classical sense of this term, no matter what some name it and claim it. Article 3 of the UN General Assembly resolution on the definition of aggression, adopted on December 14, 1974, No. 3314 (XXIX), provides a clear listing of actions that are defined as an act of aggression by one State against another. Russia's actions, in our case, are indeed eligible under the terms of six out of seven existing definitions of aggressions. The fact of Russian aggression against Ukraine was stated by decisions and resolutions of the International Criminal Court (2017) and the Parliamentary Assembly of the Council of Europe (2016).

In addition to the evidence of annexation by force of the Crimea and the deployment of the Russian armed forces units and formations to Ilovaysk and Luhansk areas in August 2014, the waging of war against Ukraine is now definitely proved by the presence of Russian regular forces in Ukraine's territory. The intelligence report that these forces currently number over 30,000 personnel, including the component deployed in the Crimea.

The accelerated militarization of the Crimea is progressing. As compared with the period prior to the Russian occupation, deployed enemy forces have almost doubled in numbers, while the amount of deployed armaments has increased over five-fold. With the deployment of the newly organ-

ized 22nd Army Corps earlier this year, respective numbers increase by another one and a half to two times.

The Black Sea Fleet has seen its combat capability boosted substantially. It already has more than 30 ships, 6 missile craft, and 5 submarines. In this case, one frigate vessel and three submarines are armed with modern, nuclear-capable Kalibr missiles capable of ranges up to 1,500 km.

The Russian military presence in the Crimea is likely to involve the deployment of weapons of mass destruction; work is being undertaken to rebuild a nuclear weapons storage capability and to prepare for the deployment of strategic aircraft at Hvardiyske Air Base. Beyond that, it is expected that a significant aviation component which is now dispersed among 18 air bases of the Southern and Western military districts may be called into supporting operations by Russian ground forces. Two more newly organized Army Aviation brigades have been deployed in Voronezh and Stavropol.

Deployment locations of the 1st and 2nd Army Corps, Center of Territorial Forces of the Russian Federation Armed Forces' Southern Military District

Threat number two is Russian militarization of the temporarily occupied Donetsk Region and Luhansk Region areas, which involves the deployment of and the provision of supplies for full-fledged force groupings there. The 1st and 2nd Army Corps of the Russian terrorist forces, numbering more than 30,000 personnel and reporting to the newly organized 8th Army of the Russian Armed Forces' Southern Military District, have been deployed to the occupied Donetsk Region and Luhansk Region areas. Action is being undertaken to bring the forces up to full strength, and there is continuous delivery of Russian-supplied armaments, military vehicles, fuels and lubricants at the rate of 5,000 tons of fuel and 500 tons of ammunition per month.

Threat number three is Russian military build-up in very close proximity to Ukraine's State Border. A total of 23,000 Russian military personnel have been concentrated there, and this not inclusive of the Russian force groupings deployed in the occupied Crimea.





The planned Russian-Belarusian strategic military drills "West-2017" could be regarded as part of Russian military buildup in proximity to Ukraine as well as the so-called "buffer zone" Countries (Poland and the Baltic states). According to information in our possession, the number of troops recruited for the drills has been increased from declared 3,000 to 5,000, and over 4,000 railway cars or three times the need have been ordered for troop transportation. This amount of transport will allow troops to be transported in far greater numbers than those announced for the event. For purposes of comparison, 125 railway cars were used for transportation purposes in 2015 and only 50 in 2016. Furthermore, Belorussian citizens residing in areas close to military airfields report in social networks that civilians are being forced to vacate their homes in favor of Russian servicemen and their families. There is strong probability that some of the troops will stay in Belarus after the training is completed.

These are all clear signs of Russia's deliberate effort to boost its military presence in the Republic of Belarus.

At the same time, there is a high probability of hidden weapons, military hardware and physical infrastructure storage points being deployed in the course of the training. This can help the enemy considerably reduce the time needed for the creation of strike groups on the western and southwestern strategic tracks.

I want to draw your attention to the fact that, according to official statements by the Russian military leadership, three more motorized rifle divisions have been organized. These are the 3rd, 144th, and 150th motorized rifle divisions stationed, respectively, in Valuyki, Smolensk and Novochoerkassk.

The Russian leaders' choice of these formations for permanent deployment in proximity to our eastern borders looks highly remarkable. Actually, the 3rd and 144th motorized infantry divisions are "offsprings" of the 31st Panzer Corps and the namesake divi-

Russian military buildup on the western and southwestern strategic tracks, inclusive of the capabilities being deployed to Belarus in preparation for the planned Russian-Belarusian strategic military drills "West-2017"

sion, respectively; the two participated in the liberation of Ukraine and Belarus from the Nazi invaders. And servicemen of the former 150th Infantry Division, in May 1945, hoisted the USSR Flag over the Reichstag building in Berlin. By giving such lofty names to the newly organized military formations the Russian Federation is seeking to exert moral and psychological pressure both on Ukraine and on the European community. By doing so it is demonstrating its far-reaching intentions.

The organizational and staff structure, the weapons and military hardware that are being supplied to them indicate that these Russian divisions are essentially strike ones and are intended for offensive actions. Even their staff name contains the concept 'strike,' which makes them different from the other divisions and emphasizes their special purpose distinguishing them from the other divisions and motivating personnel to choose them as a duty station of choice.

Beyond that, the obvious historical allusions contained in Russia's actions are not confined to names alone. Perhaps it is no coincidence that the start date of the strategic "West-2017" exercises is scheduled for September 17, 2017. And this is highly symbolic, as it was on this day in 1939 that the Red Army forces invaded the Republic of Poland which was subsequently divided between the Soviet Union and Germany.

Threat number four is intelligence and subversive operations by Russian intelligence and security services in Ukraine, involving both information and psychological influence campaigns, and actions of force (acts of terrorism).

KEY FEATURES OF MODERN CONFLICTS

An analysis of the lessons learned in countering the hybrid threats from Russia, and of other military conflicts of our time suggests that profound changes have taken place in the nature of warfare. A combination of conventional and hybrid methods is now a hallmark of any military conflict. While hybrid methods may or may not involve the open use of military force, the classical combat actions actually no longer exist without hybrid actions.

Frontal encounters of large force groupings at the strategic and operational level are gradually receding into the past; there is a blurring of the differences among the strategic, operational and tactical levels, and between offensive and defensive operations. Asymmetric methods of warfare that nullify the enemy's advantages on the battlefield have become commonly used. There has been increasing role of mobile, mixed-service force groupings, while new information technologies can significantly reduce the spatial, temporal and information gaps between troops and their associated command and control structures.

Military actions are becoming more dynamic, intensive and effective. Tactical and operational pauses are disappearing. This puts forward additional requirements in terms of forces maneuverability, and mobility and stability of reserves and resources. Maneuverability makes it possible, in conditions of the limited number of military units and the limited size of the Armed Forces,

to relocate forces to critical areas of operations within the shortest time possible. Not only do mobility and stability of reserves and resources allow for a quick response to aggravating situation, but they are also enablers of influence on how the situation goes.

The lessons we learned during 2014-2017 suggest that tactical operations can be of strategic significance with regard for how the situation develops, and can have a serious impact on political decisions and the arrangement of political forces (severe hostilities in the Avdiivka area in January-February 2017 are one example).

Remote, contact-free influence on the enemy is becoming the primary method of achieving the goals of combat actions and operations, and it is extending their spatial reach both in width and depth. Targets now can be engaged at ranges reaching out the depths of hostile territory. This is currently regarded as the utmost danger, since the destruction of arsenals, bases and storage depots would impact seriously on the capability to counter the enemy, while the demolition of industrial facilities by enemy action can bring the economy to collapse. Actually however, there is very low probability of enemy fire targeting industrial infrastructures, because a crippled territory with destroyed infrastructure is wanted by nobody.

The use of high-precision weapons is assuming massive proportions, and robotic systems and armaments built on new physical principles are being brought into the mainstream of warfare.

The information component of the hybrid war is of particular significance as it has a strong influence on the consciousness of

both the civilian population and military servicemen, and may damage their ability to counteract military aggression. We are witnessing an increasing role of non-military means in achieving political and strategic objectives, which in some cases are more effective than what can be achieved with the use of military force.

Our areas of urgent interest are ISR systems development, stabilization of rear areas, ensuring citizens' resilience to enemy propaganda attempts, and effective counter-intelligence operations.

THE DEVELOPMENT OF CORE MILITARY TECHNOLOGIES AS KEY COMPONENT OF BUILDING UKRAINE'S ARMED FORCES OF THE 21ST CENTURY

In our assessment, the core military technologies suitable to be used as basic in developing future weapons of war can be grouped into seven categories:

1. Protective technologies for personnel, military installations and infrastructural assets. The era of mass armies is over. A military expert is very expensive to train, and public tolerance of losses has been decreasing.
2. Technologies aimed at creating new means of defeating enemy personnel, military installations and infrastructural assets. At this time we cannot use as much ammunition as was used in WWII, and we are fully aware of and committed to international humanitarian law norms.
3. Network centric command and control technologies with enhanced counter-ECM capabilities.
4. Highly special category comprising information tech-



nologies and cyber security technologies. The application of the technologies provides strong advantages on the battlefield, allowing for speedy, efficient decision-making in operational planning and command and control of forces.

5. Intelligence, surveillance and reconnaissance (ISR) and situational awareness (SA) technologies. An important requirement here is obtaining a capability allowing reliable information to be obtained in real time with delays from minutes to hours, not days as was the case previously.
6. This category comprises technologies of extreme importance in terms of improving performances of armaments or bringing them back to operational status. These technologies provide significant life extension and sustainability improvement to military weapons and equipment systems.
7. Technologies in this category are of special importance

as they provide battlefield needs and support the personnel in routine and emergency situations. These technologies are aimed to protect soldier health and safety, and to allow soldiers to perform their missions with less effort and greater efficiency.

These core technologies have to be implemented in developing future weapons, hardware and special-purpose equipment.

It can be said that traditional armaments have fulfilled their historic mission and no longer play a decisive role in achieving success in modern warfare. It is therefore critical now to rebuild the nation's defense R&D capability within the shortest time possible, keeping in mind that this capability is of strategic importance, one of crucial ones for containing the aggressor.

Ukraine's Armed Forces are facing up to an enemy who enjoys technical superiority, and possesses modern means of counteraction, high-precision weapons, and the full arsenal of modern means of de-


struction. The value and high technological capacity of those means, and the human mobilization resource and economic potential that far surpass ours make it impossible for us to achieve parity with the enemy. We therefore continue to search and test the ways how to nullify enemy's advantage.

That said, and taking into account the level of the domestic defense R&D and industrial capacity, armaments for Ukraine's Armed Forces will be developed along the following main directions:

- Creating the Unified Automated Command and Control System suitable for networking with future reconnaissance-strike systems;
- Upgrading air defense capabilities;
- Upgrading ISR capabilities;
- Developing armaments for special operations forces;
- Developing high kinetic energy weapons;
- developing weapons built on new physical principles;
- extending life cycle (operational life) of existing armaments and upgrading their physical characteristics and specifications.

Significant breakthroughs can be achieved from projects to create:

- Directed energy weapons (laser weapons and high-power microwave weapons);
- Hypersonic weapons and high-speed projectiles;
- Cyber warfare technologies;
- Integrated autonomous systems for subsurface operations.

In conclusion, I would like to say that no matter how strong the enemy, no matter how outmanned or outgunned, it still has cracks in armor, and therefore there are ways to set up adequate counteraction. 



ROMAN ROMANOV,
DIRECTOR GENERAL OF THE STATE
CONCERN "UKROBORONPROM"

COOPERATE FOR SECURITY PURPOSES



Poland as well as Ukraine is an advanced bastion under the Russian threat. In this regard mutual cooperation of our defence industrial complexes is of strategic importance for both countries. «Ukroboronprom», as a largest defence holding group in Ukraine with around 100 production facilities (factories) and 80k people, fulfilling the most important task in its history – it is arming the Ukrainian army, which is now in its fourth year fighting to defend State against Russian aggression.



The Ukrainian army receives modern weapons that meet NATO standards, almost on the front line specialists of «Ukroboronprom» repair war-torn equipment, our design bureaus create samples of advanced weapons and thus we form a new image of Ukrainian army.

Each of those steps would be times harder without support and cooperation with NATO member states dates back to 2014, in which effective cooperation with Poland marked a new milestone in the relationships between our countries.


Over the past three years it was conducted extensive collaboration in main areas of defence capability. Ukroboronprom enterprises produced and supplied R-27 air-to-air missiles for the Polish Ministry of Defence. While Ukrainian army also was intensified with Polish «FlyEye» UAV's, mortar and small arms, armour which meet NATO standards.

Polska Grupa Zbrojeniowa, WB Electronics S.A., PCO S.A., Huta Stalowa Wola S.A., Bumar Labedy S.A became reliable partners of the Ukroboronprom's enterprises.

The high-tech weapons joint projects of the Ukrainian and Polish defence industries are of the most importance. Today, high-precision artillery and mortar arms and shots, anti-aircraft and anti-aircraft missile systems are jointly developed, various types of UAVs are produced, marine patrol aircraft on the AN-148 platform is designed, also production and development of protection systems, both for individual use and for armoured vehicles.

Ukraine is moving towards NATO, identifying the Alliance as one of the main strategic tasks for the country. And «Ukroboronprom» has the task to adapt the Ukrainian armed forces to NATO standards.

«Ukroboronprom» implemented the international ISO quality standards at the all enterprises, and now we are working on introduction of the AQAP 2000 quality management and quality assurance system. At the same time, Ukroboronprom's companies collaborate with NIAG and NSPA.

We believe that Ukrainian and Polish defence industries will ensure efficient, mutually beneficial and long term cooperation. 

[cooperation]

UKRAINE- POLAND MILITARY TECHNOLOGY COOPERATION – WITH A SURE FOOTING

Valeri RIABYKH, Defense Express

The year that has passed since the MSPO 2016 and Weapons & Security 2016 exhibitions in respectively Poland and Ukraine was quite tense and busy year in defense-industrial production and technology development cooperation between Ukraine and Poland. Over that time, there has been much talk about bilateral defense-industrial cooperation, and the prospects of achieving synergy through partnership have become even more tempting.

ACTIVE NEGOTIATIONS

Issues of Ukrainian-Polish cooperation in the security and defense realms were high on the agenda of lots of related events held since then.

Ukraine-Poland defense-industrial cooperation prospects came under discussion at platforms such as the 10th Europe-Ukraine Forum at Rzeszow, Poland (January 27-28, 2017), the Industrial Defense and Energy Summit – Europe Meets Ukraine

– 2017 at Warsaw (April 20, 2017), the Ukrainian Defense and Security Forum at Kyiv (April 27, 2017); and Seminar on Ukraine's Defense Industry Reform at Kyiv (June 20, 2017).

