UKRAINIAN DEFENSE REVIEW

№1 [JANUARY-FEBRUARY 2015]

UDR

Defense express

ANTONOV – IN PACE WITH MARKET TRENDS

DOZOR-B

UKRAINIAN LIGHT VEHICLE

THE WAY OF «KORSAR»

New ATG missile launch system

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direct speech

UKRAINIAN DEFENSE REVIEW ARMS EXPORT AND DEFENSE INDUSTRIAL COMPLEX OF UKRAINE

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CENTER FOR ARMY CONVERSION & DISARMAMENT STUDIES

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ARMED FORCES OF UKRAINE RECEIVE 177 UNITS OF NEW MILITARY EQUIPMENT

Since last year the Armed Forces have received 177 units of new and upgraded military equipment as well as equipment supplied by domestic defence enterprises as reported by Vladyslav Seleznyov, Speaker of the General Staff of the Armed Forces of Ukraine, on 28 January, 2015.

«Last week, ATO military units received 2 new BTR-4E, 6 KrAZ trucks and 8 combined chaff and flare dispensers for aircraft and helicopter protection,» he said. According to the representative of the General Staff the Armed Forces have already received 177 units of new and upgraded weapons and military equipment since the beginning of the year. «We have received 89 new means of destruction and 1 789 other new armaments, including 4 upgraded aircrafts, 7 upgraded helicopters, 46 radars of different range, 9 upgraded tanks, 14 new armoured personnel carriers, 18 howitzers, 69 trucks and special vehicles as well as 14 air defence and 75 anti-tank guided missiles, 134 navigation devices, over 500 advanced small arms, 1 000 collimator sights, 14 countermeasure EO systems for helicopter protection and 48 combined chaff and flare dispensers. We have also received parachute systems, anti-tank missile complexes, secure communication equipment, etc.» Seleznyov added.

UKRAINE TO SPEND $5.4 BILLION ON DEFENCE AND SECURITY IN 2015

Ukraine's budget for 2015 has allocated an unprecedented sum of about 90 billion UAH ($5.4 billion at the exchange rate of 16.6 UAH per USD) for defence and security as reported by Prime Minister Arseniy Yatsenyuk on 29 December 2014. «The Ministry of Defence, Ministry of Interior and the National Guard will be financed as provided in the Law on State Budget of Ukraine. We started with UAH 80 billion and reached the mark of UAH 90 billion to be spent on national security and defence,» he said The Prime-Minister also mentioned that this amount includes UAH 6 billion ($0.36 billion) allocated as the state guarantee to enterprises of the national military and industrial complex to enable the purchase and manufacture of weapons and equipment. The Ministry of Defence is allocated UAH 40.2 billion ($2.4 billion) including UAH 39.4 billion as the general fund and UAH 819.5 million as the special fund.

SPECIAL FORCES RAPID RESPONSE DETACHMENT TO BE CREATED IN UKRAINIAN ARMY

One of the directions of NATO assistance to Ukraine will be creation of Special Forces rapid response detachment in the Armed Forces as announced by Ambassador of Ukraine in the Alliance Ihor Dolhov while talking to journalists in Brussels. «I will tell you a little secret regarding a specific project (in which Kyiv counts on the Alliance support). There is a need for a new detachment in the Armed Forces - special operations one. This is exactly what we will work on,» he said. He noted that NATO would mainly provide the advisory support of the establishment of the detachment although there may be new forms of assistance provided later on. «This requirement of the Armed Forces is not new at all and it must be solved. And in a situation when we do not have our own mechanisms of providing it the first thing we have to do is to rely on the experience of neighbours,» he explained.

'UKROBORONPROM' TO CREATE INDUSTRY CLUSTERS

Having analysed the activity of enterprises, the management of 'Ukroboronprom' reported on the start of the new programme of reformation of the Ukrainian defence industry. The advanced model of such clusters has already been developed based on clear specialisation, vertical integration and closed production cycle to an end product as reported by the press-office of 'Ukroboronprom'. Enterprises of the Concern will be structured into seven clusters: aviation production and repair; radar and air defence; armoured and special purpose equipment; missiles, ammunition and explosives; missile-artillery weapons; electronic surveillance, EW, communication and automated control systems; shipbuilding and naval systems.

SC 'UKROBORONPROM' TO IMPLEMENT IMPORT SUBSTITUTION PROGRAMME

As a result of the Russian military aggression and war in the eastern Ukraine leading to a complete termination of all the military and technical cooperation with the Russian Federation, Ukrainian defence industrial group 'Ukroboronprom' is forces to implement a large scale import substitution programme as quickly as possible.

It is essential to develop Ukrainian analogues of all the Russian components previously imported to Ukraine. Otherwise it will significantly damage the production and repair of military equipment, systems and other technologies in seven most important sectors of the Ukrainian defence industry. Ukraine needs to establish the production of up to 30 thousand items - from small and simple components to complex systems. 'Ukroboronprom' has already met one third of current challenges. Enterprises already manufacture components not only for their own needs but for other production facilities. For instance, SE 'Lviv Armour Plant' delivers a part of manufactured components to other armour manufacturing plants. Aviation repair plants have mastered the production of almost 4 thousand of new components. SE 'Lutsk Repair Plant 'Motor'' specialising in the renewal and upgrade of aviation engines has been another bright example of active import substitution. Every engine consists of approximately 7 thousand parts each with its design documentation. The majority of these components are already manufactured in Ukraine. In cases when Russian products can not be manufactured in Ukraine SC 'Ukroboronprom' carries out so-called import substitution by signing contracts with our countries representatives. In autumn 2014 'Ukroboronprom' intensified the cooperation with EU and NATO countries represented by world leading companies.

UKROBORONPROM, POLAND'S LUBAWA TO SET UP JV TO PRODUCE AMMUNITION AND MILITARY EQUIPMENT

'Ukroboronprom' plans to establish a joint venture (JV) with large Polish-based multipurpose camouflage producer Lubawa SA to manufacture ammunition and equipment for military personnel as reported by the press-office of Ukroboronprom.

The corresponding cooperation plan is envisaged in the agreement signed by Deputy Head of Ukroboronprom Sergey Pinkas and Chairman of Management Board of Lubawa S.A. Marcin Kubica in Kyiv. Details of the partnership and the list of the JV's future products will be developed in the near future. The start of production is scheduled for 2015.

The cooperation with one of the largest European manufacturers of military ammunition is considered to be one of the key tasks in transforming the Ukrainian military and industrial complex to the new standards of production and partnerships with EU and NATO member states.

Lubawa SA has been operating on the military ammunition market for more than 60 years supplying multipurpose camouflage to NATO member states. The company exports products to over 40 countries.

UKRAINE TO DEVELOP HYBRID OF TANK AND INFANTRY FIGHTING VEHICLE

'Ukroboronprom' has resumed the development of a new infantry fighting vehicle based on the T-64 platform. The armoured vehicles industry specialists are ready to launch the commercial production of this equipment this year should they receive corresponding orders from the Ministry of Defence and National Guard of Ukraine as reported by the press-office of 'Ukroboronprom'. While conducting the factory tests designers jointly with specialists of the Armed Forces of Ukraine decided to further upgrade the platform with new weapons system and advanced reactive armour significantly enhancing the survivability.

The new advanced armour is quite effective at stopping armour piercing bullets and grenades.

AVTOKRAZ' PLANT DEVELOPS NEW 8X8 ARMOURED VEHICLE

'AvtoKrAZ' is currently working on the development of new multipurpose 8x8 armoured vehicle in the interests of the Ukrainian Defence Ministry and export customers as reported on www.ukraineindustrial.info news portal.