On a parallel track, work is underway at the level of the two countries' military and defense-industrial establishments. In December 2016, Defense Ministers Stepan Poltorak of Ukraine and Antoni Macierewicz of Poland signed a general cooperation agreement on defense, in a ceremony attended by the Ukrainian President Petro Poroshenko.





ko and Polish President Andrzej Duda. The agreement envisages a significant increase in cooperation in 24 areas of mutual interest. During the year reviewed, there were reciprocal visits between MoD officials of the two countries, and, in late June 2017, Stepan Poltorak and Antoni Macierewicz met again at a meeting of NATO Defense Ministers at NATO headquarters in Brussels to discuss how to strengthen and diversify collaboration between the two defense establishments.

At the defense-industrial level, contacts were equally inten-



Polish company PCO S.A. is interested in developing collaborations with Ukrainian R&D and production companies / Photo courtesy of PCO S.A.



sive. The work continued to search for new and better ways and methods of collaboration, and the two parties were advertising and demonstrating their capabilities to each other.

Particularly in December 2016, an official Ukrainian team visited Huta Stali Jakosciowych S.A., a Polish maker of high-quality armor steel Ukraine needs so much to expand and increase its domestic armored vehicles production.

During the international Air Fair 2017 aviation exhibition held on May 26-27 at the Military Aircraft Works No 2 in Bydgoszcz, Poland, Ukroboronprom's aviation related businesses exhibited their proposed initiatives that might be of interest to Polish counterparts and, also, in terms of potential collaborations on third country markets. Ukrainian exhibitors at Air Fair 2017 demonstrated their products in a joint pavilion organized by state-run Progres firm.

There was also intensive work going on between Ukroboronprom and the Ministry of National Defense of Poland that is officially charged to supervise the Polish defense industry.

Milestone meetings took place in March 2017 in Warsaw and in June 2017 in Kyiv. The negotiations headed by Secretary of State at the Polish Ministry of Defense, Bartosz Kownacki, and CEO of Ukroboronprom, Roman Romanov were attended by officials of the leading Polish defense contractors already engaged in collaborative projects with Ukroboronprom. The latter is now searching for new partners from among Polish companies to assist in the development of advanced armaments technologies, especially air defense systems and military armored equipment.

INTERIM OUTPUTS

Such an intensive work could not but yield certain outputs, although it's too early to talk about specific completed projects.

In December 2016, Ukroboronprom and Poland's private-sector defense supplier WB Electronics S.A. signed collaboration in developing new air defense and SAM technologies. This may be about co-development of a prototype short-range air defense sys-

tem under the Narew program. A relevant project, currently known as R-27 ADS (Air Defense System), has been developed by Kyiv-based JSHC Artem.

As proposed by the Ukrainian party, the Polish share in the R-27 ADS project might include the surveillance radar, missile guidance radar, mobile missile launcher platform, passive optronic target tracking and missile guidance system, combat control system, and intra system communications.

It is envisaged that Polish partners Polsk Grup Zbrojeniow and WB Electronics S.A. will assist in R&D, while Polska Grupa Zbrojeniow, WB Electronics and JSHC Artem will commence low rate initial production in the summer of 2018 so the system is ready for military acceptance tests in November 2018, with full rate production scheduled for November 2019.

On June 26, 2017 in Poland, two agreements were signed between Ukroboronprom's Ukrinmash and PGZ S.A.'s (Polska Zbrojeniowa Group) PCO S.A.

One deal includes the supply of PCO S.A.-produced optical components to state-run Zhytomyr Armored Vehicles Plant, while the other covers the delivery to Zhytomyr Armored Vehicles Plant of optronic devices for integration with an armored combat vehicle upgrade package.

Polish partners are going to provide 30+ advanced optics kits to equip the Ukrainian military's armored vehicles. Relevant contract from Ukraine's Defense Ministry includes optical sights, day/night surveillance devices, and periscopes. As this deal has been signed, there should be a strong expectation that the much talked about project proposed by Poland's PCO S.A. to establish an armored combat vehicles modernization center in Ukraine will be brought to fruition in the near future.

In December 2016, Defense Ministers Stepan Poltorak of Ukraine and Antoni Macierewicz of Poland signed a general cooperation agreement on defense, envisaging a significant increase in cooperation in 24 areas of mutual interest

WB Electronics and Ukroboronprom have also been closely collaborating in the development and production of new UAS technologies. Ukroboronprom's companies have worked closely with Huta Stalova Wola S.A. in developing and manufacturing mortar and artillery systems, and with Bumar Labedy S.A. in upgrading/updating powerplants of tanks operated by the Republic of Poland Armed Forces. Collaborative development of a guided artillery projectile and a 120mm command-detonated mine for the Polish armed forces marks an important milestone in bilateral defense-industrial cooperation between Ukraine and Poland.

Generally, collaboration between Ukroboronprom and its Polish partners encompasses supplies of components and replacement parts, and the provision of aircraft MRO services, as well as supplies of parts and components of radar equipment. Recent years have seen an increase in Polish defense exports, especially combat vehicle armor products to Ukraine.

Ukrainian private-sector defense industries have been as active as their state-run peers in es-

tablishing useful ties with their Polish counterparts. Highly illustrative is already long-term, multi-field partnership between Ukraine's PJSC Chernihiv Radio Equipment Factory (otherwise known as PJSC CheZaRa) and Poland's WB Electronics S.A. Recent collaborations include the integrated "Sokil" reconnaissance & attack UAV system developed and produced for Ukraine's Armed Forces. Sokil consists of two UAVs (the Fly Eye UAV that is already in service with Ukraine's Armed Forces, and the Warmate combat drone developed and built by WB Electronics) integrated with a shared ground control station.

THE POTENTIAL OF MUTUAL BENEFIT

There is a very great potential held in expanding mutually beneficial cooperation between Polish and Ukrainian defense industries. Further cooperation could proceed along the following promising directions among others:

- development and production of optical, optronic and electronic systems for vari-

The prototype short-range R-27 ADS air defense system developed by Kyiv-based JSFC Artem under Poland's Narew program

ous purposes, especially under broader weapons development programs;

- development and production of a self-propelled 152mm/155mm artillery system;
- development and production of a self-propelled mortar system;
- development and production of a man-portable ATGW system;
- shared production of precision munitions;
- development and production of missile systems for various purposes;
- modernization of existing and development of new air defense systems;
- development of new and modernization of legacy radar systems, and EW/ECM systems;
- collaboration on a maritime patrol aircraft being developed for the Republic of Poland Armed Forces;
- development of a new helicopter using technical solutions incorporated in Ukraine's MSB-6 Ataman and Poland's W-3 Sokol multipurpose helicopter technologies;
- development of new and improvement of existing UAS technologies, including combat drones;
- post-Soviet-era weapons modernization to NATO compliance.

Modernization of helicopters (most particularly those of the Mi-24/35-series) and related systems to NATO compliance (which is a highly relevant issue for the Polish Armed Forces) holds a substantial promise for bilateral collaboration. This collaboration could feed in Ukraine's innovative engineering solutions and extensive expertise and experience with modernizing technologies in this specific area, and it could benefit further from the ready availability of MRO capabilities and production infrastructures for most of the requisite replacement parts and com-





ponents. Ukraine – who has set itself ambitious goals of developing a fully indigenous helicopter and ensuring self-sufficiency in the production of rotary-wing aircraft – has much to offer its partner. Collaboration in upgrading/ updating the two countries' legacy helicopter fleets could produce significant enhancements in performance and combat effectiveness of their respective army aviation forces, and, also, produce a new helicopter of the shared Ukrainian-Polish origin.

The aforementioned potentialities for cooperation, if used to their full capacity, could contribute greatly to strengthening homeland defense capabilities of Ukraine and Poland, and could also help them boost their presence in the global arms export market. In particular, there is a great potential held in bilateral projects for modernization of Soviet-built military equipment inventories (especially tanks, infantry fighting vehicles, and armored personnel carriers) of third countries' armed forces.

Even better viable prospects are here for collaboration between specific Ukrainian and Polish industries in develop-

ing and producing most promising product categories. Poland's PCO S.A., for instance, is seeking to expand and diversify its cooperation with a number of Ukrainian R&D and production companies, among them Izyum Instrument Factory (the Polish partner is interested in purchasing optical glasses and materials; co-developing optical devices for supply to Ukraine's domestic market and, also, to third-country markets; collaborative development of software programs for command and control applications etc), and state-run Photoprylad company (co-development of instrument products for Ukraine's domestic market and for third-country markets, the setting up of assembly lines for Polish-designed instrument products targeted at third-country markets etc). This same Polish company is seeking partnerships with Ukrainian companies engaged with the development and production of armored military vehicles, aircraft and related systems, and with the provision of aircraft MRO services.


Both in Poland and Ukraine, there is an even greater number of companies who well realize the

emerging potentialities, but have as yet failed to formulate their proposals for potential partners, mainly due to lack of knowledge of the latter's capabilities.

The real work carried out by the Ukrainian and Polish parties during the period under review has revealed a great number of areas of mutual interest and those needing focused, coordinated attention. There is an almost unlimited synergy potential held out by growing defense-industrial cooperation between Ukraine and Poland.

Meanwhile, new initiatives of potential interest to one of the partners or both are emerging almost day by day. This begs the need for robust lines of communication between the partners – in order to yield more from coordinated action and to enhance the synergy effect.

Research reviews suggest that – given the differing approaches used by Ukraine and Poland in organizing and managing their respective defense industries, and in addressing their homeland defense deficiencies – a useful step for better Party-to-Party coordination would be to reciprocally establish specialized representative offices with mixed representations of military and defense-industrial communities. These offices could be tasked to do practical research on the possibilities and opportunities for enhanced cooperation and to provide support to collaborative projects at the project assessment and on-site implementation stages.

As a result of the above considerations, it could be stated, that there are now all the preconditions in place for military technology cooperation between Ukraine and Poland to grow in scope and to become more diversified, and for the issues arising in this process to be solved by way of consensus. 

On June 26, 2017 in Poland, two agreements were signed between Ukroboronprom's Ukrinmash and Polska Grupa Zbrojeniowa's PCO S.A.



SOUTH KOREA -
LEAD NATION

↑ YEARS
25
↓ LAT
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OF THE REPUBLIC OF POLAND
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YEARS 25
LAT

Targi Kielce
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Ukraine's defense industry is introducing its armored personnel carrier known as BTR-3. This infantry carrier vehicle has been exported to the Royal Thai Army, and employed extensively during the Donbas conflict. Ukraine it is offering the vehicle to potential customers both on the domestic and export markets. Here UDR introduces its readers to the BTR-3E APC – one of Ukraine's defense industries' most successful products of the past few years.

Developed by the Morozov Machine Design Bureau, Kharkiv, and produced by Kyiv Armor Plant, the BTR-3 APC has every chance of winning new markets. In its maneuverability and combat performance, this Ukrainian designed armored vehicle far outperforms its rivals originating in the fellow former Soviet states. It has long been assumed that the APC should be as maneuverable as the battle tank, allowing motorized infantry to march alongside armored units and, in some situations, even lead the way. In

many armed forces, such an approach has led to caterpillar APCs ousting their wheeled counterparts altogether.

What makes the Ukrainian vehicle particularly attractive to prospective buyers is its price tag; low-cost serviceability and through life support; low weight; a greater amount of firepower as compared to same-class counterparts; the capability to negotiate water obstacles; the ability to operate in environments heated up to +55°C, and air conditioning of crew and passenger compartments. The BTR-3E's layout design



BTR-3E – BATTLE-

provides enough room for extra weapons and for an automatic Allison transmission. The base-line design is easy to convert into configurations for auxiliary missions such as medical evacuation, policing, command and control or repair and recovery.

The BTR-3E is a highly-maneuverable, wheel-typed amphibious armored vehicle. Its internal volume is enough to accommodate a squad of six infantry personnel in addition to its three-man crew consisting of the commander (squad leader),

gunner and driver. Compared to Russia's BTR-80, the BTR-3E APC has a hull offering a greater usable space, hence heavier displacement. The Russian BTR-80 is claimed to be able to negotiate river obstacles in two-point river motions, while for the BTR-3E, as proven by the testing, even three-point river motion is no obstacle.

The vehicle's earlier sibling, the BTR-3U, was equipped with a 320hp Deutz engine coupled to Allison MD 3066 automatic transmission. The BTR-3E has two options for powerplant – the indigenous UTD20 300hp diesel and a 320hp Deutz engine.

THE BTR-3E IS A HIGHLY-MANEUVERABLE, WHEEL-TYPED AMPHIBIOUS ARMORED VEHICLE. ITS INTERNAL VOLUME IS ENOUGH TO ACCOMMODATE A SQUAD OF SIX INFANTRY PERSONNEL IN ADDITION TO ITS THREE-MAN CREW CONSISTING OF THE COMMANDER, GUNNER AND DRIVER



HARDENED



The BTR-3E features an enhanced clutch; back-up (pneumatic) starting system for cold start; heating system for the coolant and oil, enabling the engine to start in temperatures as low as -55 C; new automatic equipment that identifies the type of the cooler used (water or antifreeze), warns about critical temperatures of the cooler, and shuts the engine once the oil pressure falls down to below critical levels.

There are two choices of transmission available for the BTR-3E – a fully automatic hydromechanical Allison transmission, or a manual gearbox. The latter would reduce the overall price of the vehicle. The BTR-3E is two tons heavier than the 14 ton BTR-80. With French tires Michelin, which are ideal for operation in hot climates, the Ukrainian vehicle makes 100 kph, whereas the BTR-80's «rubber legs» only allow for 85 kph during 30 minutes at the longest.

The height of the ceiling in the troop compartment has been increased by 150 mm for the increased comfort of occupants, and there is also room for air conditioning, which is provided as an optional extra. Air conditioning, as strongly suggested by experience out of most recent military campaigns, particularly in Iraq, is a prime necessity for durable mis-

sions in high-temperature environments. Furthermore, the vehicle is equipped with NBC protection to shield the crew and infantry squad from penetrating radiation, toxic agents, germ weapons or radioactive dust during movement over contaminated terrain.

The BTR-3E is armed with «Shkval» turret mount, which puts it on a par with an infantry fighting vehicle in terms of the amount of firepower.

The fighting compartment is positioned in the vehicle's medium section, taking space between the crew commander's and driver's seats and power pack compartment.