The new armoured carrier will feature a different layout of the cabin and engine compartment compared to the rest of KrAZ vehicles. Chief Designer Sergey Basichek reported that the plant would demonstrate the first prototype of the new modular 8x8 combat vehicle for evaluation by the Ministry of Defence of Ukraine in the first half of 2015. Unlike previous vehicles of the company the new chassis will have the front-mounted armoured cabin and engine compartment in the back featuring foreign engine instead of familiar turbocharged diesel V-shape engine YaMZ-7511.10. The chassis will also enable the installation of various modules for different tasks. The plant is already working on additional modifications with a section for assault forces, command control post, communication control module and on a special modification designed to serve as a launching platform for various missile systems.

The new range of armoured carriers is designed to transport personnel and carry different special purpose equipment and weapon systems. This vehicle can become a platform for advanced communications vehicles, mobile artillery systems, unmanned aircraft systems transportation and launch, evacuation, excavation and other applications. The new vehicles will also become a unified platform for land forces brigades.

ANTONOV AN-70 ENTERS SERVICE WITH UKRAINIAN ARMED FORCES

The Antonov An-70 military transport STOL aircraft has been put into service with the Armed Forces of Ukraine after 20 years of design and development work as reported by General Staff Speaker Vladyslav Seleznyov in January 2015.

«Military transport short take-off and landing aircraft An-70 has been put into service with the Armed Forces of Ukraine. Defence Minister Stepan Poltorak has signed the corresponding order,» said Seleznyov. The aircraft is intended for troops landing, transportation of troops and material supplies, provision of manoeuvres and combat activity of troops. An-70 has proved to be a better solution than alternative air platforms including French aircraft Airbus A400M. It is half price and maintenance costs.

UKRAINE LIKELY TO MANUFACTURE NEW MISSILE SYSTEM IN 2015

According to the plan of activities of State Space Agency of Ukraine for 2015 under the Programme of the Cabinet of Ministers of Ukraine and Coalition Agreement it is scheduled to initiate the production of new multi-purpose missile system.

According to the document posted on the official web-site of the State Space Agency of Ukraine executors will provide the production facilities and special technologies for the manufacture of multi-purpose missile system in 2015 and 2016. Currently the Armed Forces of Ukraine have only one type of missile complex - 9K79 'Tochka-U'. These systems provide the range of 120 km with relatively low accuracy (up to 150 m CEP) and have exhausted their operational resources. The number of missiles has decreased as a result of active firing in the eastern Ukraine against strategic objects of hostile forces. At the moment there are open projects focusing on designing and building a new multi-purpose missile system for the Armed Forces of Ukraine. It has been reported that it would provide the range of up to 300 km.

AUTOKRAZ TO DELIVER TRUCKS TO LAOS

'AutoKrAZ' has signed a contract on the delivery of a large batch of AWD trucks to Lao People's Democratic Republic.

The 6x6 KrAZ-6322 trucks will be built in basic configuration and provided with engine meeting Euro 0 emissions standard. This model has been selected by the customer for a reason, particularly to operate in tough environments. The customer requested a vehicle with exactly the same performance as KrAZ-6322 truck. It features excellent cross-country ability, easy to operate, maintain and repair. It is reliable and rugged. According to contract trucks will be delivered throughout 2015. The first batch is scheduled for shipping in the first quarter of 2015. To reduce the cost of transportation KrAZ trucks will be delivered in sea containers as semi-knocked down kits.

DIAMOND DA50-JP7 WITH UKRAINIAN ENGINE TAKES FLIGHT

DIAMOND DA50-JP7 powered by Ukrainian engine has performed the first flight as reported by the 'Kryla Ukrainy' web-portal. On 19 January the Ukrainian delegation headed by President of 'Motor Sich' Holding Company Vyacheslav Bohuslayev and Chief Designer of SE 'Ivchenko-Progress' Ihor Kravchenko travelled to Wiener Neustadt, Austria, where DA50-JP7 aircraft of local company Diamond Aircraft equipped with Ukrainian engine performed its first test flight at the Wiener Neustadt East airport south of Vienna. Diamond specialists have evaluated all the advantages and disadvantages and decided to set up a commercial production of the aircraft with new more powerful turbine engine AI-450S (465 hp) of the Ukrainian manufacturer instead of old Teledyne Continental TSIOF-550J (350 hp).

«We are very happy that our AI-450S engine has been selected from a large number of competitors as a result of an open tender,» said Vyacheslav Bohuslayev, President of 'Motor Sich'. «This is indicative of the fact that our engines are better than alternative engines of our competitors in many respects. Most important the price has not been the most important factor. We have first managed to enter an already well-established European market with our products. The Austrian company intends to install Ukrainian engines on other larger planes designed to deliver humanitarian supplies to hard-to-reach regions and aircraft which will replace old flight trainers for the training of young pilots.

'MOTOR SICH' DELIVERS FIRST MULTI-PURPOSE MI-8MSB HELICOPTERS TO DEFENCE MINISTRY

JSC 'Motor Sich' (Zaporizzha) has delivered the first batch of upgraded multipurpose Mi-8MSB helicopters with replaced engines to the Ministry of Defence, Interfax Ukraine news agency reports, citing the company's management. «As of today, the Defence Ministry has already accepted the first three helicopters assembled for the army as part of the state defence order. The shipment of the helicopters is expected in coming days and the delivery time really depends on the customer. The delivery of another seven helicopters to the Ukrainian Armed forces is scheduled for 2015,» said a representative of the company's top management. According to the source the company plans to deliver three Mi-8MSB helicopters to the Ukrainian National Guard in December. «We have completed the assembly of these helicopters. They are currently passing the flight tests,» he added. Motor Sich will supply the total of 13 Mi-8MSB helicopters to the Defence Ministry and the National Guard in 2014-2015 under the state defence order placed in October.

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Jaisha Wray, Political Officer, **US Embassy**

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Group Captain Martin Johnson, Director, National Air Defence and Space Operations, **Royal Air Force**

Professor Richard Crowther, Chief Engineer, **UK Space Agency**

Kenneth Hodgkins, Director of Space and Advanced Technology, **US Department of State**

Air Commodore Peter Round, Capabilities, Armament and Technology Director, **European Defence Agency**

Colonel Jerome Bernier, Chief of Staff at Joint Space Command, **French Ministry of Defence**

Commodore Christian Anuge, Director ICT, Training and Operations, **Nigerian Navy Headquarters**

Peter Woodmansee, HQ U.S European Command Missile Defense Program Manager, **EUCOM**

Colonel Olaf Holzhauer, Director, Space Situational Awareness Centre, **German Air Force**

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UKROBORONPROM IS SUCCESSFULLY WORKING FOR THE PROVISION OF ARMS AND MILITARY EQUIPMENT TO THE UKRAINIAN MILITARY

ROMAN ROMANOV

GENERAL DIRECTOR OF UKROBORONPROM UKRAINIAN DEFENSE INDUSTRY

«Our first priority is work for strengthening Ukraine's ability to defend itself. All of the domestic defense companies that are run or managed by Ukroboronprom have now switched onto «war economy lines». This reality requires that we respond, promptly and decisively, to new challenges», Roman ROMANOV, CEO of [Ukraine's state weapons industry holding] Ukroboronprom, said in an interview with Defense Express.

– An entrepreneur by profession, you used to have nothing to do with the military. How did it happen that you have become engaged in the defense industry now?

– Yes, indeed, I am a teacher of physics by education, of which I'm proud, because this is what made me have passion for exact sciences. That said, I was born in a family of military officers. From my earliest years, I was surrounded by military men, so I couldn't care less about the state of affairs in our army. As an entrepreneur by profession, I once headed the Council of Small Businesses of Kherson, and I was member of the Kherson City Council and Kherson Region Council. I received an MBA degree in business administration, and did practical training in Hong Kong and Macau. I have set up about 35 businesses from scratch. So I am a professional manager, and it is exactly in that capacity that I was appointed to this position. I have an experience in the real economy, and this is what Ukroboronprom is dealing with in the first place. My first priority as a manager is profit earning. [The Company's] status as State property must generate profit, not losses. We must bring money into the budget, so that this money could then be used for hospital's services, street cleaning, road construction etc.

– Would you tell us about current operations by Ukroboronprom? What impact has the situation in the East of Ukraine had on these operations?