The BTR-3E carries more effective weapons as compared with the BTR-80. These include a 30-mm automatic gun ZTM-1, a twin-barrel 7.62-mm machine gun, an automatic grenade launcher, an antitank guided missile system and a smoke grenade dispenser. The turret additionally accommodates five surveillance devices TNPO-170A, backing up the PZU-7M sight and an optical television sight.

The vehicle's weapons, supported by a computer-aided fire control system and sighting devices, ensure speedy, accurate acquisition and engagement of ground and low-flying targets with high-

rate, precision fire. The price tag of the BTR-3E APC would vary with the cost of optional extras.

The BTR-3E1 APC is the next evolution of the proven APC BTR-3E technology. It features the indigenously developed Shkval weapons station integrating a 30 mm gun, and antitank missile system Bar'yer with two ready to launch missile containers. State-owned Design Bureau Luch and Joint Stock Holding Company Artem have ensured that the BTR-3E1 provides an enhanced amount of firepower by equipping it with more effective precision guided weapons.

The vehicle's turret mount will undergo fundamental modifications too. In particular, the current Tandem fire control system will be replaced with new, indigenously designed TREK system.

In the BTR-3E1, the crew commander will be able to take over gunfire control if need be, unlike in the baseline configuration, where this was solely the gunner's responsibility.

The BTR-3E1 is offered in a number of configurations to meet the varied requirements of armed forces. The major variants are BTR-3E1K command vehicle, BRM-3E1 combat reconnaissance vehicle and repair-and-recovery vehicle. The other variants include the MOP-3E1 fire support vehicle, the BTR-3E1Sh command and staff vehicle, and the BSEM-3E1 armored ambulance.

The Royal Thai Army acquired more than 230 BTR-3E1 APCs till date, under a contract with Ukrspecexport.

Keeping pace with current trends, Kyiv Armor Plant, part of the Ukroboronprom state-owned defense industries group, developed its BTR-3M1 and BTR-3M2 APC upgrade equipped with a 81/82-mm or 120-mm mortars and the 12.7-mm NSVT machine gun respectively.

In November 2013, the first BTR-3M2 upgrade performed a

Live-fire testing
of BTR-3DA



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IN JUNE 2017, KYIV ARMORED VEHICLES PLANT COMPLETED ACCEPTANCE TESTING OF THE NEXT BATCH OF BTR-3DA APC VEHICLES MANUFACTURED FOR UKRAINE'S NATIONAL GUARD

live fire demonstration at a training range. Having completed its trials successfully, it was exported to Thailand under a contract signed with Ukraine's government, with four vehicles delivered in 2013 and two in 2014.

In June 2017 SE "Kyiv Armored Plant" successfully carried out acceptance tests of the new batch of BTR-3DA, manufactured under the state defense order for the National Guard of Ukraine.

According to the results of acceptance tests – in accordance with the decision of a special commission of customer's representatives – the batch of BTR-3DA was transferred to the National Guard of Ukraine.

BTR-3DA is equipped with combat module "Sturm-M" with 30-mm ZTM-1, with a rate of fire of 330 rounds per minute. Targeting with modern digital laser complex with range finder and gun stabilizer ensure high accuracy of fire in all firing modes.

In addition, the combat module "Sturm-M" is equipped with a 7.62-mm machine gun and automatic grenade launcher, as well as the set of guided weapons "Barrier," providing armor penetration not less than 800 mm- not including dynamic protection – at the distance of 5 km. This allows BTR-3DA crew to destroy any enemy armored vehicles.

Kyiv Armor Plant developed its BTR-3M1 and BTR-3M2 APC equipped with differing mortar systems

In general, it should be noted that the BTR3 APC enjoys a high demand in Ukraine. In 2016 alone, state-owned Kyiv Armor Plant of the Ukroboronprom Group supplied more than fifty BTR-3 vehicles in various configurations to Ukraine's Armed Forces. To meet the domestic requirement, Kyiv Armor Plant, in late 2016, completed the construction of a new production facility, including a modern-standard assembly and welding line to produce BTR-3 APC hulls. This has allowed the Company to increase production many fold while reducing production cost, and to lay the technological foundation for future growth. 



■ For marine propulsion



60 MW

45 MW

25 MW

16 MW

10 MW

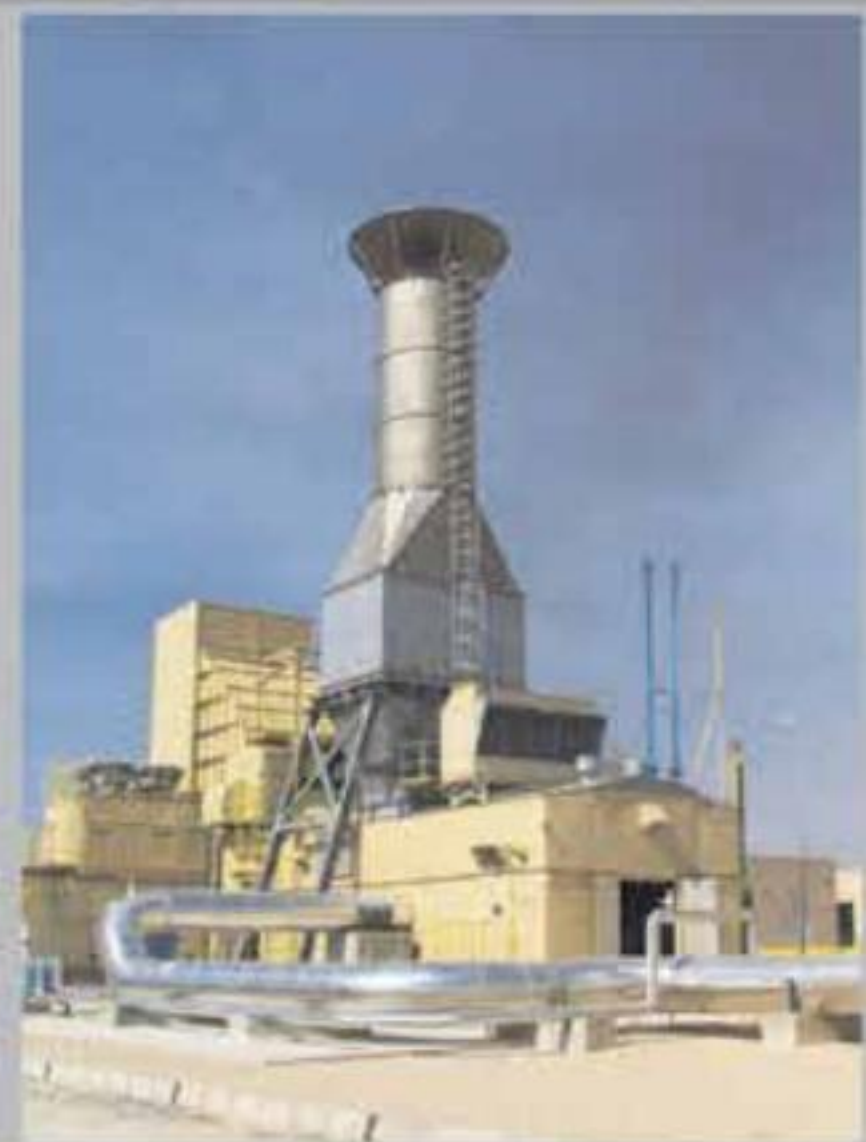
6 MW

5 MW

3 MW

2,5 MW

■ For gas industry



■ For power generation



UKRAINIAN GAS TURBINES



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[trends]

ROBOTIZATION OF UKRAINE'S MILITARY FORCES

**CURRENT STATUS,
IDENTIFICATION OF
STRATEGIC FRONTIERS,
AND STRUGGLING
WITH CHALLENGES**

The character of warfare is changing, as do a human being's role and place on the battlefield. There are tendencies suggesting that, in future battlefield scenarios, the dirtiest and most dangerous missions will tend to be performed by robotic platforms of different levels of autonomy, from remotely operated to fully autonomous. The features of this future are already demonstrated by the most technologically advanced armed forces which are adding increasing numbers of unmanned robotic platforms for various purposes, deployed at sea, in the air and on land. Ukraine, although taking its first steps on this path, is trying to keep pace with these tendencies in modernizing its military forces.

Three years of military conflict in East Ukraine and a continuous buildup for a credible defense against potential military aggression from the Russian Federation have prompted the country's military authorities to revise their approaches to the development of advanced military weapons and equipment systems and providing these to forces in the field.

After the Russian occupation of Ukraine's Crimean Peninsula and the start of military action against regular Russian forces in 2014, Ukraine's defense and

political establishments have seen the severity of the gap that needs to be bridged to provide deployed forces with reliable situational awareness by acquiring advanced unmanned aerial vehicle (UAV) platforms capable of operating in all weathers, day and night. As a result of this revision, Ukraine's military began fielding new UAV capabilities, both domestically made and imported from international suppliers.

Appreciating the battlefield value of UAV capabilities, Ukraine's military authorities



Serhiy ZGHURETS
CEO, Defense Express
Media & Consulting
Company, Ukraine

and both government-run and private sector defense industries decided to begin with developing, also, unmanned ground robotic vehicles. Part of achieving this goal, however, needs to address the organizational, technical and financial pressures faced by Ukraine.

IDENTIFICATION OF GOALS AND OBJECTIVES

The emergence of new threats necessitates the advancement

in the means and techniques of warfare and with it the development of advanced unmanned ground robotic systems. This strategy is enshrined in a series of new papers outlining frontiers to be achieved in Ukrainian military robotization. One such paper, Ukraine's Armaments Development Program 2020 (enacted on March 30, 2016) includes the development of new and upgrading of existing military weapons and equipment systems, inclusive of remotely operated vehicles deployed on land, in the air and at sea.

To implement the land component of the Program, a dedicated paper was developed, titled "The Concept for Employment of Unmanned Ground Robotic Systems in Performance of Ukraine's Armed Forces Missions". Enacted by a directive of the General Chief of Staff in 2016, the Concept outlines key frontiers and benchmarks to be achieved by 2030.

The paper highlights the creation and fielding of unmanned ground vehicles (UGVs) in support of Ukraine's Armed Forces operations to be a key force multiplier and an important beneficial factor in the transformation of the nature, means and techniques of modern warfare.

The role and place of UGV capabilities in Ukraine's Armed Forces armaments system are defined as follows:

- UGV platforms will complement conventional weapons and equipment systems in almost all battlefield scenarios;
- will be employed for a wide range of roles (intelligence gathering, attack, special) in various battlefield situations;
- will be suitable for use in wars and military conflicts

of various degrees of intensity, and during peacekeeping and antiterrorist operations.

It is noted by the Concept that the key advantage of using UGV platforms for various missions is that the goals set will be achieved with fewer casualties and with reduced impact of human factor on mission success. The range of potential UGV uses includes combat operations; combat logistics operations; combat engineer support and mine-clearing operations; NRBC reconnaissance operations; security guarding of perimeters, areas, locations, positions, and infrastructure; search and rescue operations; defense logistics operations.

Specific missions will require specific types of UGV platforms varying in terms of weight, size and the level of artificial intelligence and automation. Future UGV platforms and their components will have to meet certain unified standards regarding the Form Factor, design commonality, and modular architecture. These standards need to be enshrined in relevant guidelines, rules and regulations and in unified specification requirements.

ON THE BATTLEFIELD

Ukraine's Armed Forces requirement for UGV capabilities might be categorized in three major groups depending on functionality as specified by the Defense Ministry. These are combat capable UGVs, combat support UGVs (which are sub-categorized into scouting UGVs, engineering UGVs, and utility/logistics UGVs), and general-purpose UGVs.

In Ukraine, formalized procedures for battlefield use of un-



manned robotic systems have been only established for unmanned aerial vehicles as of to date. Over the three years of antiterrorist operation in east Ukraine, the country's military have tested and practiced different techniques of using UAVs for battlefield surveillance and artillery fire adjustment roles. These techniques are described in dedicated guideline papers used both by UAV operators and different echelon commanders concerned. In the face of an ever increasing complexity of operational environments (for example, the increasing use of counter-UAV electronic countermeasures by Russian forces), applicable guidelines have been regularly updated based on user feedback and the acquired operational experience.

This being said, the means and techniques for military use of UGVs in Ukraine are still in the discussion stage. On rare occasions, software simulations are carried out to verify probable scenarios involving the use of UGVs in standard infantry assault and defensive operations. Regarding the experience with using utility/logistics UGVs for transport roles, and en-

gineering UGVs for explosive hazard clearing roles, it appears to be more usable and streamlined in terms of technology and the use in real-world tactical scenarios.

STARTING POINT

Being guided by the 2020 Concept for Employment of Unmanned Ground Robotic Systems in Performance of Ukraine's Armed Forces Missions, and taking into account the current vision of and the requirements made by Ukraine's military with respect to UGV technology development, defense research organizations affiliated with Ukraine's Armed Forces General Staff have drawn up and brought to enactment tactical and technical specification requirements on six UGV types: an unmanned robotic vehicle carrying in-close combat weapons; a robotic antitank vehicle; a scouting UGV; a utility/logistics UGV; an engineering robotic system; and an NRBC reconnaissance robotic system.

These requirements mark a starting point in the domestic UGV development and the development of international counter-

The Phantom UGV is a collaborative project by Spetsstechno-eksport Import/Export Firm, Kyiv Armor Plant and partner companies

parts aimed at possible Ukrainian Armed Forces requirement.

As at the beginning of 2017, however, fielded UGV capabilities are not there in Ukraine (with a minor exception of a few robotic platforms currently used to support the clean-up of antitank/anti-personnel mines and unexploded ordnance left in eastern Ukraine as a result of Donbas hostilities).

Ukraine operates a very limited fleet of the robotic scouting and mine-clearing systems Talon, Andros F6A, Codham, and Digital Vanguard ROV – all obtained as gift from international aid partners.

The domestic market for ground robotic vehicles is expected to grow in pace with the demand for mine clearing. The focus of Ukraine's domestic UGV development is on multi-purpose ground robotic platforms with intelligence gathering and combat functionalities. The first prototypes were demonstrated in 2016. These included the Piranha – a remote-operated, track-driven combat platform developed by JSC Lenkuznya, Kyiv.

Kyiv Armor Plant, which is incorporated with Ukroboron-

prom defense industries holding group, demonstrated a prototype of its unmanned combat ground vehicle to be known as Phantom. This multi-role 6x6 robotic vehicle is designed to support combat, battlefield surveillance and logistics missions.