– For a long time, given the lack of domestic orders from Ukraine's military and security services, 134 of the Ukroboronprom holding's companies dealing with industries that include aircraft, shipbuilding, marine equipment, armored military vehicles, radar technologies, air defense and communications equipment, artillery rocket systems and ammunition, used to be focused largely on export contracts so they would be able to sustain and grow their business. However, the situation has changed radically with the start of ongoing external aggression. In the face of the annexation of Crimea, the active support of terrorists in Eastern Ukraine and massive concentration of forces along the border [with Russia], Ukroboronprom has refocused its business operations to address the needs of national security. I am talking in the first place about the provision of modern armaments to the Armed Forces, National Guard, special operations forces of the Security Service of Ukraine (SBU) and State Border Guard Service. Moreover, Ukroboronprom's companies are dealing with repair and overhaul of the arms and military equipment (AME) damaged as a result of the anti-terrorist operation (ATO) in Eastern Ukraine, bringing them back to operational status. For prompt recovery of weapons systems and military equipment in the ATO area, 47 mobile teams have been set up to do repairs in the field, with a total of about 1,000 pieces of equipment brought back to operational life thus far.

– What are the results of your business operations over the past six months? Has there been any rotation among the people in managing positions at Ukroboronprom and its constituent companies?

– I came to lead Ukroboroprom along with my own team, who have no previous experience in the defense sector. My first deputy is a little older than 30, and my deputy in charge of international trade activity is also a young man with an MBA degree. Just a few executive positions are now being held by men from the previous team. I have replaced CEOs at 12 companies out of more than 100 businesses run by Ukroboronprom. Most of these businesses used to run at a loss; now we have eight profit-making ventures. I can confidently say that Ukroboronprom produced and delivered more products [to the Ukrainian Armed Forces] over the first six months of 2014 than it did over all of the years since its foundation. Ukroboronprom finished 2014 with Hr 150M profit, versus Hr 400M loss in the first half of the same year, meaning not only did it fully regain its losses, but generated overall profit of Hr 0.5B, created 2,000 jobs and paid off Hr 40M in wage bills. We delivered Hr 1.5B more worth of products to domestic customers (the MoD included) over the July-December period than we did over the first six months of 2014. How did we do it? Firstly, and most important-

ly, this was assisted by the introduction of electronic bidding process on 6 November. We held more than three hundred contract competitions thus far, with a resulting saving of about Hr 4M. For example, we were able to save up to 60 percent of the cost of some products purchased by the Armored Vehicle Factory in Kiev. How did it become possible? We held 17 tenders for contracts to supply metals, plastics, rubbers etc. Previously, there would be exactly 17 vendor proposals submitted for those 17 requests for proposals (RFPs) by firms owned by brother, uncle or father of the [Factory's] CEO. This time around, about 2,000 bids and proposals were submitted. This is how we managed to achieve an average cost reduction of 35-36% across the Ukroboronprom Holding's companies.

-– Does the Ukrainian defense industry have sufficient capacities to provide the country's Armed Forces with the AME types that they require? Which requirements can it fulfill, and which cannot?

– Ukroboronprom makes every effort to provide for the needs of the Armed Forces and the whole security sector. More than 700 vehicles have been brought back to operational status or upgraded, and 350 new vehicles have been put out by domestic factories over the past several months. This year, we are delivering an initial quantity of the new «Dozor-B» armored vehicles to forces in the field. We are planning to set up the domestic ammunition industry to make up for the loss of the ammunition factory in Luhansk.

Indeed, there is now more focus being placed on upgrading the existing technologies [rather than on producing new ones], but it's just a matter of discretion. For example, most of the T-64 MBTs are now upgraded to the more capable «Bulat» configuration, which is essentially a different tank with new, absolutely improved capabilities. Furthermore, it is 80 times cheaper to overhaul an MBT than create a new one such as the «Oplot», for example.

Ukroboronprom produced and delivered more products [to the Ukrainian Armed Forces] over the first six months of 2014 than it did over all of the years since its foundation.

As far as gun artillery is concerned, just now we are busy setting up production of large caliber barrels, [which we are lacking] given that our «KB Artozbroyennya» previously had the capacity to produce AFV-mounted guns of no more than 30 mm diameter.

-– Has [defense-industrial] cooperation with Russia been fully suspended; what losses has the termination of this cooperation caused for Ukraine's defense industry?

– Our defense industry has lost USD 3.3B as a result of the termination of cooperation with Russia. We used to import about 30,000 product items from the Russian Federation. Production lines for domestic substitutes of about 11,000 (or 30%) of those product items have been set up so far. I am talking about aircraft and related products in the first place – an area where our capabilities even grew with the suspension of cooperation, and production lines for domestic substitutes of over 4,000 product items have been launched.

– Does Ukroboronprom sell equipment to the export market?

– As things stand now, not a single [export] contract can be executed or piece of equipment exported from Ukraine other than by permission of the National Security and Defense Council's Inter-agency Commission on Military-Technical Cooperation and Export Control Policies (such permissions require further approval by the President of Ukraine) and the State Service on Export Control. But where we have active contracts, they must and will be executed. In this case, the following procedure will be followed: We get an order, which we will submit to the Ministry of Defense for consideration and possible approval if it is qualified as not affecting the orders executed for Ukraine's Armed Forces. After such approval is secured, we then proceed to work on a given order. Over the past six months, we have partnered with two dozen new foreign partners, with whom we have signed USD 450M worth of contracts. Here I am talking about the provision of services, as well as deliveries of over 70 pieces of manufactured goods and tens of thousands of small arms weapons.

-– What about collaboration with Western partners?

– We are observing the qualitative growth in political dialogue

and practical collaboration between Ukraine and the EU countries and the USA. Businesses in the EU and U.S.A. have an interest in Ukraine's defense market as the country is poised to embark on a massive program of military modernization. The United States, the UK, Lithuania and Poland are the biggest partners who are really helpful. There are also [partners such as] Serbia and Bulgaria. There is regular contact maintained with ambassadors of many countries, including Estonia and Latvia, who are also assisting us. We are looking to solicit high defense technology companies such as Lockheed Martin, Airbus, Textron and Boeing for cooperation in arms production. This is of great interest to us, given that the Ukrainian military has the requirement for current-generation armaments, and it would be of great benefit if the armaments are manufactured at Ukrainian factories. [Our partners] are likewise interested in such cooperation, given that we have a great deal of arms producing companies that are effective and highly experienced. In this regard, Ukraine's defense industry has a competitive advantage such as the availability of an extensive array of repair and overhaul capabilities, which have grown greatly due to export sales over recent years, and serve as a platform on which to set up new production lines.

As for our partners, there is a broad framework for demonstrating their capabilities. This includes, inter alia, military aid programs, provided free of charge, such as the U.S. Foreign Military Sales/ Foreign Military Financing (FMS/ FMF) programs; the provision of arms and military equipment on rent or lease; and money lending for AME purchases. Offset programs as a form of industrial compensations are also possible. Aid is twice as valuable if it is offered exactly when it's needed. This will be taken into account as an important factor when it comes to discussing long-term collaborative programs.

By the way, it should be noted that Ukraine and Poland are jointly developing the first indigenous armored personnel carrier that will be NATO-standard-compliant. As I see it, one of our strategic priorities is to modernize all the military equipment to NATO compliance, so that everything is ready by the time of the country's NATO accession. An example is Sweden who, although not being a member of the Alliance, has brought its military to NATO standards. This is a matter of national defense capability, but also a matter of business as we are exploring new markets in Europe, not just in Asia or Africa, as was the case until recently.

– This year will see one of the world's biggest exhibitions — IDEX-2015 in Abu Dhabi. What kind of products will Ukroboronprom's companies demonstrate at the expo?