Along with developing tracked and wheeled robotic platforms, Ukrainian industries are working to add remote operation capabilities to the already fielded wheeled and tracked combat platforms used by the Armed Forces and National Guard. In 2016, Infocom Ltd, Zaporizhia, partnered with AvtoKrAZ truck maker to demonstrate the first domestic prototype of the Spartan APC vehicle offering the Pilotdrive automated driving capability. The vehicle can be controlled remotely via a tablet PC, a smart glove or an operator station. WiFi/Wimax network is used to control the vehicle within a radius of 10 to 50 km. The unmanned robotic KrAZ Spartan vehicle is designed to help minimize risk and save lives of soldiers in different tactical scenarios involving the transportation of supplies (ammunition, fuel and medical aid stores), and the rescue of wounded casualties from the battlefield.

Mock designs and working models of indigenously-developed UGVs imply they essentially are all radio-controlled robotic vehicles. As the vehicles are all controlled from a fixed-base facility, there needs to be visibility between any given vehicle and its respective control center. So the vehicles will be most effective and efficient when operated on a favorable, flat terrain allowing unobstructed communication. But they still need to learn to move over complex terrains – woodlands, cities and rural areas, and especially in ECM heavy conditions.

In the near future, we can hardly expect that unmanned robot-



ic vehicles will participate in attacks alongside tanks or infantry fighting vehicles during Ukrainian Armed Forces operations.

CONCLUSIVE REMARKS

1. In all the years up to 2016, there was no systemic work done by Ukraine's Armed Forces to develop and produce military unmanned robotic capabilities and to operationally deploy these with forces in the field. Ukraine is lagging far behind the technologically advanced world in this innovative technology development domain. In Ukraine's Armed Forces, UGV capabilities (if few robotic mine clearing vehicles obtained as gift under international military

The unmanned robotic KrAZ Spartan vehicle is designed to help minimize risk and save lives of soldiers in different tactical scenarios.

The Piranha unmanned combat and support robotic system



aid programs are not included) are not there.

In Ukraine, however, there is a certain amount of R&D and technological capabilities needed to develop and produce military UGVs.

2. The development and enactment of the Concept for Employment of Unmanned Ground Robotic Systems in Performance of Ukraine's Armed Forces Missions; and the adoption of strategic programs aimed to meet the Armed Forces' requirement for robotic capabilities are indicative of Ukraine's striving to keep pace with the trends that are shaping a new reality on the battlefield. Military robotization is being considered to be an irreversible trend that would transform the means and techniques of warfare and would significantly reduce the risks to personnel when performing combat, counter-terrorism or peacekeeping missions.

Another encouraging factor is the behavior by neighboring Russia who is seeking to have a strong combat robotic capability that potentially might be used against Ukraine just like it was the case with the "little green man". Ukraine needs to have the means to counter this new threat. **UDR**

[missile technologies]

UKRAINE'S MISSILE PROJECTS – EXPECTATIONS AND REALITIES



As Russian military aggression is ongoing, Ukraine's military and political authorities are seeking to provide the country with an adequate weapons deterrent capability that could contain and deter the eastern neighbor from its aggressive intentions.

As stated by Oleksandr Turchynov, Secretary of Ukraine's National Security and Defense Council, "Ukraine's defense industries continue work on a MoD commissioned project to develop an indigenous short-range missile system. The key challenge now is to improve physical characteristics and performance of the technology and to ensure that it is fully manufactured in Ukraine".



We have in mind the Vilkha missile and launch system that is being developed out of the legacy 9K58 Smerch MLRS technology.

The first mention of the Vilkha project came from President of

Ukraine Petro Poroshenko at National Security and Defense Council meeting on January 27, 2016.

The Vilkha is being developed as a cooperative project between Pivdenne (otherwise known as Yuzh-



noye) Design Bureau, Zaporizhia, and Luch Design Bureau, Kyiv.

Technical parameters of the project were not disclosed as of 2016. The Vilkha project, which is scheduled for completion in 2017, encompasses the development of both the missile and associated launch platform.

Test launch program for the Vilkha missile began in March 2016, with at least 14 successful launches carried out since then.

On May 26, 2017, the missile was successfully test launched in the presence of President Poroshenko. Several missiles launched from a test range near Tuzla village, Odesa Region, successfully hit targets at a test site in Kherson Region, with an accuracy of 15 m or less.

Open source information suggests that Vilkha is a 300 mm guided missile system optimized

to defeat ground targets and sea targets distanced from 60 to 120 km, with circular error probable of less than 7 m (9K58 Smerch, by way of comparison, can reach out targets at a 90-km range).

Vilkha stands out among same-class counterparts by the method of guidance used and an in-flight trajectory update capability enabled through the use of a pulse engine. It will employ a GPS-free guidance method to eliminate the risk of signal loss due to GPS jamming or spoofing attacks.

According to Yuriy Biryukov, a military volunteer activist and Ukrainian presidential adviser, the Vilkha launcher platform is designed to accommodate twelve 900-1,000 kg missiles guided independently from each other. The missiles are armed with 250-kg warheads of different types selectable depending on specific targets to be dealt with.

All the system's components, including missile control equipment, missile fuel and warheads have been developed and produced domestically in Ukraine.

The Vilkha launch platform is based on the KrAZ-7634 truck chassis (initial tests were carried out with a Vilkha launcher mounted on the MAZ-543 truck chassis).

It should be mentioned here that Belarus has recently developed MLRS system Polonez that is similar to a degree to Ukraine's Vilkha. It is likely that develop-

ment of Polonez was assisted by China. It fires a 301 mm rocket that strongly resembles the A200 rocket developed and produced by the Chinese Academy of Launch Vehicle Technology (CALT, otherwise known as the First Academy).

The Vilkha, however, is far from being the most interesting of the recent missile products offered by Ukraine's defense industries. The new Hrim-2 ("Thunder") short-range missile system offers even more impressive capabilities. Pivdenne Design Bureau, who developed the iconic SS-18 Satan ballistic missile, has been developing missile technologies since 2009. The Hrim-2 project, which was known as Sapsan at the time, suffered serious delays and funding cuts by Yanukovich government.

The Hrim-2 missile, as claimed by the Designer, is able to reach targets out to 300 km. It has a highly maneuverable flight capability that reduces the probability of intercept by anti-missile system, making it virtually immune to enemy air defense attacks. Essentially, this nullifies the value of Russia's S-300/400 air defense systems so aggressively promoted by the Kremlin.

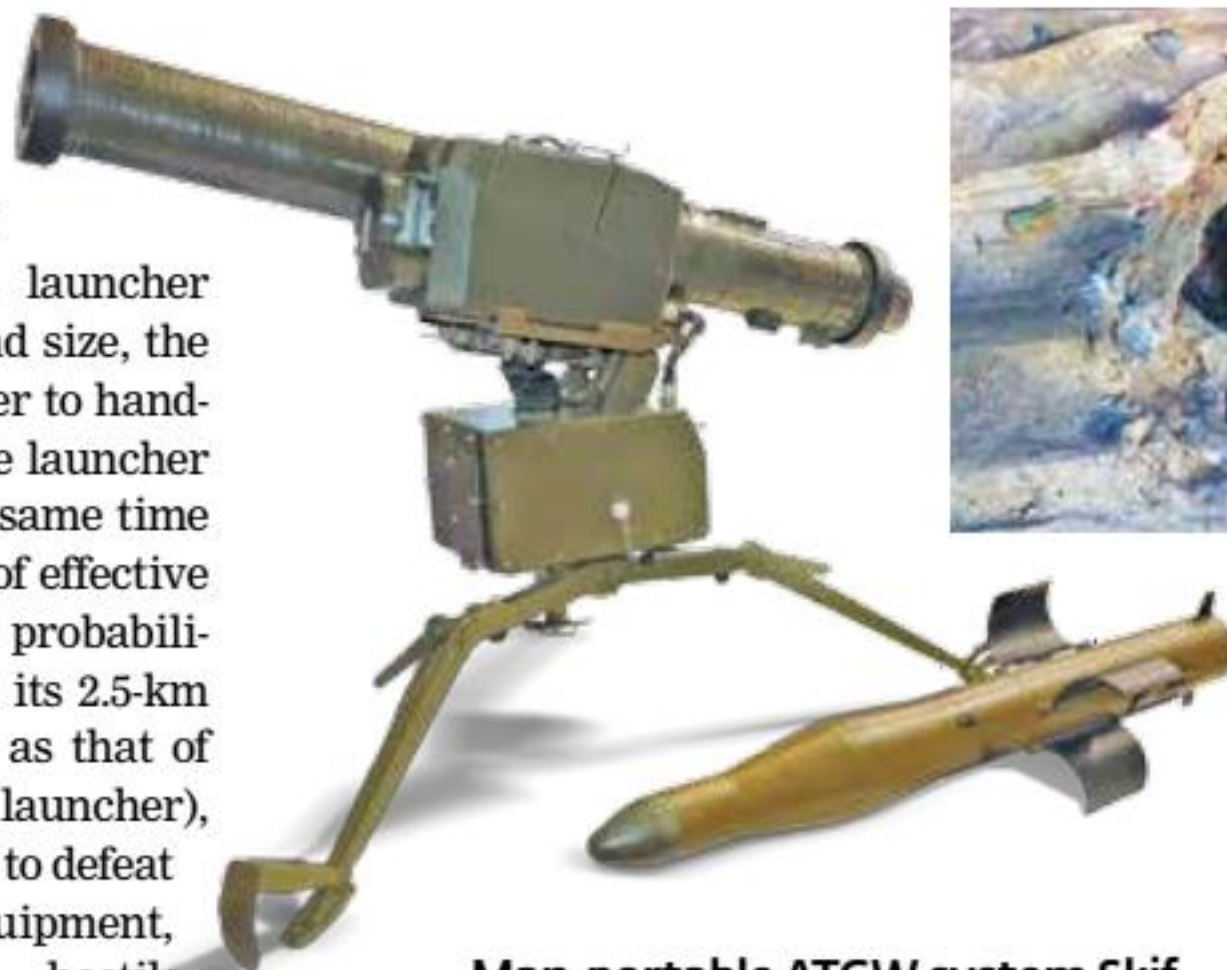
Near future will see how successful Ukraine's new missile technology projects will be. Meanwhile, it is to be hoped that Ukraine will eventually obtain the weapons it needs to contain and deter the Russian aggressor. 

[man-portable capabilities]

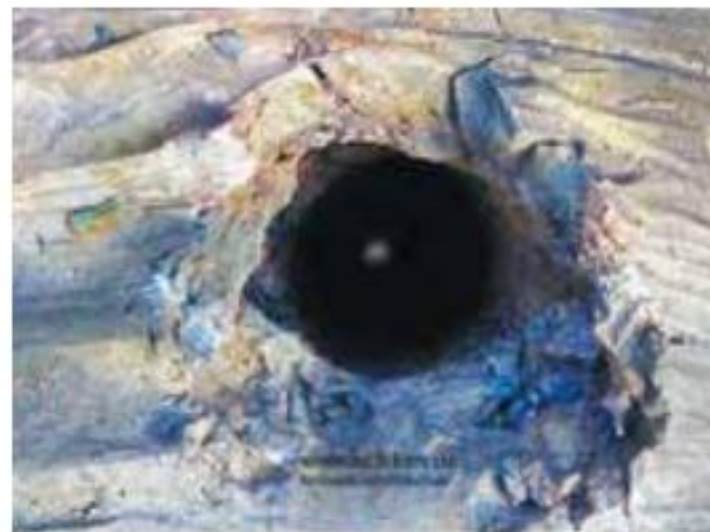
WITHOUT A MISS

Precision-guided weapons is a key element in creating new and improving existing weapons systems and complexes deployed with combat units of modern armed forces. State Kyiv Design Bureau Luch of the Ukroboronprom state-owned defense industries corporation offers potential customers wide spectrum of weapons products in this category. One such is man-portable ATGW system named Corsar.

In 2014 SKDB “Luch” successfully completed the testing of its anti-tank missile system and launcher Corsar. In its mass and size, the Corsar is coming closer to hand-held 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 range (twice as longer as that of a handheld grenade launcher), the Corsar is designed to defeat hostile armored equipment, missile launchers, hostile



Man-portable ATGW system Skif



800 mm armor plate penetrated by a 130mm Skif Missile

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 military infantry units in Ukraine and elsewhere will demand increasing amounts of precision-guided weapons with multi-target capabilities -- light in weight but highly lethal.

Ready to fire, the system weighs 18 kg, including its associated 13.5kg missile housed in a storage/transport/launch canister. It will operate within a temperature range of minus 40 degrees to plus 60 degrees Celsius (by comparison, 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 defeat-



Man-portable Corsar ATGW system

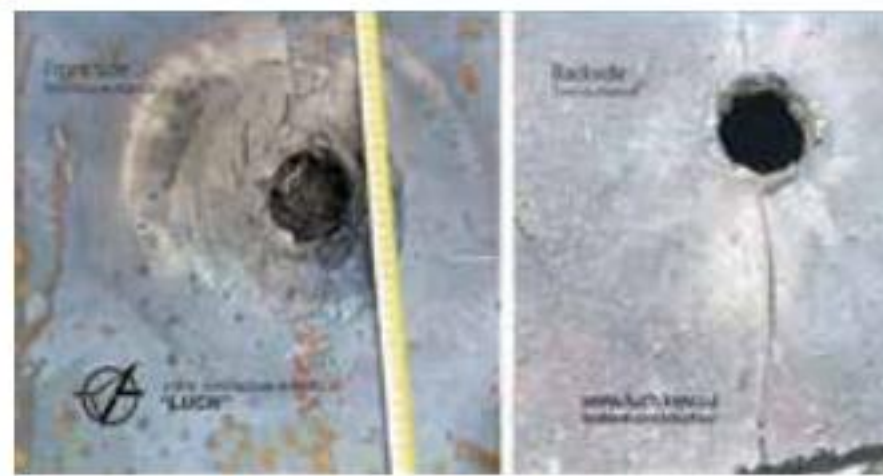
ed even without the need of penetrating the shelter, provided they are non-pressurized. The missile is also suitable for missions such as breaching safe passages through mine fields or non-explosive obstacles. The extensive tests showed that the Corsar ATGW system is a highly lethal and highly effective 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 se-

lected by Ukrainian ATGW missile designers differs from that used for the U.S. Hell-fire and Israel's Lahat semi-active laser riding missiles. The latter two employ 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.

But 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-designed ATGW missiles are guided by a laser beam that is directed not onto the target but the tail of the flying missile where the signal receiver is positioned. This is what gives the

500 mm RHA plates penetrated by a 105 mm Corsar blast fragmentation missile



Corsar a 'low probability of intercept' capability.