– At IDEX-2015, Ukroboronprom is going to demonstrate a broad range of indigenous products. This year will see the unveiling of an actual piece of the Dozor-B, an updated all-wheel-drive 4x4 armored fighting vehicle. Produced by Armored Vehicle Factory in Lviv, the Dozor-B will feature new, state-of the-art weapons station, situational awareness capabilities and satellite navigation aids. Potential customers will also be introduced to actual pieces of equipment such as the BTR-3E1 APC that is already in successful operation in Thailand; the antitank guided missile system designated «Skif»; the remote weapons station «Sarmat»; as well as products by the DKKB Luch — the 100mm antitank gun-launched guided missile «Stugna» and the 125mm ATG missile «Kombat». Also on display will be the ZTM-2 artillery gun system produced by the Fine Mechanics Factory in Kamyanets-Podilsky, which can be adapted to deploy on a wide variety of combat platforms.

On view at Ukroboronprom's Stand will be models of Kharkiv Morozov Design Bureau's BTR-4 APC vehicle and «Oplot» MBT; Shipbuilding R&D Center's armored gunboat «Giurza»; a unique floating composite drydock of Pallada in Kharson; the passive electronic monitoring radar system «Kolchuga» and a shore-based situational awareness radar based on the radar technology «Delta». UDR

[arsenal]

BTR-3E IN FORWARD LINE

Ukraine's defense industry is offering potential customers, both on the domestic and export markets, an armored personnel carrier APC designated BTR-3E. Developed and built up by the Morozov Machine Design Bureau in Kharkiv, next generation of this infantry carrier successfully used in Royal Thai Army and has every chance to open new markets. UDR decided to describe in details the most successful Ukrainian defense industry product over the last few years.

Now the procurement programs of the world's biggest military importers suggest that lightweight armored hardware scores a solid third place by the amount total of procurements, behind fighting aircraft and precision-guided weapons. Customers mostly demand wheeled air-deployable vehicles, armed with light turret-mounted weapons complemented by the newest powerful precision weapons suites, and well protected.

The Ukrainian defense industry is offering its potential customers the APC designated BTR-3E. In its maneuverability and combat performance, this new 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, which would not only allow it for motorized infantry troops to march alongside armored units but in some cases even lead the way. In many countries such an approach has led to caterpillar APCs ousting their wheel-typed siblings altogether. But the lessons learned from the Iraq war revealed the advantages of precisely the wheel-typed vehicle which, delivering a substantial amount of fire-power, is virtually equivalent to the infantry fighting vehicle (IFV) in its basic performance characteristics.

In that context, the projected APC, developed in 2002 by the Morozov design bureau in Kharkiv in compliance with the Ukrainian Ministry of Defense' (MoD) requirements specification, is deserving of consideration.

BTR-3E wheel-typed armored troop carriers are being assembled by MoD's repair factories, with 90 per cent of all the assembly units coming from domestic companies.

What make the vehicle particularly attractive to prospective buyers, are its price tag; low-cost serviceability and through life support; low weight; a great amount of firepower as compared to same-class equivalents; the capability to negotiate water obstacles of whatever width or depth; the ability to operate in environments heated up to +55°C, and air conditioning of crew and passenger compartments. The BTR-3E's design has enough room for extra combat modules and also for an automatic transmission (Allison or Ukrainian made). The baseline design is easy to convert into configurations for auxiliary applications such as medical evacuation, policing, command and control or repair and recovery.

The BTR-3E is a highly-maneuverable wheel-typed amphibious combat armored vehicle. It can carry a 3-man crew, consisting of the commander (section leader), gunner and driver, plus six troops. Compared to Russia's BTR-80, the Ukrainian APC BTR-3E has a different body that has 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 previous variant from the same family, BTR-3U, was equipped with a 320hp Deutz en-

gine integrated with Allison MD 3066 automatic transmission. The BTR-3E is powered by Ukrainian-designed 300hp diesel engine UTD20 of Pivdendieselmach from Tokmak, Western Ukraine, which effectively operates in environments heated up to shade temperatures of +50C. The UTD20 can consume both diesel fuel or aviation kerosene, and offers a fuel endurance of 750 km on highway. With a mechanical gearbox, the vehicle is cheaper than equivalents with an automatic transmission.The BTR-3E also 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 discriminates cooler types (water or antifreeze), warning about critical temperatures of the cooler and shutting the engine once the oil pressure falls down to below critical levels.

Also the BTR-3E can be equipped with a computer controlled hydromechanical transmission from Allison, 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 high-temperature environments, 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 Ukrainian Army will have a new mortar carrier, the BTR-3M2, added to its fleet of armored vehicles. Two BTR-3M2 vehicles delivered to the Ukrainian Army for State Trials.

For comfort of the crew and passengers, passenger compartment's ceiling height has been increased by 150 mm, and air conditioning is optional. Air conditioner, as suggested by feedback from the Ukrainian military contingent in Iraq, is a prime necessity in high-temperature environments. The armored vehicle is equipped with protective facilities to shield the crew and passengers from penetrating radiation from nuclear munitions, as well as from toxic agents, germ weapons or radioactive dust.

The vehicle's exclusive forte is a general purpose combat module called Shkval. The overall amount of firepower provided by a Shkval fitted BTR-3E is on a par with that of an IFV. The combat compartment is positioned in the vehicle's medium section, taking space between the crew commander's and driver's seats and engine compartment.

The BTR-3E is armored with more powerful 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 anti tank missile suite and a smoke grenade dispenser. The turret accommodates five surveillance devices TNPO-170A, backing up the PZU-7M sight and an optical television sight.

The vehicle's weapons, supported by an automatic fire control system and sighting devices, ensure speedy detection, identification and engagement of ground and low-flying targets with high rate and accuracy of fire. The overall price of the armored troop carrier varies with the cost of optional extras.

The price of the Ukrainian APC much depends on the terms and volume of every specific contract, and also on the customer's buying power. The vehicle sells at prices that are on the whole higher than the BTR-80's (due to more powerful, hence more expensive weapons), but far lower than foreign made rivals' such as the AMV XC 360P Rosomak, Pandur II 8x8, Stryker or Piranha IIIC, which are all completed with the expensive IR imaging systems, cameras and surveillance displays non-existent in the BTR-3E. The hardware may come to buyers with an associated production license.

DEVELOP AND WIN: BTR-3E-1

To develop the APC BTR-3E in Ukraine has been made next generation vehicle, to be known as BTR-3E-1. Ukraine developed combat module Shkval integrated with a 30 mm gun, and anti tank missile suite Baryer with two ready to launch missile containers. State owned design organization Luch and state joint stock holding company Artem will ensure that BTR-3E-1 possess an enhanced amount of firepower by equipping this with new precision guided weapons.

The vehicle's combat module will undergo fundamental modifications as well. In particular, the current fire control system Tandem will be replaced with new indigenously designed TREK system, for which an electronic optical module is cur-

rently under development by an instrument making factory in Kharkiv region's Izyum. The module's designer and integrator is Kyiv's Kvant Radiolokatsiya research and development institute, known for its so far unique naval radar designs.

In the BTR-3E-1, 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 armoured ambulance.

The Royal Thai Army acquired more than 230 BTR-3E1 APCs till date, under agreement with Ukrspecexport. The first 2 of 96 BTR-3E1 have been delivered at U Tapao Airport on 17 September 2010. The second batch of 121 BTR-3E1s with a price tag of 5 billion baht have been ordered by Royal Thai Army and 14 BTR-3E1s have been ordered by Royal Thai Navy to be used by Royal Thai Marine Corps in August 2010 with the MTU Engine and Edison Gear.

Thailand placed an order for additional 15 BTR-3E1 and six BTR-3RK vehicles from Ukraine in August 2013.