In December 2016, Luch held a test launch of its upgraded light-weight Corsar ATGM system. The demonstrated testing results proved that the 105 mm Corsar HE/fragmentation missile is capable of penetrating a 50 mm armor plate.

Luch also offers its man-portable ATGW missile system Skif. It is intended to be used against enemy personnel, moving and fixed armoured vehicles with combination, add-on or rolled homogenous armor protection behind explosive reactive armour, and pinpoint targets like weapon emplacements, tanks in defilade, light-armoured targets and helicopters.

The system's feature lies in the capability to do missile guidance from closed emplacements and shelters to reduce the risk of the gunner coming under enemy fire. Another feature is the missile's flight trajectory. Once launched, it is flying at approx. 10 m above the line of sight and descends to its target in the terminal phase of flight.

The Skif is optimized to fire 130 mm/152 mm missiles. These are housed in transport-launch canisters and armed with tandem hollow-charge (RK-2S, RK-2M-K) or high-explosive fragmentation (RK-2OF, RK-2M-OF) warheads capable of penetrating 800 mm of rolled homogenous armor equivalency.

The guidance system is comprised of a TV camera, a laser guidance unit, and an electronic control unit, with a thermal imager provided as an optional extra. The missile is laser-guided within a 100 m to 5 km range.

The tripod-mounted Skif launcher equipped with a thermal imaging sight weighs 26 kg.

The SKIF carries a tandem warhead consisting of two sepa-



rate 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 optoelectronic sensor eye in backward direction from the target. One more advantage provided by the SKIF is that it can be controlled 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.

Man-portable rocket grenade launcher

At the IDEF 2017 defense exhibition in Istanbul, Turkey, Ukroboronprom unveiled a Luch-developed man-portable grenade launcher named RK-4 Ingul

Ukrainian missiles are about four times cheaper than the US Javelin counterpart, are wholly made in Ukraine, and do not contain component parts from the Russian Federation.

At the IDEF 2017 defense exhibition in Istanbul, Turkey, Ukroboronprom unveiled a Luch-developed man-portable grenade launcher named RK-4 Ingul.

The RK-4 Ingul is capable of engaging light armored and soft targets at ranges from 70 m to 800 m. In ready-to-fire configuration with an optical sight and an 8.2-kg grenade, it weighs 11.4 kg.

The launcher can fire grenades fitted with different warheads depending on the mission. Its 2.4-kg, 14-degree FOV, 4.2±0.2X optical zoom sight can detect and identify targets at ranges from 70 to 1,200 m. The sight's CPU maximizes the accuracy of every shot by factoring weather variables such as wind speed, ambient temperature etc.

RK-4 Ingul is one of the latest man-portable ATGM products by Luch. Ukraine's MoD has already developed an interest in the RK-4 Ingul ATGM capability. **UDR**



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The SPAR™ run flat wheel assembly includes:

- modular run flat wheel rim provided by Kremenchug Wheel Plant JSC;
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The SPAR™ run flat wheel assembly has been developed based on global trend surveys in this field, and on lessons learned with the use of wheeled ACVs in the Donbas conflict area.

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SPAR will save your vehicle and life!



Science-Industrial Association «Fort» is leading enterprise in Ukraine which develops and serially produces different types of firearms. For the moment company manufactures modern weapon with high ballistic characteristics that is confirmed by the results of numerous tests including state tests. The enterprise is also the main supplier of the weapon for divisions of National police and the National Guard of Ukraine.

Fort-600

(Grenade Launcher)



Caliber, mm	40	Trigger mechanism	double action only(DAO)	Barrel length, mm	280	Trigger pull, kgf	not more 5
Working ammunition	Low speed grenades of caliber 40x46 mm (HE MGP, TPT MGP, HEOP M7) and other grenades of cal. 40x46 mm NATO	Dimensions with butt stock extended, mm	670x196x54	Maximum firing range, m	400	Weight without grenade, kg	2,8
		Dimensions with butt stock folded, mm	365x196x89	Minimum firing range, m	50		



Fort-500 M1S

Caliber, mm	12/76	Length with folded butt-stock, mm	585	Magazine capacity, rds	4
Operation mode	Pump-action	Barrel length, mm	345	Trigger pull, kgf	2,5-3,5
Length with extended butt-stock, mm	845	Weight with an empty magazine, kg	4,3	Type of butt-stock	Metallic folding

Fort-500 MS



Caliber, mm	12/76	Length with folded butt-stock, mm	780	Magazine capacity, rds	4
Operation mode	Pump-action	Barrel length, mm	345	Trigger pull, kgf	2,5-3,5
Length with extended butt-stock, mm	878	Weight with an empty magazine, kg	4,1	Type of butt-stock	Telescopic

Fort-14PP



Caliber	9 mm Luger	Weight with empty magazine, up to, kg	0,95
Operation mode	short recoil system	Trigger pull force, kgf	1,5 - 2,5
Trigger mechanism	Double action SA/DA	Magazine capacity, rds	16
Overall length, mm	218	Accuracy range, m	25
Height, mm	140	Rate of fire shots / min	50
Width, mm	35	Rifling	6 grooves
Barrel length, up to, mm	116		

Fort-19



Caliber	9 mm Luger	Weight with empty magazine, up to, kg	0,77
Operation mode	short recoil system	Trigger pull force, kgf	1,5 - 2,5
Trigger mechanism	SA/DA	Magazine capacity, rds	16
Overall length, mm	208	Accuracy range, m	25
Height, mm	139	Rate of fire shots / min	50
Width, mm	35	Rifling	6 grooves
Barrel length, up to, mm	112		

Fort-28



Caliber	5,7x28 mm	Width, mm	33
Operation mode	Semi-free bolt	Barrel length, up to, mm	114 ± 0,5
Trigger mechanism	DAO	Weight with empty magazine, up to, kg	0,70
Overall length, mm	200	Trigger pull force, kgf	1,5-3,5
Height, mm	135	Magazine capacity, rds	20



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Kombat ATGW round

KOMBAT AND KONUS ATGW ROUNDS

Nowadays, ATGW [anti-tank guided weapon] munitions designed to launch from tank gun tubes make up a separate niche on the global arms market, where Ukraine is present with its anti-tank guided missile systems KOMBAT and KONUS. These precision-guided weapons, developed by the State Design Bureau «Luch» in Kyiv, are series produced by the Artem State Joint Stock Holding Company, also based in Kyiv.

The KOMBAT laser-beam riding precision-guided missile can launch from the 125-mm smooth-bore guns mounted on the T-72, T-80UD and OPLOT main battle tanks equipped with fire control systems compatible with it. The missile can be fired while both of

the host vehicle and the target are in motion. Although the primary role of the missile is to engage main battle tanks operating at ranges beyond the effective range of the 125mm tank gun firing conventional ammunition, it can also be fired against other battlefield targets such as hovering helicopters or pillboxes.

The KOMBAT missiles can be loaded into the tank gun's carousel-type automatic loader together with all other round types employed by the gun. The KOMBAT missile body consists of two parts: the head end/tandem warhead and aft end (accommodating sensor/control aids and propulsion), both being stowed in the automatic loader in the same way as conventional ammunition. The two parts get united into one body in

the gun bore at the moment of firing. The missile's tandem warhead enables it to defeat targets fitted with explosive reactive armor with a first-round hit probability of 0.8-0.9.

The KOMBAT has four fold-out fins at its extreme rear, and offers an effective range of 5,000 m which it covers in 17 seconds. With a mass overall of 30 kilos, the missile is far heavier than Russian counterparts, such as the 125mm REFLEX with a maximum range of 5,000 meters, and the BASTION which fires from 100mm rifled guns to ranges of up to 4,000 meters. A tandem shaped-charge warhead makes up almost half of the KOMBAT's length, allowing a heavier explosive payload to be delivered to the target. The warhead weighs 9kg, including a 3kg explosive charge (it is by far heavier than the warhead featured in the REFLEX), contributing considerably to the missile's armor piercing capability, which, again, much exceeds that of the REFLEX. The KOMBAT is a laser-beam-riding guided missile, the laser beam being directed onto



KONUS ATGW round

the tail of the flying missile rather than on the target proper. The missile's control system allows for a few guidance modes. One such is so called "lead-on" mode, whereby the laser beam is directed forward the designated target without actually illuminating it. The laser beam is only brought into coincidence with the target (tank or helicopter) for 0.3 seconds prior to impact, effectively leaving the enemy with no time to activate a laser-warning system. At a range of 5.0 km, miss distance does not exceed 0.5 m. The missile has been accepted as standard issue for the Ukrainian Armed Forces.

The Luch Design Bureau has developed one more tank gun round, designated KONUS, which is optimized for 120mm standard NATO tank guns. The KONUS guided missile is built as a unitary round of the same size as NATO standard tank gun munitions, and it can be loaded into the tank gun's carousel-type automatic loader together with all other round types used by the gun. The KONUS can be reconfigured for NATO-standard 120mm guns,

SPECIFICATIONS

	Kombat	Konus
Maximum firing range, m	5000	5000
Flight time at maximum range, s	16,3	16,3
Guidance method	semiautomatic by laser beam	semiautomatic by laser beam
Warhead:		
- type	tandem hollow-charge	tandem hollow-charge
- armour penetration behind ERA, mm	not less than 750	not less than 700
Missile weight, kg	not more than 30,45	28
Overall dimensions, mm:		
- missile diameter, mm	125	120
- missile main body length	675	1074
- tail section length	408	
Operating temperature range, oC	-40 to +60	-40 to +60

which could help it to find markets in NATO countries and also would boost its export potential. 'Westernized' KONUS has already been tested on the T-84-120 YATAGAN main battle tank with the KBM2 L50 smoothbore gun of the 120mm standard NATO caliber. The KONUS has tandem shaped-charge warhead capable of piercing through 700 mm of RHA (Rolled Homogenous Armor) behind explosive reactive armor, using the guidance technique analogous to the KOMBAT's.

The Ukrainian-designed anti-tank precision-guided missiles KOMBAT and KONUS are being manufactured by Artem in collaboration with precision engineering and chemical enterprises in Ukraine. The two weapons are available in configurations specific to tank guns of standard NATO calibers, which makes them suitable for use in military-technological cooperation programs with NATO countries and for advancement on markets in other countries employing NATO standard military equipment. 

[hybrid actions]



THE RUSSIAN HYBRID WAR: STRATAGEM OR MILITARY CRIME?

Observations of the Russian community development demonstrate the plain tendency of turning back time, particularly – on glorification of moral and ethical experience gained by previous generations, idealization of regulations and maxims, intrinsic to the early historical periods of developing interstate and inter-ethnic relations, that were characterized by primitive dichotomy: “we are civilized, and they are barbarians”. In fact, this focus on the past, incapability of projective civilized thinking is an ancestral vice of the Checka-NKVD-KGBistic world perception, which now not only defines the strategic directions and operating style of the Russian imperial machine but also, to the greatest regret, but also has a widespread destructive influence on the entire Russian society.

Hence, childish enthusiasm of the Kremlin strategists for the “moral and strategic discoveries” of the distant millennial times, which have coincided so conveniently and opportunely with the practice and the internal objectives of the imperial beliefs in the context of circumstances and challenges of the 21st century. It does not matter anymore to the Kremlin ideologists and strategists (such as the “court cardinal”

V.Surkov or the “military genius” V.Gerasimov) that like views and approaches to the problems of the modern military conflicts have been already, more than once, officially reproved by the world community, and the current practice of the Russian power machine bears more resemblance to the style and ideals of the criminal world and terroristic and mafia-style groups. Thus, as distinguished from the Roman maxim on “all-permissiveness in relation to the adversary”, the fourth Hague Convention of 1907 declared that “the right of belligerents to adopt means of injuring the enemy is not unlimited”.

For example, international humanitarian law makes a clear distinction between the notions “ruse of war” (as an element of techniques for warfare) and “perfidy”, which is defined as “non-fulfilment of the promise given to an adversary”. In that way, Article 37 of the previously mentioned Hague Convention states: “It is prohibited to kill, injure or capture an adversary by resort to perfidy”.

In January of 2015, commanders of the Russian servicemen made a truce request to the defenders of the Donetsk Airport for the purpose of taking their wounded people and the bodies of the dead from the battle area. The Ukrainians acceded to it. During the “evacuation”, Russian military sappers, who were hiding behind the corpses of their own soldiers, secretly mined the building of the DAP (Donetsk Airport). Overnight into 21 January, 2015, Russian mercenaries set off the planted explosive under the hall of the terminal, in which cyborgs were holding the fort. The explosion caused the ceiling on three storeys to fall, and the Ukrainian soldiers were caught under the piles of concrete. It should be recalled in this regard that on the very date of January 21 (!) the Ukrainians intended to retreat from the DAP, having preliminarily reached a corresponding “officer agreement” with the Russian party.

The price of the “Russian officer’s words” was once again markedly confirmed on 29 August, 2014. That day, at 6 a.m., the Russian of-

On 29 August, 2014 Russian officer notified the Ukrainian party on the agreement relating to withdrawing of Ukrainian subdivisions from the surroundings of Ilovaisk. As a result, columns of the Ukrainian servicemen were shot during the marching of the Russian artillery, tank-type and small arms; around 1000 soldiers were killed or injured, a large number of military machinery and equipment was damaged.

ficer notified the Ukrainian party on the agreement relating to withdrawing of Ukrainian subdivisions from the surroundings of Ilovaisk, that had to move in a travel position (which, as compared to the armed position, excluded the possibility of conducting battle operations). As a result, columns of the Ukrainian servicemen were shot during the marching of the Russian artillery, tank-type and small arms; around 1000 soldiers were killed or injured, a large number of military machinery and equipment was damaged.

What happened gives very strong associations with a partly similar event –the shameful Operation Typhoon – which was undertaken by the Soviet military command, this time, during withdrawing of the Soviet military contingent from Afghanistan in January, 1989, through the territories of the southern Salang and Panjsher, which were controlled by the forces of Afghan military commander Ahmad Shah Massoud. At the time mentioned, General B.Gromov achieved an agreement with Massoud in connection with unobstructed passage of the military columns through the territories controlled by the Afghans; for their own part, the Soviet troops were obliged to not use of weapons against the Mujahideen of Massoud. However, the Russian aviation and artillery inflicted a “pre-emptive” series of destructive blows to the Afghan settlements, having turned them into complete ruins. Thereafter, Ahmad Shah Massoud, who formerly displayed certain restraint towards the Russian invaders, started revealing most intense antipathy to everything related to Russia and Moscow.