EXTRA CAPABILITIES AND OPPORTUNITIES

Soldiers in the battlefield can choose variety of APC BTR-3E capabilities because Ukrainian BTR has a several variants of modernization packages, depending on customer's financial capabilities and requirement. Global weapons market players have tended to award contracts to several independent suppliers for one and the same modernization program. Combat modules, for example, can come from one supplier state, and security systems or communications facilities – from another country. Ukrainian suppliers offer an integrated modernization package, each of its components being totally autonomous and easy to integrate into an overall weapons system. The package includes the most advanced armaments and technologies, such as the Stugna laser guided tank gun and armored fighting vehicle gun rounds, explosive reactive armor (ERA) and explosive active armor (EAA) systems Nozh and Zaslon, electronic optical countermeasure system Varta, tank protective system Fantom 3, upgraded communication equipment, camouflage system Kontrast M and even tank simulators mounted on electric motion platforms for driving and firing training. Apart from Stugna, Ukrainian manufacturers offer potential buyers new anti-tank guided projectile Baryer for guns mounted on tanks, IFVs and APCs.

The armored vehicle modernization package offered by Ukraine also includes communications facilities with cryptographic modules to ensure that classified information remain secret. The Ukrainian technology has an advantage of being an average half of the cost of western designed alternatives. Considering that reprogrammable communication devices are on some occurrences easy to counter using modern electronic warfare technologies and radio communication jamming systems, the cost advantage may become a weighty argument in the fight for future customers.

Ukrainian weapons designers have accumulated considerable expertise in the area of simulating facilities for armored fighting vehicles. In particular, Ukraine supplies to the export market simulators supporting driving and firing training requirements for BMP-1 and BMP-2 IFVs, and also APCs. It is only natural that weapons modernization projects are not the 'thing in itself' but developed to suit specific customer requirements. For example, Kharkiv's Morozov design organization several years ago developed a modified version of the BTR-80 IFV, upgrading this to the BTR-3E capability, which was being supplied to a customer in Southeast Asia under a major framework contract. In addition, a new type lightweight armored vehicle BTR-3DA has been developed, marking for Ukraine the initial milestone accomplishment in this area. UDR

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[light armor]

UNDER THE GUARD OF DOZOR

Engineers at Kharkiv Morozov Machine Design Bureau, which is part of the Ukroboronprom (Ukrainian Defense Industries) state-owned holding group, have developed the DOZOR family of high-mobility tactical vehicles that are intended both for civil and military applications. The civilian variant is designated DOZOR-A and military DOZOR-B.

Members of the DOZOR family are two-axis all-wheel drive vehicles based on a common 4x4 chassis. The vehicles are offered with a choice of armored and unarmored cabs incorporating many of the components and subassemblies borrowed from the BTR-80 armored personnel carrier (APC). The Dozor vehicle is motorized with a four-cylinder turbocharged IVECO diesel engine coupled to a mechanical transmission. Options include more powerful IVECO engines developing 136 hp or 197 hp, the latter being mated to an automatic transmission. All the IVECO engines for the DOZOR-series vehicles are license-manufactured at an automobile plant in Kremenchuk.

Suspension is of independent type with A-type control arms, with torsion springs integrated with hydraulic buffers on each of the four wheels. Wheel center members are of the same type as the ones found on the BTR-80 APC. Fuel supply system comprises two fuel tanks, with filler holes on either side of the hull. Headlights, rear taillight clusters and turn indicators are of a conventional design and, if required, can be outfitted with standard blackout devices. Optional extras include a GPS receiver, air conditioning system, night vision devices, means of communication and other equipment types.

The vehicle is available in armored and unarmored configurations, each coming with its own advantages. The armored variant, designated the DOZOR-B-1311, is intended for transportation of personnel and military provisions. It has reliable protection against small arms fire and effects of the weapons of mass destruction. Special operations forces and rapid reaction police squads can use it as a transport vehicle or a platform for a variety of weapons systems and military equipment, on the battlefield or in peacekeeping operations. The vehicle can operate over different terrain types, on highway or off-the-road.

The Dozor-B can form a basis for a family of specialist vehicles, including armored personnel carrier, armored car, NBC reconnaissance vehicle, command vehicle, medical evacuation vehicle, scout vehicle and utility automobile.

The vehicle is armed with a turret-mounted 12.7-mm KT-12.7 machinegun which is aimed and fired remotely from within the armored hull. There are some firing ports provided for the troops. The vehicle comes complete with a VHF R-173 radio with a range of 20 kilometers.

Here are key specifications of the DOZOR vehicle:

weight in running order	**6.30 tons**
engine power	**122 hp**
max road speed	**90 km/h**
fuel endurance (on main fuel tanks)	**1,000 km**
road clearance	**400 mm**
ascending angle	**30º**

The vehicle can carry a full squad of seven soldiers in addition to its crew of three (commander, gunner and driver).

The DOZOR vehicle was finalized in 2006. Since then it was demonstrated at many defense technology exhibitions in Ukraine and worldwide, but failed to generate much interest on the part of Ukraine's Ministry of Defense, and there were

none of export contracts secured by the end of 2010 either. But now there are expectations that this situation will change.

It was reported that the Ukraine government would acquire 200 DOZOR vehicles in the nearest-term future to equip the Ukrainian Army and National Guard units. This was announced by the Ukrainian parliament speaker, Oleksandr Turchynov, during a DOZOR demonstration at Chuhuiv test and training facility in early June 2014.

The government is interested in providing the Army and National Guard with armored vehicles in this category, and induction of DOZOR-B vehicles would contribute to operational effectiveness of the Ukrainian Armed Forces while providing sustained business for the domestic defense industries, Mr. Turchynov said.

It was revealed in late July 2014 that production lines for first production-standard DOZOR-B vehicles will be launched at Lviv Armor Plant. Manufacturing development work for the new vehicle is now well underway. Apart from the Ukrainian customers, expressions of interest in purchasing DOZOR-B vehicles were coming from Kazakhstan and a number of African countries.

Poland is another country that is showing practical interest in the new Ukrainian APC vehicle. In 2011, Poland's Mista acquired production license for the DOZOR-B vehicle from a license rights owner in an unnamed EU country. It took two years for the Polish company to set up production line and obtain the requisite manufacturing facilities. The Polish version of Dozor-B, named Ocilla, is an upgrade to meet western manufacturing and quality standards as well as NATO ballistic protection requirements. Further upgrades are planned to include new driving axle, wheels and a remotely controlled weapon station in place of the one-man turret among other improvements. A prototype upgrade vehicle will be subjected to comprehensive testing at Military Institute of Armored and Automotive Technology in Sulejowek.

Ukrainian armored vehicle manufacturers are making great strides to keep pace with global trends. Particularly in July 2014, new armored vehicle personnel carriers SPARTAN and COUGAR, developed jointly by Streit Group (Canada-UAE) and AvtoKrAZ of Ukraine, were unveiled to the public. But this is another story which will be discussed in a later edition of Ukrainian Defense Review. UDR

[firepower]

WEAPON STATION FOR ARMORED VEHICLE

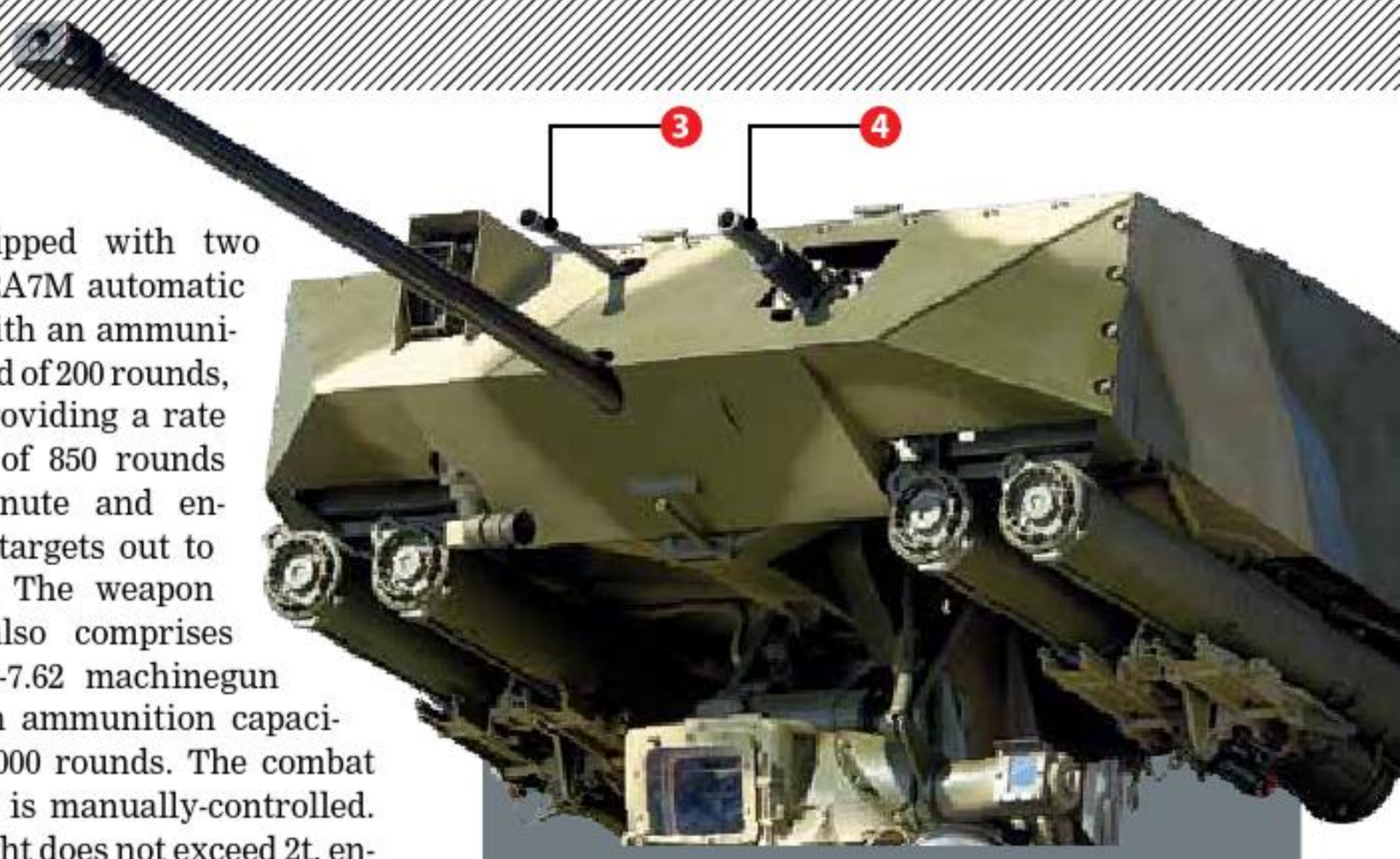
Over the past twenty years, Ukrainian designers have developed an entire family of combat modules for armored fighting vehicles. The main driving force behind this vigorous activity by domestic military design companies in this domain was an idea that the available fleet of combat armored vehicles (first of all, Soviet-vintage infantry fighting vehicles (IFV) and armored personnel carries (APC)) is possible to upgrade to modern standards by replacing their conventional turrets with a combat module that would integrate in itself several firing weapons types at a time. Another reason was striving to follow advanced international trends in the development of armored vehicles based on the modularity concept.

As seen from the Ukrainian combat modules' technical parameters and combat capabilities as claimed by the designers, as well as promotional materials, these are all effective firing weapons suites that add significantly to the combat vehicle's firepower, provide a better protection for the gunner and make overall control of firing weapons much easier. The one who would like to look at these Ukrainian designs at close view would see that they all are very much similar.

Lets' begin with combat modules designed by State Enterprise "Kharkiv Morozov Machne-Building Design Bureau" (SE "KMDB"). Judging by the amount of export supplies, the best of these is a weapons suite designated BAU-23x2. In February 2005, Morozov was awarded a $3.7mn contract for the supply of 190 BAU-23x2 modules to Jordan. To date, 106 such suites have been shipped to the customer, and, in early November of this year, reports had it that the Jordanian armed forces ordered an additional shipment of 195 BAU-23x2 modules. BAU-23x2 is the most unsophisticated and easiest to operate Ukrainian-designed weapons systems in this category, and this might have played a no small part in the customer's choice.

BAU-23x2 is designed for attacks at both ground and aerial targets. It is equipped with two 23mm 2A7M automatic guns with an ammunition load of 200 rounds, each providing a rate of fire of 850 rounds per minute and engaging targets out to 2,000m. The weapon suite also comprises the KT-7.62 machinegun with an ammunition capacity of 2,000 rounds. The combat module is manually-controlled. Its weight does not exceed 2t, enabling it to be integrated onto lightweight vehicles weighing 6t or heavier. The main advantages of the Morozov's combat module are low weight, reasonable price, reliable protection of the gunner and an impressive amount of firepower.

Another Morozov's design, the multifunctional combat module Grom, is not as much successful as BAU-23x2 from the viewpoint of export contracts secured, but it is understood to be a more advanced, sophisticated and powerful weapon in terms of the combination of killing agents. Grom is designed for installation on lightweight armored vehicles (such as BTR-60/70/80 and BTR-3E APCs, MT-LB multipurpose tracked vehicles, M-113 APCs and BMP-2 IFVs) to increase their firepower. The weapons module is mounted exteriorly,



Multipurpose weapon station "GRIM"

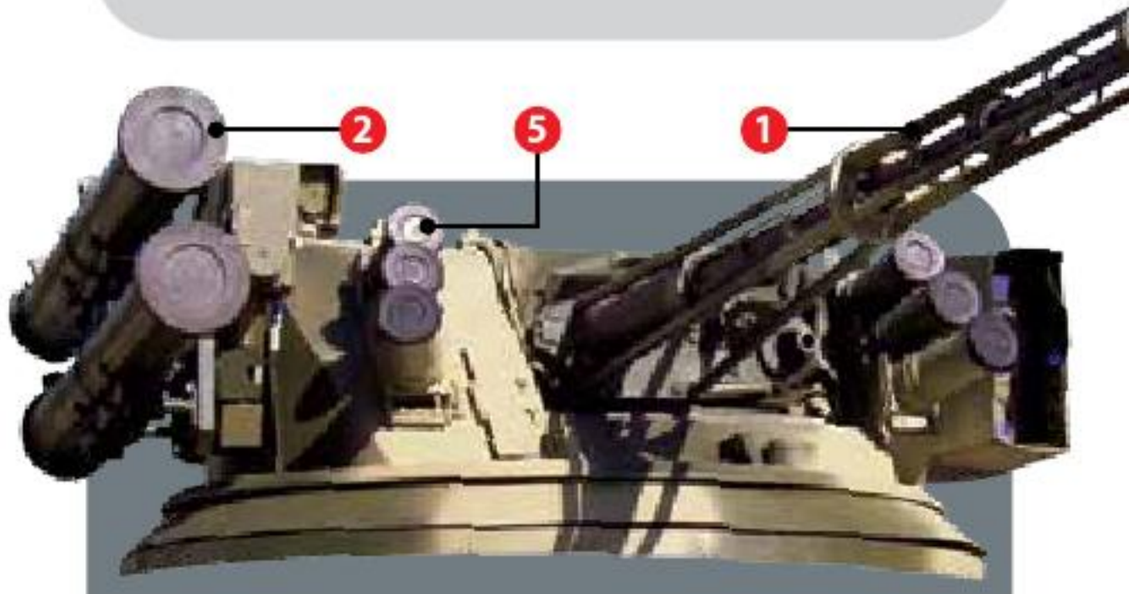
The GRIM weapon station is unmanned, weapon aiming being performed using a visual display at the operator's (crew commander's) station within the hull of the vehicle. It accommodates a cannon coaxial with machine-gun, an automatic grenade launcher and an antitank guided missile system.