The tragedy of the present-day Syrian Aleppo has shown again how cynical is the attitude of the





Kremlin towards the human life: applying powerful bombs, including those filled with white phosphorus and napalm, blatant disregard for the problems of aiming accuracy and selectivity of bombing... In consequence, the number of the perished and grievously wounded Syrians has already reached a hundred thousand. The bombs were systematically dropped on hospitals, schools and other unprotected elements of the town infrastructure. An analogous style, although not on such a dreadful scale, was applied in bombardment by Russians of the Georgian cities in 2008. The same tactic is adopted today as well, in the course of conducting "counter-terrorism operations" on the North Caucasus against the local Guerrilla Fighting, when the places where the local rebels reside are razed to the ground with artillery fire and bomb strikes (that very "military prowess" was used by the Soviet troops during invasion of Afghanistan, when kishlaks, where the group of the Mujahideen could live, were utterly destroyed; doing so, the military commanders were not especially worried even by false bombardments according to unverified data: revenge considerations or intimidation of the population were attached a bigger importance.

It looks like the Chinese stratagem of "looting a burning house" inspired Putin's "brigade" to a military feat – annexation of Crimea in the spring of 2014. Furthermore, the fire itself was diligently fanned by the Moscow winds, which were singing hymns of support for the "legitimate Yanukovych"; fuel to the flames of the civil confrontation on Maidan was added through supplies of Russian equipment for security officers, methodological assistance in planning of military actions against the protesting population, and, lastly – through direct participation of special forces soldiers in the shootings on Instytutska Street.

Examples of such kind of "military and political victories" were frequently seen across the map of Europe and of the world in the modern history of the 21st century: Bosnia and Herzegovina, South Ossetia, Abkhazia, Chechnya, Transnistria, Ukraine...

Another "discovery of the Russian military science", which became one of the main features and elements of the Russian hybrid war, consists in concentrated engagement of social, quasi-military and civilian status features for the purpose of hiding the participation of their war machine in one operation or another. That said, the mil-

itary "scientists" from the Russian General Staff and Academy of Military Science try to take no notice of the provisions in already mentioned Art. 37 of the Additional Protocol to the Hague Convention, which gives the following example of perfidy: "the feigning of civilian, non-combatant status".

Another point to recall is the famous phrase of Putin, which has already become the classics of his "military genius": "we will be behind [Russian-occupation forces] – not in front of them, but behind them"! Thus, he was going to provide "protection of Ukrainian citizens in Crimea" on the eve of the scandalous stacy referendum in March 2014.

Concentrated artillery blows from the territory of Russia to the positions of the Ukrainian servicemen in the summer of 2014 have also become an impressive example of hypocrisy and deceitfulness. Independent international experts have recorded 149 among merely documented blows, during which several thousands of projectiles were fired on the territory of Ukraine.

Yet, the Kremlin propagandists continued telling on the civilian conflict in Ukraine and the necessity to open a dialogue with the East! Moreover, Europe almost believed in all of it! An additional piquancy to that disgusting practise is added by the fact that, in many cases, even Russian artilleryists were misled by their command: the targets marked for firing were designated on the given operation and tactical map as located on the territory of the Russian Federation and the shootings were conducted as training exercises.

It really seems that in this case Putin's creative thinkers only drew upon the experience of their predecessors from Stalin's cohort of military "thinkers": let's recall that the fake artillery shooting by the "the White Fin-

The tragedy of the present-day Syrian Aleppo has shown how cynical is the attitude of the Kremlin towards the human life

land militarists" of Russian border objects became in 1940 the reason for starting the disgraceful war against Finland.

By firing on the Ukrainian servicemen over the border in 2014; Putin's creative specialists thinkers only drew upon the experience of their predecessors from Stalin's cohort of military "thinkers": fake artillery shelling by "the White Finland militarists" of Russian border objects became, in 1940, the reason for starting the disgraceful war against Finland.

Well, betraying and setting up one's own servicemen, playing with a stacked deck are also within the deeply rooted tradition of the Great Russian statist style. It is a different matter that many of Russian servicemen would "long to be deceived themselves"[from the poetry of Pushkin - TN], gladly playing along with the chauvinistic policy of the Kremlin.

Systematic use of civilian objects (kindergartens, hospitals, etc.) for deployment of military positions, bombarding settlements of the adverse parties, destruction of the civilian infrastructure, critical sites, ecologically dangerous structures, use of the weapons prohibited by the international agreements – all the actions were completely implemented by the Russian military-political command during the campaign for "protection of Russian-speaking population" and "restoration of bonds" on the Ukrainian territory; these very actions were classified by the international law as a military crime.

For instance, the pro-Russian grouping Somali is located in the premises of the former Makiivka Design Institute, and in several buildings of Donetsk Polytechnic Institute, the subdivisions of special group Sparta were placed. The home stations of Russian military groupings are purposely situated in densely populated districts, protected by "human shield" of the civilian popu-

lation. For a long time, Donbas Arena had in its neighbourhood missile artillery subdivisions of Russian occupation troops, that were placing fire on Donetsk Airport in Avdiivka. The fire of the Ukrainian subdivisions in response had to be filmed to the cameras of the Russian propaganda, in order to show hitting "the pride of Donetsk" – a stadium built for Euro 2012. Liberating the city of Horlivka faced a serious obstacle – Russians mined most ecologically dangerous part of the combine in the chemical enterprise Styrol. In case of attacking by the Ukrainians, Russian invaders were ready to blow up the chemical enterprise, which would have definitely caused a large-scale ecological catastrophe, and Ukraine would have been declared the culprit. Several attempts to explode the infrastructure facilities of the Seversky Donetsk - Donbas channel by the raiding forces of Russia are also the actions directed at artificial creation and use of ecological cataclysms for military purposes of hybrid aggression.

In all these cases we also deal with an interesting phenomenon, peculiar to the authoritarian type of state – deep degradation of moral and ethical values, which strikes all the layers of society. We

Current practice of the Russian power machine bears more resemblance to the style and ideals of the criminal world and terroristic and mafia-style groups.



can recall here the mass psychosis of Russian politicians, actors, writers, musicians, clerks, students, housewives and the homeless on the occasion of "the Crimea is ours"! The military angle demonstrates rooted traditions of hypocrisy, villainy and lies, which entail commission of military crimes at three basic levels:

- strategic – lies and hypocrisy of the top executive management in the Russian Federation and of the high military command;
- operational – at the level of commanders and middle ranking seniors, field grade personnel, as well as of the administration at the levels of the region;
- tactical – at the level of junior officer, sergeant and enlisted personnel of security and army subdivisions, everyday lies, fraud and hypocrisy of average people in Russia.

Readiness of the society to accept and generate lies at its various levels allows the Kremlin management to fulfil successfully their "special operations" of various degrees for their own political survival at the cost of the people's national dignity, sufferings and losing of the surrounding and distant neighbours.

That mutual responsibility, criminal solidarity, full and fundamental neglect of behaviour customs are the quintessence of the Stalinist and Putinist type of the state regime.

Understanding of the substance and source of the current Russian policy is still the lesson to be learned by the international society. Formulation of right conclusions from this lesson and the corresponding lining of the relations with the criminal authority of the country, that claims for a key role in the world, will help to make the correct and decisive step for overcoming of the biggest global threat of the present – the criminal regime at the head of a nuclear country. 

[modernization]

UKRAINE'S FIGHTER FLEET CAPABILITY UPGRADE



MiG-29MU1

In the early 1990s, Ukraine was left without combat aircraft R&D and manufacturing capabilities, which almost all were left in Russia as a result of Soviet collapse. But the country still retains a strong industrial capability and infrastructure for aircraft overhaul and related industries. Due to their effort, Ukraine has obtained a refurbished fleet of Su-25, Mig-29 and L-39 aircraft upgraded to Ukrainian standards Su-25M1/UBM1, Su-27M1, MiG-29MU1, and L-39M1, respectively.

The main contractor for the Su-25M1 upgrade standard was MiGremont company of Zaporizhia, a specialized aircraft repair plant. The list of the upgrade package's princi-

pal components includes new, fully indigenous equipment – GPS-aided navigation system, air data system with digital output, digital flight data recorder, radio station and digitalized weapons sight enabling some 30 percent improved accuracy in comparison to the original Su-25's sighting equipment.

The new digital weapons sight and GPS receiver, integrated with the existing navigation suite enable the Su-25M1 to perform the so-called navigational (non-visual) bombing against invisible targets with known position – in day/night, all-weather, cloudy or clear-sky situations. In addition, the new sight enables weapons delivery from high-altitudes – up to 6,000 m.

MiG-29 aircraft upgrade to the Ukrainian MiG-29MU1 standard

includes improvements in air-to-air target detection range, accuracy of navigation to a target point, and functionalities for control, monitoring and data recording of the aircraft, powerplant system and mission systems behavior.

The upgrade – which encompasses life-extension overhaul performed by Aircraft Repair Plant of Lviv – includes the GNSS navigation equipment kit SN-3307 developed and produced by Orizon-Navigation. The SN-3307 equipment provides improvements in terms of the enhanced accuracy of navigation and improved instrument landing capability, thus enabling the crew to pilot the aircraft in an effective way by operating in a combat environment.

Phasotron-Ukraine is responsible for upgrading the NO19 air-

borne radar and expanding the airborne radio station's frequency range in compliance with ICAO standard requirements.

National Kharkiv Air Force University, in early 2014, developed an upgrade package for the P-591B voice logging and reproduction equipment used on the MiG-29 aircraft. The package includes the replacement of P-591B's P-591-30 P-591-48 units with modern-day counterparts allowing for a substantial reduction in the overall system's weight and bulk.

The arsenal of the Ukrainian upgraded MiG-29 aircraft has been expanded with upgraded weapons such as the 230-mm, 95-km range R-27ER1/ET1 air-to-air missiles developed by Luch Design Bureau and produced by Artem JSHC.

As of early August 2014, four MiG-29MU1 aircraft had been taken on strength by the 40th Tactical Aviation Brigade stationed at Vasylykiv, and another two followed suit in 2016.

The L-39M1 standard was formally commissioned in Ukrainian service in July 2009. The main contractor for upgrading the L-39 combat-capable trainer to the L-39M1 standard was Odesaaviareservice company in Odesa. The upgrade included the enhanced and improved Ivchenko-Progress AI-25TLS engine which can produce a maximum thrust of 1,850 kgf. The engine has had its acceleration time reduced to 5-6 s from 8-12 s, with resulting benefits in terms of aircraft flight dynamics and flight safety at low altitudes. Additionally, it included a new flight data recording system allowing for high-quality mission debriefing.

The L-39M1 is fitted with the BTK-39 airborne simulator that offers enhanced capabilities in terms of pilot training in real flight conditions and especially the pi-



loting of the aircraft while operating in a combat environment.


The L-39M1, in addition to being a highly useful pilot training tool, is a cost saving solution that allows for substantial savings of aircraft fuel and life.

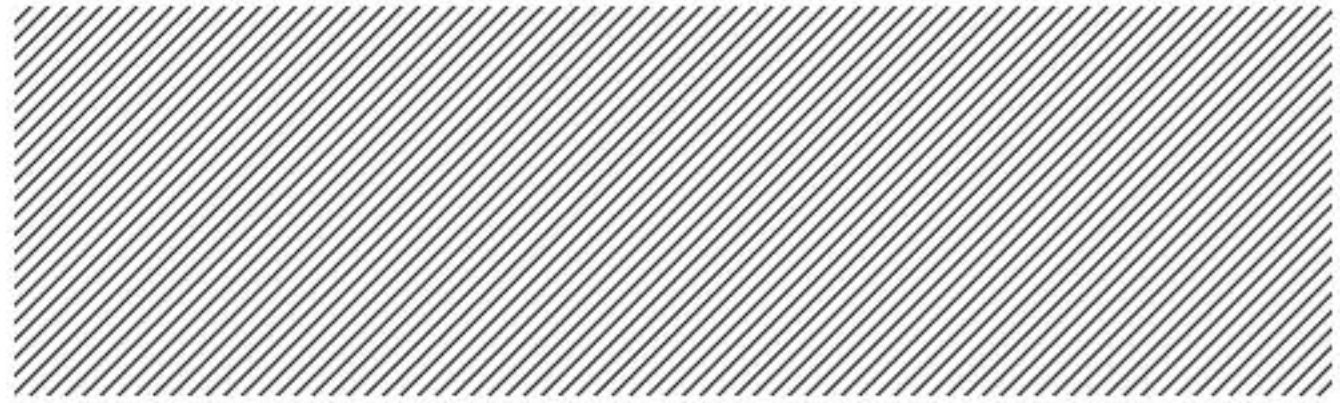
In October 2015, Ukrainian President Petro Poroshenko ceremonially handed over logbooks on

two upgraded Su-27M1 aircraft to members of the country's air force.

MiGremont, Zaporizhzhya, was the main contractor for upgrading the Su-27 fighter to the Su-27M1 configuration.

The Su-27M1 upgrade provides enhanced combat capabilities. In particular, it has its air-to-air target detection range increased by 30 per cent compared to the Su-27's original sighting equipment, and enables improved accuracy of bombing against ground targets. The Ukrainian upgrade introduces new capabilities that particularly include navigational bombing in horizontal flight conditions, modern-day flight data processing, and PC-aided monitoring and data recording of the aircraft, engine and mission systems behavior.

Generally, it can be stated that Ukraine has substantial R&D and manufacturing capacities for upgrading Soviet-vintage combat aircraft technologies, including particularly attack aircraft. In the medium-term, the country's military authorities will remain to be focused on overhaul and upgrade projects for the MiG-29 and Su-27 fighter aircraft, Su-24MR reconnaissance fighter, Su-25 attack aircraft, and L-39 combat-capable trainer aircraft. The enhancements feed in lessons learned with the use of both production and upgraded aircraft (such as MiG-29MU1 and Su-25MU1) in the Donbas conflict area. Actually, however, combat aircraft capabilities are not being improved to the degree as announced by senior Air Force leaders. After all, further capability improvement of the aircraft should proceed on a parallel track with the development of new aircraft weapons systems replacing the Soviet-era counterparts currently used by Ukraine's Armed Forces. 



SE SFTF "PROGRESS": COMPREHENSIVE APPROACH TO THE EXPORT OF ARMAMENTS



TARAS SHYIKO,
GENERAL DIRECTOR
SE SFTF "PROGRESS"

State Enterprise "Specialized Foreign Trade Firm "PROGRESS" (SE SFTF "PROGRESS") was established in 1990 as the first official exporter/importer of military goods and services in Ukraine and has long-term business experience on armament and military equipment markets. In accordance with the resolution of the Government of Ukraine SE SFTF "PROGRESS" is entitled with full rights

to act as an exporter or importer of military and special purpose goods and services. Nowadays, SE SFTF "PROGRESS" performs its business activity being equal member of the State Concern "Ukroboronprom" – the consolidation of great number of diversified enterprises of the Ukrainian military industry. Ukraine has a strong industrial potential in arms and military equipment production, the whole spectrum of which is offered for export by SE SFTF "PROGRESS".