Design Organization – Kharkiv's Morozov Engineering Design Bureau

Weapon station includes the BTR-60/70/80, BTR-3E1 and BTR-4 APCs, MT-LB and other

кг 1890

It weighs plus an ammunition load



Multipurpose weapon station "ShTURM"

The unmanned weapon station ShTURM (which means 'assault') is intended for integration into the upgraded BMP-1U armored IFV and BTR-3U APC vehicles. It is comprised of a cannon coaxial with a machine-gun, an automatic grenade launcher and an antitank guided missile (ATGM) system. The weapon station features a highly flexible layout design allowing the composition of the weapon kit to be easily changed to meet specific customer needs.

Design Organizations – Kharkiv's Morozov Engineering Design Bureau and "Temp" Special Design Bureau

The weapon station was selected for the Ukrainian-built BTR-3 and BTR-4 armored fighting vehicles.

кг 1300

It weighs plus an ammunition load

A unified multi-target weapon station, the PARUS is mounted exteriorly, the remote control of the weapons being accessible for both the gunner and commander from their respective workstations. It accommodates a cannon with coaxial machine-gun, an automatic grenade launcher and an antitank guided missile system. Optional equipment includes a Linkey-type smoke grenade dispenser system.

Design Organization – Kharkiv's Morozov Engineering Design Bureau

Designed for the BTR-4 APC, BTR-60/70/80 and BTR-3E1 APC vehicles.

1720 It weighs plus an ammunition load

Multi-target unified weapon station PARUS

Weapon station BAU-23x2

The weapon station BAU-23x2 is intended for use in ground-to-ground and ground-to-air roles. It is equipped with two 23-mm 2A7M automatic guns, each provided with 200 ready-to-fire rounds of ammunition and delivering 850 rounds per minute against targets out to 2,000 meters; and a 7.62-mm KT-7.62 machine gun provided with 2,000 ready-to-use rounds of ammunition. The weapons station is controlled manually.

Design Organization – Kharkiv's Morozov Engineering Design Bureau

Installation on light armored fighting vehicles in the weight category of 6+ tons.

985 Weighing a meager

The weapon station is controlled manually by an operator accommodated in a turret within the hull of the vehicle. The weapon kit includes a cannon coaxial with a machine gun, an automatic grenade launcher and an ATGM system.

Design Organization – Kyiv's Science and Engineering Center for Artillery and Small-Arms Weapons.

Its range of applications includes armored personnel carriers BTR-70/80, armored infantry fighting vehicles, as well as small patrol boats.

1300 The weapon station weighs plus an ammunition load

Unified weapon station ShKVAL

1 Main armament: Automatic 30-mm dual-fed cannon: ZTM-2 (2A42 and 2A72 cannons are optional) offering effective and maximum ranges of 2,000 meters and 4,000 meters respectively. Ready-to-use ammunition allowance: 350 rounds for the ShKVAL and 400 rounds for the PARUS. Rate of fire: 330 rounds per minute.

2 Antitank guided weapons: the BARYER ATGM system firing unified R-2 antitank guided missiles capable of defeating armored targets out to 5,000 meters. Allowance of ready-to-launch ATG missiles: the GRIM – four missiles, other weapon station types – two missiles, with two more missiles being stowed within the hull of the vehicle.

3 Machine-gun: a 7.62-mm machinegun coaxial with an automatic cannon. Ready-to-fire ammunition allowance is set at 500 rounds for the ShTURM weapon station and 2,000 rounds for the PARUS weapon station. Rate of fire: 200-250 rounds per minute.

4 Automatic grenade launcher: the 30-mm AGS-17 automatic grenade launcher providing a maximum effective aiming range of 1,700 meters against armored targets and sheltered personnel. If used with the ShKVAL weapon station, the AGS-17 is provided with 29 ready-to-use grenades and 87 stowed grenades in three magazines each containing 29 grenades. The weapon station can alternatively be fitted with an UG-1 automatic grenade launcher capable of ranges of up to 2,200 meters.

5 Smoke/aerosol grenade dispenser system: Six 81-mm forward launched grenades are arranged in three on the right and left sides of the turret.

6 Fire control kit: The most recent designs of Ukrainian weapon stations are fitted with sophisticated aiming-and-observation and fire control equipment kit with television and thermal imaging cameras for guiding antitank missiles and a laser rangefinder integrated into a single package.

which provides a better protection for the crew and improves habitability of the fighting compartment due to the absence of gaseous emissions during firing. The suite consists of a KT-7.62 machinegun, ZTM-1 30mm gun, Konkurs anti-armor missile launcher and AGS-17 grenade launcher, as well as a Linkey smoke screening system and weapons stabilizing system CVU-1000. The module weighs 1,280 kg plus ammunition load.

The integrated combat module Shkval was designed by State Enterprise "Design Bureau "Artillery Armament (SE BBAA). It includes a 30mm gun, a 7.62mm twin-barreled gun, a 30mm automatic grenade launcher and anti-armor missile launching system Baryer. Shkval's design provides advantages such as a possibility to replace component weapons with more advanced ones as they become available. Reports are there that Shkval is slated for considerable improvements, among them gradual enhancements on the fire control system for the suite. In particular, the combat module is to be government tested using the OTM-20 fire control system, then the system known as Tandem and, finally, the fire control system Trek. After completion of government testing, Shkval is to be installed on upgraded IFVs BMP-1U and APCs BTR-

3U which have already been accepted as standard issues for the Ukrainian armed forces.

Shkval is being exported to foreign countries. In particular, this combat module is expected to equip 1,000 BTR-3E APCs to be exported to Myanmar, and was integrated onto Guirza-class armored craft supplied by Ukraine to Uzbekistan.

On the Ukrainian market for combat modules for armored vehicles there are also designs by state-owned enterprise State Enterprise "Mykolayiv Armoured Plant" (SE "MAP"). True enough, these designs are, in effect, equivalents of similar developments by Morozov and ADB. The combat module Ingul, fore example, has technical parameters and combat capabilities that are very similar to Shkval of ADB and Grom of Morozov, even though Shkval and Grom both include the AGS-17 grenade launcher which Ingul does not have. Instead, AGS-17 is there in another MRMP's design - a combat module known as Buh. What distinguishes Buh from other Ukrainian developments in this category is that it uses machineguns as its main weapon: the 14.5mm KPVT and KT-7.62 machineguns, in addition to an anti-armor missile launcher Konkurs.

Other designers, having evaluated the promise of technologies based on the 'modularity concept', fastened on it at once, opting for the same Shkval as basic model. So it turned out that Ukrainian combat modules are all similar, with slight distinctions which only accentuate their similarity. A 30mm gun, a 7.62mm twin-barreled machinegun, a 30mm automatic grenade launcher and an anti-armor missile launcher - this is what makes each of the Ukrainian modules. Variances are there, indeed, but they only belong to the sphere of either the application of each specific weapon type (for example another gun in place of an anti-armor missile launcher) or specific operating features of fire control technologies used (even though these are all similar in principle). The combination of weapons making a combat module may vary as well, as may be seen in modules of MRMP.

The ambition of a number of Ukrainian designers to develop a combat module of their own most likely originates from the times when Government defense orders practically reduced to zero, effectively making the design companies to look at export markets for survival. But the foreign-trade business, especially in the defense area, is associated with risk and uncertainty. What's more, occurrences were reported of various Ukrainian manufacturers coming to one and the same export market through the intermediary of different licensed defense exporters, at times competing with one another. Of all the Ukrainian combat modules that appeared on the export market, only two - the Shkval of ADB and BAU-23x2 of Morozov - managed to find their buyers there. So the leading positions were won by the pioneers of modular technologies in

Ukraine, and the two are very unlikely to 'yield the palm' to anybody else - if, of course, human or political factors do not intervene, against which there is no security for anybody.

One of the popular Ukrainian combat module is designed by SE "KMDB". It is BM-7 PARUS. Today it is used by BTR-4, as the main weapon station. A remotely controlled combat module installed on light armoured fighting vehicles (APCs, ICVs, etc.) is intended to engage, when stationary or on the move (at speeds of up to 10 km/h), manpower, stationary and mobile armoured vehicles fire emplacements, as well as to engage low-altitude low-speed air targets. The increased level of protection of the crew is ensured due to the use of remote control and ammunition load mounted externally.