Having a broad geography of cooperation and trade during more than 25 years of the activity in the world armament market, our enterprise has effected export and import supplies of military and special equipment, armament and services to more than 50 countries in the different regions of the world, including countries of Europe, Middle East, Southeast Asia,

Latin America and Africa. The wide range of such sales included a broad spectrum of military products, goods and technologies of dual use ammunition, various equipment and services.

SE SFTF "PROGRESS" proposes the export supplying of military equipment of current production (MBT, APCs, Antonov-type transport aircraft, modern navy ships, radar and communication systems), modern technologies and know-how, the newest weapons and military products' designing and development.


SE SFTF "PROGRESS" has taken a comprehensive approach to the export of armaments and military equipment. We are pleased to offer mutually advantageous cooperation in the following areas:

- export and import of products and services of military and special purposes, including arms, ammunitions, military and special equipment, spare parts, explosives and other goods, which may be used for the creation and production of arms, military and special equipment;
- shipbuilding industry (design and construction of combat ships and civil vessels, repair and upgrade of marine equipment, component parts for shipboard systems and equipment, hydro-acoustic systems and complexes);
- aircraft engineering and maintenance (aircrafts, missiles, engines, equipment, repair services and aircraft modernization);
- modernization of armament and military equipment for foreign customers;

- rendering of services in repairing and maintenance of arms and military equipment;
- export of new technologies, project documentation and other scientific-technical products in military and civil areas;
- training of the foreign military staff in the basic training military institutions in Ukraine and in the countries of the customers;
- design of specialized factories and projects.

Our company together with Ukrainian shipbuilding centers has great experience in designing and construction of vessel of different displacement and purpose. We offer supply of coast guard boats, patrol boats, assault and Special Forces ships. Specified ships are intended for guarding and protection of water boundary and counteraction against poaching. Ukrainian repair facilities are capable to perform complete overhaul and modernization of a series of the Soviet military units and armaments and modern Ukrainian production.

Nowadays, SE SFTF "PROGRESS" is a dynamic developing enterprise which can offer a wide range of military products and services. During the years its activity our company has built up the reputation of a reliable partner. The team of professional experts and full range of rendered services are a guaranty of effective mutually beneficial cooperation and fulfillment of our partners' requirements.

We are always open for a dialogue and mutually advantageous cooperation. 



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[guided weapons]



R-27 – MADE IN UKRAINE

The Soviet-designed R-27 (NATO reporting name AA-10 Alamo) medium-to-long range missile holds a special place among air-to-air missiles. R-27 missiles equip all of the known configurations of the MiG-29 and Su-27 fighter aircraft, and have been used by nearly two dozen armed forces across the world.

As is known, 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 missiles are produced at the facilities of the State joint-stock holding company "Artem" (Kyiv, Ukraine) - aircraft missiles series assembly headquarters plant in the former Soviet Union.

Previously, these aircraft missiles manufactured in close collaboration with the Russian Federation. But after the beginning Russian aggression in Ukraine the situation has changed. Today Ukraine is becoming a self-sufficient producer of this missile type.

Volodymyr Korobov, Deputy Director General of Ukroboronprom for Aircraft Industry and Operations, recently noted in his interview for Defense Express: "In the times of the USSR, Ukraine manufactured most of the R-27 missile components and assemblies, with the remainder being manufactured by Russian factories. Immediately after the collapse of the Soviet Union, Ukrainian companies faced the choices of curtailing their production, getting closed or changing their specialization. Many companies, however, especially those focusing on the production of missiles, were able to survive and even get some growth. Ukraine has retained all the key competencies, and we brought them back to life. For the time being, the R-27 missile remains exactly the same and retains the same specifications it had when

it entered service with the USSR's Armed Forces and still remains part of the Ukrainian military's arsenal. This is because of the needs of war which must be met quickly. Now, with our acquired competencies, we will be able to create new configurations in the future and bring them into production"

In Ukraine the R-27 is produced in several modifications. These modifications are characterized by the use of two types of seekers-semiactive 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 radiocorrection 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 power-plant 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.

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.

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

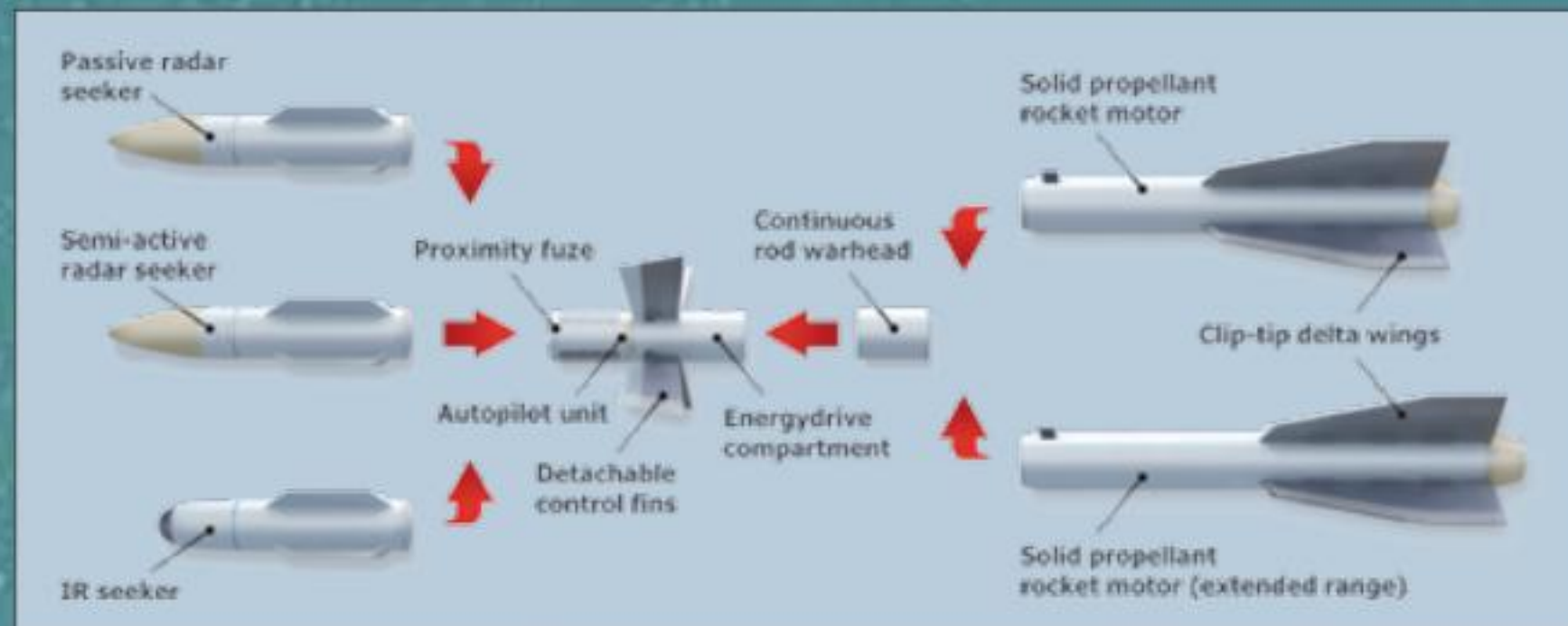
As for seekers, for the equipping of R-27R missiles in Ukraine JSC "Kyiv factory "Radar" produces semi-active radar seeker RGS-27, a seeker target lock-on range is 25 km.

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 is the possibility of long-term (up to three hours) reliable system operation. Moreover, with some reduction of lock-on range, infrared seeker "Mayak-80M" is able to well-function for a prolonged period even in the absence of coolant.

It should be noted that manufacturer of R-27 missiles State

joint-stock holding company "Artem" actively develops. In February 2015 "Artem" set up its own R&D center to facilitate the transformation into an integrated R&D and production organization. Certainly, among the R&D center's current projects, the greatest emphasis place on updating the R-27 AAM technology to keep it up to date with development outputs of the past and present. But in October 2016 "Artem" expanded range of own products. With the help of R&D center Company created the unguided missile RS-80 that previously never produced in Ukraine.

But, unfortunately, the level of domestic contracts is low. The Company gets most of its revenues from the export of air-launched missiles and related maintenance services. And beyond there is another portfolio of products and services that are exportable and profitable. "Artem" is ready for work with international companies. It is a joint stock company and a full-fledged economic entity. The Company doesn't depend on government funding, and it is therefore prepared best for getting involved in various forms of cooperation with international partners. **UDR**



Ukrainian company Radionix, Kyiv, has developed an upgrade package for the S-125M «Pechora» SAM System, and is already implementing it to order from an export customer. Packaged into the upgrade are all the key components and subsystems of the S-125M Pechora, including the UVN radar post, high-frequency receiving devices, target sight channel transmitter, missile command transmitters, TV/optical sighting equipment; 5P73 launcher system; 5V27D missile; and a new booster motor replacing the 5C45.

Upgrade package for 5V27D missile includes a Customer-selectable semi-active/active seeker head and a fully redesigned missile guidance electronics set.

Radionix has branched out into a promising technology business such as the development of missile guidance equipment. Among the Company's latest developments in this domain are two innovative active and semi-active seeker to be known as Onyx (active) and Topaz (passive), which it developed in collaboration with domestic stakeholders. These seekers are designed such as to suit application for both SAM and AAM roles. The two seekers are designed and built with 60-65 percent electronic parts commonality.

UPGRADING OF MISSILE 5V27D WITH APPLICATION

of semi-active seeker (5V27D-M1) or active seeker (5V27D-M2)

Within upgrading of the missile, the following works will be performed:

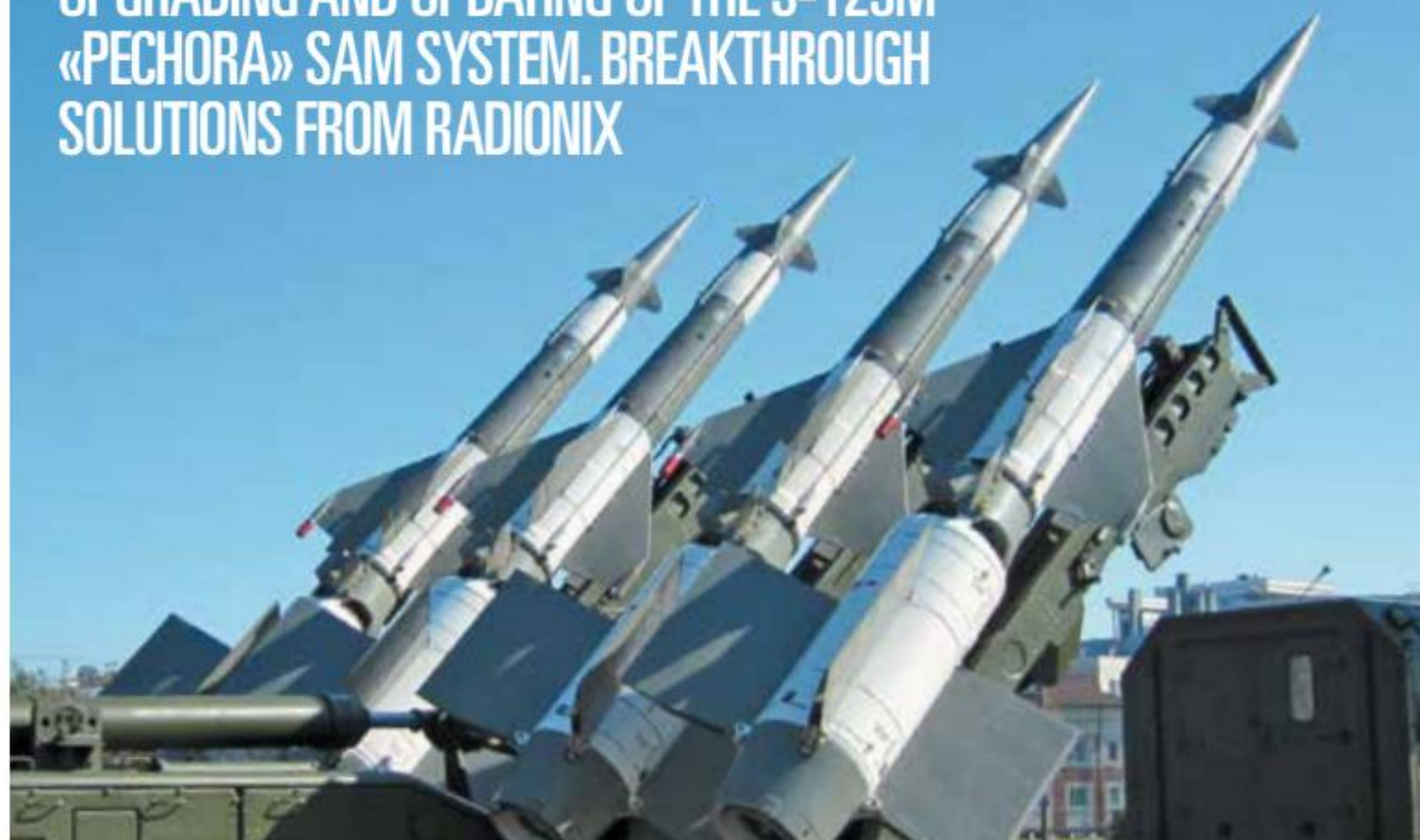


replacement of pneumatic steering gear and aileron drives for electric ones that reduces the weight of unit and increases its control properties; installation of semi-active seeker/active seeker; installation of platformless inertial system for guiding the missile to acquisition point by seeker; upgrading of the radio receiving unit for providing receiving and deciphering of corrective signals on inertial guidance area (target coordinates in antenna port coordinate system); installation of radar proximity fuse based on new component base; installation of new missile control unit.

Within upgraded missile 5V27D-M1 with semi-active seeker, the combined guidance method is achieved: on

AT FULL STRENGTH

UPGRADING AND UPDATING OF THE S-125M «PECHORA» SAM SYSTEM. BREAKTHROUGH SOLUTIONS FROM RADIONIX



BASIC SPECIFICATIONS OF SEMI-ACTIVE SEEKER

Angle rate of target indication processing, deg./sec	50
Range of target approach speeds, m/s	300...2400
Weight of active seeker components, kg, not more than	15
Diameter, mm, not more than	200
Length, mm, not more than	400
Duration of radio correction path, ms	30,72
Time between failures, hrs, not less than	500

BASIC SPECIFICATIONS OF ACTIVE SEEKER

Simultaneously attacked targets	1...4
Search area, degrees:azimuth/elevation	$\pm 35^\circ/\pm 25^\circ$
Angle rate of target indication processing, deg./sec	50
Range of target approach speeds, m/s	300...2400
Search area by distance, km	0,1...20
Air target acquisition distance (target of mig-29 type), km, not less than	20
Weight of active seeker components, kg, not more than	15
Diameter, mm, not more than	200
Length, mm, not more than	400
Duration of radio correction path, ms	30,72
Time between failures, hrs, not less than	500

initial phase of trajectory it is applied an inertial guidance at predicted point with radio correction from SNR-125M of its velocity and position at target maneuvering; on final phase of trajectory, it is applied a semi-active self-guidance after target acquisition with illumination from SNR-125M. Such type of upgrading will provide increase of far damage envelope of 5V27D missile up to 40 km against high-speed and maneuvering targets and up to 45 km against small-speed targets. Characteristics of C-125M-2UM AADMS damage envelope in vertical and horizontal planes for targets flying with speed $V_t \leq 300$ m/s (effective reflective area = 1 m²) are presented on Fig. 1 and 2. Application of upgraded missiles 5V27D-M1 allows for increase of C-125M AADMS potential in simultaneous tracking of targets and missiles guided at them. The upgraded equipment of antenna post UNV-M and cabin UNK-M provides detection and tracking within the beam of SNR-125M up to 3 targets. Upgrading of missile line-of-sight radio transmitter and control command radio transmitter allows for controlling over 6 missiles 5V27D-M1 simultaneously.

Within upgraded missile 5V27D-M2 with active seeker, proportional modified target guidance method is achieved: inertial guidance with radio correction from SNR-125 on initial stage of missile flight and active radar guidance on final stage; inertia guidance without radio correction on initial stage of missile flight and active radar guidance on final stage.

Such type of upgrading will provide increase of far damage envelope of 5V27D missile up to 40 km against high-speed and maneuvering targets and up to 45 km against small-speed planes for targets flying with speed $V_t \leq 300$ m/s (effective reflective area = 1 m²) are presented on Fig.3 and 4.

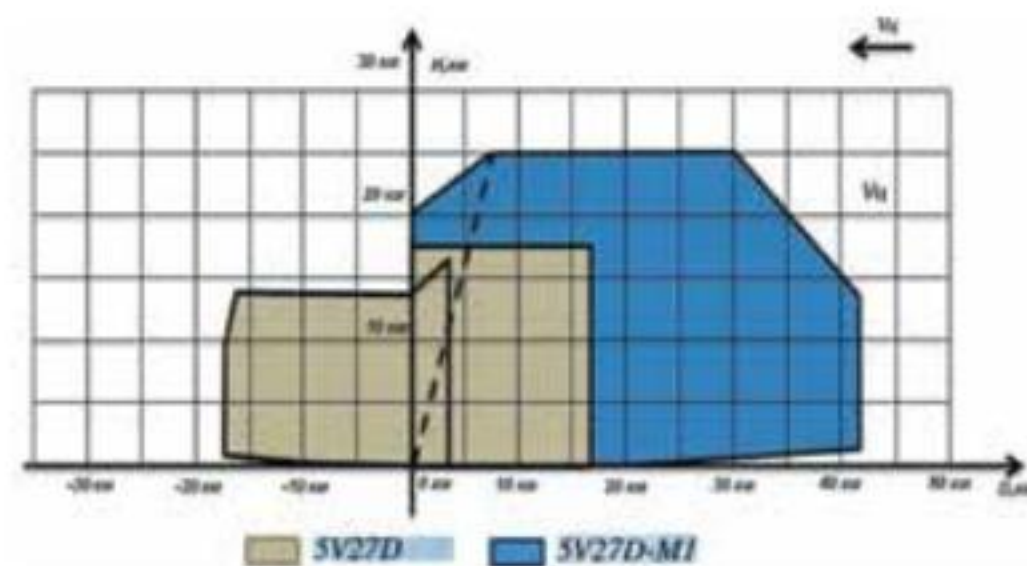


Fig. 1 and 2. Characteristics of C-125M-2UM AADMS damage envelope in vertical and horizontal planes with upgraded missile 5V27D-M1 for targets flying with speed $V_t \leq 300$ m/s.

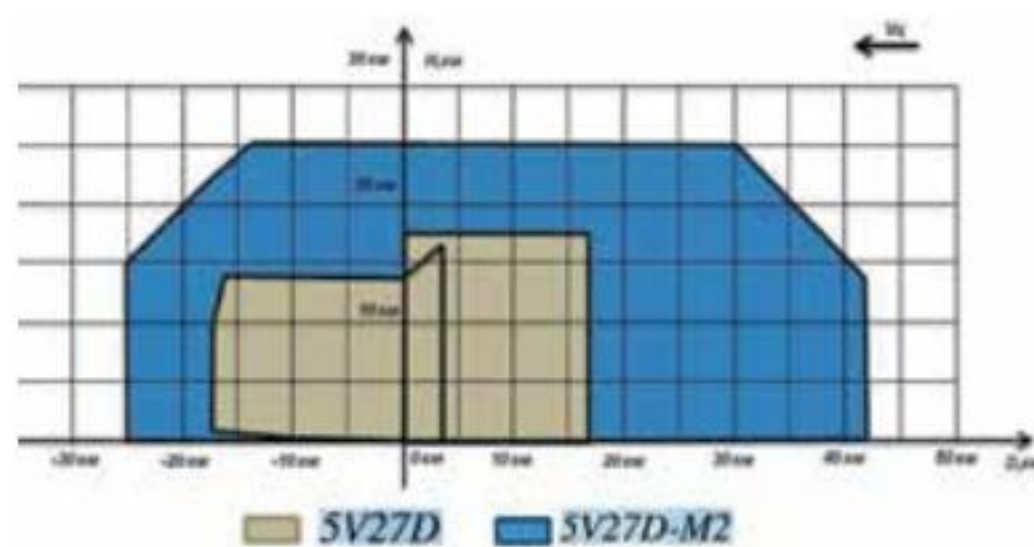


Fig. 3 and 4. Characteristics of damage envelope of C-125M-2UM AADMS in vertical and horizontal planes with upgraded missile 5V27D-M2 for targets flying with speed $V_t \leq 300$ m/s

Application of upgraded missiles 5V27D-M2 allows for increase of C-125M AADMS potential in simultaneous tracking of targets and missiles guided at them. Application of upgraded missiles 5V27D-M2 provides fundamental upgrading of C-125M AADMS. Herewith, the antenna post - the cabin UNV-M is deleted from the composition of C-125M AADMS and is replaced by standard three-dimensional Radar Station of 36D6 type and radio cor-

rection equipment on each launcher. The target detection data is submitted in digital form to the cabin UNK-M and to the correspondent launcher in the form of usual flight task data. The control of missile in flight is done by missile sighting transponder, placed on the launcher. Three-dimensional warning radar station provides detection and tracking of 8 targets (target channels). The launch control system allows controlling over 16 missiles 5V27D-M2 simultaneously.

Replacement of 5C45 take-off booster. When replacing the 5C45 take-off booster solid-fuel charges are replaced. At that, 14 cylindrical single-channel explosive cartridges with usual gunpowder charge are replaced with the same single-channel cartridges with combined charge. Advantage of explosive cartridges with combined charge compared with usual gunpowder charge is increased time of cartridge burning when characteristics of developed boost thrust are the same. Applying cartridges with combined charge allows flying with the aid of take-off booster along all-ballistic trajectory within the initial trajectory phase of the 5B27D missile flight and at that the zone edge of lethal envelope of C-125M AADMS amounts to 45 km. Profound upgrading of the 5B27D anti-aircraft guided missile allows prolonging its service life by 10 years, and it is factor of no small importance, taking into account long-term periods of storing these missiles, which were manufactures else in the former USSR. 

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«АНКЛАВ»

Постановник радіоперешкод «Анклав» призначений для створення завад для прийомних навігаційних систем GLONASS та GPS, системам управління та телеметрії які використовуються БПЛА та іншим високоточним озброєнням. «Анклав» може мати кілька варіантів розміщення - переносний мобільний варіант у вигляді звичайного ранцю, на будівлях і стаціонарних вишках, а також на бронетехніці та автомобілях.

Постановник радіоперешкод «Анклав» виготовляється в переносному та стаціонарному варіанті з використанням антен направленої та ненаправленої дії.

Радіус дії:

з направленими антенами	до 30 км.
з ненаправленими антенами	до 15 км.

«ANKLAV»

Portable jammer "ANKLAV" is intended to create obstacles for receiving navigation systems GLONASS and GPS, control systems and telemetry used UAVs and other high-precision weapons. "Enclave" can have several accommodation options - portable mobile version in plain bags, on buildings and residential towers, as well as armored vehicles and cars.

Portable jammer "ANKLAV" made in portable and stationary version using directional antennas and omnidirectional action.

Jamming range:

with directional antennas	up to 30 km.
with omnidirectional antennas	up to 15 km.



ПАТ «Холдингова компанія «Укрспецтехніка», діє на ринку телекомунікацій і електронних технологій з 1989 року. Досвід фахівців, творчий успіх і талант дозволили завоювати провідну позицію в Україні в області розробки, створення і постачання широкого спектру складної радіоелектронної та іншої техніки військового та спеціального призначення.

JSC "Holding company" Ukrspetstechnika" operates in the market of telecommunications and electronic technologies since 1989. Experience professionals, creative success and talent have allowed to win a leading position in Ukraine in the design, creation and delivery of a wide range of sophisticated electronic and other equipment for military and special purpose.

Радіолокаційна станція «МАЛАХІТ» Radar «MALACHITE»

Цифрова, перешкодозахищена радіолокаційна станція розвідки повітряних і надводних цілей здійснює виявлення, визначення координат і передачу радіолокаційної інформації споживачам в автоматичному режимі.

Digital, Interference-proof radar reconnaissance aircraft and surface targets provides detection, identification of the origin and transmission of radar information consumers automatically.

Дальність виявлення цілей:

Range target detection:

400 км/km



місце оператора станції / place the operator station



«ДЖЕБ»

Мобільний комплекс наземної розвідки "Джеб" призначений для виявлення, класифікації та ідентифікації наземних рухомих цілей, а також низькошвидкісних, низьколітаючих повітряних цілей; цільовказівки з метою забезпечення виконання завдань з охорони протяжних територій і ведення розвідки.

монітор оператора комплексу «ДЖЕБ»

monitor operator complex "JAB"



«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 pointing with the aim to provide performance of tasks on security of wide areas and reconnaissance.

Дальність виявлення:

людини
техніки

2,5 км.
6,4 км.

Detection range:

person
vehicle

2,5 км.
6,4 км.

[made in Ukraine]

BATTLEFIELD PREDATOR

Aleksandr HOROBETS,
Exclusive for Defense Express

High maneuverability and the expansive deployment of tactical-level units and special operations forces are characteristic of modern military conflicts. No greater proof of this tendency is needed than the ongoing Donbas conflict in Eastern Ukraine.

New technological solutions are needed to improve battlefield effectiveness of tactical-level units. Individual Protective Equipment Factory company, Kharkiv, proposes some interesting solutions in this field, developed as private ventures.

At its pavilion at an arms exhibition in Turkey, the Ukrainian League of Defense Industries showcased new technology products by the Kharkiv's company, which are already deployed with the special operations units of Ukraine's Armed Forces and National Guard that are fighting separatist rebels in Eastern Ukraine.

Visitors to the exhibition were particularly impressed by a machine gun ammo backpack system named "Predator". The Predator, as claimed by the Designer, will be the most reliable solution for raid missions and close combat situations requiring high volumes of firepower.

The Predator system provides the obvious advantages in terms of soldier mobility, the freedom for the operator to keep his weapon in ready position and to conduct controlled, lengthy firing sessions without the need to reload the ammo belts.

The system integrates a load bearing frame, nylon backpack, composite-material ammo box, ammo feed belt adjustable to the shooter's standing position, and a quick (4 sec) discard system.

The Predator is optimized for rounds of 7.62 mm and 5.56





mm and is compatible with both NATO's and Warsaw Pact's machine gun weapons such as PK/PKM, Negev/Fort 401, Mark 46, Mark 48, M240, and M249. The belt box holds 550 7.62 mm rounds or 650 5.56 mm rounds of ready-use ammunition.

The system, which can be used with bulletproof vests of all known protection classes, weighs 8 kg plus a loadout of ammunition.

To minimize the weight load on the soldier, the Individual Protective Equipment Factory offers its new product – a plastic belt that would reduce six-fold the mass of the Predator ammo backpack when fully loaded.

Plastic belts are as effective as those of steel while providing significant weight savings.

The composite-material belt is suitable to be used without limitations by Army special operations units and other Army organic forces.

In Ukraine, plastic belts are supplied in limited quantities to deployed forces and special operations units for user

evaluation and temperature exposure testing.


In Ukraine's Armed Forces, personnel are still reluctant to use polymer belts, and an awareness campaign is needed to make them see that plastic belts are as effective as those of steel while providing significant weight savings.

As of today, 40+ units of the "Predator" system have been delivered to Ukrainian government forces deployed in the Donbas theater of operations.

The system is undergoing continuous modification and improvements. The exhibition in Turkey saw the unveiling of the fourth evolution of the Predator technology. The technology generated an interest from an Italian company who is now considering combining the Predator with its proprietary exoskeleton technology.

In developing the Predator technology, the company benefited from the experience of other countries, especially the USA

where counterpart products such as TMIL Systems PRIME or The TYRTactical MICO are selling for about USD 4,000. In Russia, FRONT offers its machine-gun ammo feed system

"Scorpion" for about RUB 42,000. Ukraine's Predator is offered for export at half the price of its American counterparts, while the domestic market price is flexible depending on the production rate and profitability level. 



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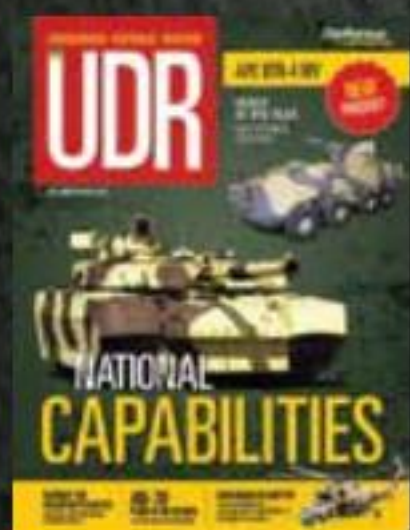
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