PARUS module consists of a 30 mm gun ZTM-1 or 2A72 with 360 rounds, 30mm grenade launcher KBA-117 with 150 rounds, a 7.62 mm KT-7.62 or PKT machine gun with 2,000 rounds and two Baryer anti-tank missiles.

In «Eurosatory-2014» State Enterprise "State Kyiv Design Bureau "Luch" presented own weapon system SARMAT/ It is designed to equip a wide range of combat vehicles, light ships and coast guard motorboats.

It is used to hit static and moving modern armoured targets that have combined, spaced or monolithic armour, including explosive reactive armour, as well as pinpoint targets like permanent fire positions, tank in a trench, lightly armoured objects, hovered helicopters, waterborne targets and manpower of enemy at any time of day or night.

The SARMAT system comprises:

- Combat Module consisting of: rotating platform with launching rails for missiles, power unit, guidance device, Hawk SLX Thermal Imaging Camera of the SELEX ES production,
- Guided missiles in transport and launching containers: four RK-3 or two RK-2S;
- Machine gun of the manroy engineering production;
- Remote control panel.

One of the newest combat Ukrainian module 'Blik-2' was presented in ADEX 2014, the 1st Azerbaijan International Defence Industry Exhibition which takes place in Baku from the 11 to 13 September 2014. Designed by State Enterprise "Kyiv Armored Plant" new module for armored vehicles was showed on the exhibition stand of 'Ukroboronprom'.

'Blik-2' Machine-Gun and Grenade Launcher is designed to destroy manpower, transportation means, and ground-based targets by firing performed from 7.62mm and 12.7mm caliber machine-guns as well as by 30mm caliber grenade launcher. Combat module is capable to fire with machine-guns against aerial targets on the altitude up to 1000 meters, it is remotely controlled within the distance of up to 50 meters throughout the console. The device can be mounted on wheeled or tracked chassis, as well as on the stationary objects. The module is planned to be installed on 'Dozor-B' Light Armored Vehicle.

Besides, the following equipment samples were presented on Ukrainian stand: Oplot MBT Tank, BTR-4, mobile 81mm caliber mortar carrier BTR-3M2 and the other. The number of the newest Ukrainian developments are planned to be presented in the framework of the exhibition.

The Ukrainian module is second to none if you consider performance versus cost, as rival Western designs all have one but very serious disadvantage - the price. Ukrainian designers have developed a series of combat modules for armored fighting vehicles, which all have a substantial export potential and could be introduced into service with the Ukrainian armed forces as well.

This promises for Ukrainian combat modules bright prospects on the export market. But Ukraine should not forget about the need to develop a new in principle technology. And this work should be started immediately... UDR

The BTR-4 armored troop carrier can mount multi-target weapons stations of various types, including the BAU-23 (1), PARUS (2), SHTURM (3), GROM (4) and similar types of above-hull combat modules

PROTECTION TECHNOLOGIES FROM MICROTECH

The Microtech Base Center for Critical Technologies, a State-owned company based in Kiev, is renowned both in and outside Ukraine for its innovative product designs. The Company has achieved significant accomplishments in the area of active protection and explosive reactive armor (ERA) protection technologies for heavy armored military vehicles and, recently, lighter weight armored vehicles. The R&D and technological solutions implemented in Microtech's production-standard and experimental equipment demonstrate a high potential for effective protection of military armored vehicles. The active protection and ERA technologies are particularly relevant at the current time as Ukraine is countering Russian aggression. Microtech offers technologies that could effectively protect Ukraine's Mounted Infantry units equipped with both heavy and lighter weight armored vehicles.

Microtech supplies the reactive armor system "Nizh" (Ukrainian for "knife") and more advanced ERA system, the "Duplet", which is tailored to defeat tandem warhead antitank grenade attacks. Being new generation designs, both have entered service in the Ukrainian Armed Forces and are offered to domestic and export customers. The Nizh and Duplet

Designed to counter tandem-charge threats, the ERA system "Nizh" was officially accepted for service use in the Ukrainian Army on 3rd July 2003 and entered full-rate production in 2007. The Nizh modules are mounted on the tank's turret, upper forebody and sides – integral or add-on, or both at once. Each ERA block contains counter-HEAT devices KhSChKV-34P, KhSChKV-19 and KhSChKV-19A, as well as ballistic components, a damping unit and a container. The ERA system "Nizh" equips the T-84, BM "Bulat", T-64BV1M, T-64BV-1, T-72AG and T-72B1 MBTs. Full set of the Nizh equipment for one MBT weighs about 3,000 kg.

The system is modular in architecture, enabling counter-HEAT protection of the armored platform to be enhanced without an increase in the thickness or mass of the core armor. It also enables to improve armor protection of the host MBT during its life cycle by adding more advanced technologies as they become available. The damaged ERA blocks are easily replaceable in the field conditions.

The counter-HEAT devices KhSChKV are available in configurations for integral and add-on installation. A – KhSChKV-34P panels designed for add-on installation in place of the ERA panels "Kontakt-1". B – KhSChKV panels integral with side screens on the "BM Bulat" MBT.

The "BM Bulat" MBT is seen here equipped with the integral ERA modules "Nizh" mounted on the upper forebody (1) and side screens (2); the turret accommodates containers for counter-HEAT devices for protection of the tank's forebody (3) and the roof (4).

are both built based on the KhSChKV-type ERA panels. Each panel contains extended "knife" charges that explode outward on impact and work on the principle of directive concentrated consecutive effect on the inbound projectile. Both the Nizh and Duplet are significantly superior to all known foreign counterparts in terms of battlefield effectiveness. They are designed to protect the host tank from threats such as subcaliber armor piercing penetrator projectiles, explosively formed striking-nucleus-type impact rounds and tandem-charge HEAT weapons.

The Ukrainian "Bulat" MBT was accepted for service use equipped with the KhSChKV-34 and KhSChKV-19 (Nizh) ERA panels that are already in full-rate serial production and delivered to forces in the field. A quantity of upgraded T-72B1-1050 MBTs outfitted with integral/add-on ERA equipment "Nizh" have been delivered to an export customer. The "Duplet" ERA system has been officially accepted for service use and now equips the "Oplot" MBT.

Specifically for the protection of lighter weight armored vehicles, Microtech has developed ERA products called "Nizh-L" and "Raketka". The Nizh-L is comprised of the KhSChKV-34A and KhSChKV-19A (where 'A' stands for 'aluminum', meaning the "knife" charges in the KhSChKV panels are housed in pipes made of aluminum instead of copper for weight saving) ERA panels, which have been officially approved for service use. The Nizh-L provides protection against single-charge anti-tank grenades, single-charge ATG projectiles and striking-nucleus-type impact rounds -- with a probability of success of 80% and 100 percent probability that the core armor will not be penetrated.

The Nizh-L, with a mass of just 200-250 kg/1m2, protects from impacts of armor piercing 12.7 mm rounds fired from 250 m and 7.62 mm rounds fired from 50 m, with 100 percent probability of success, according to Microtech. During trials, the core armor protected with Nizh-L panels remained un-perforated by a PG-S-type single-charge grenade, and deflected inward by just 6mm as a result of an impact by an explosively formed projectile.

The ERA system called "Raketka" consists of the ERA panels KhSChKV-34A and KhSChKV-19A, and it offers improved capabilities over the Nizh-L counterpart. It is intended to protect the core armor from impacts of single-charge antitank grenades, tandem-charge grenades, single-charge and tandem-charge ATG projectiles and striking-nucleus-type impact rounds, with 0.8 probability of success. Weighing from 300 to 350 kg per 1m2, it provides improved protection against impacts of small-caliber gun fired armor piercing rounds such as the 7.62mm, 12.7mm and 14.5mm rounds of the B32 type.

The "Oplot" MBT is offered equipped with the ERA protection system "Duplet" to counter tandem-charge threats.

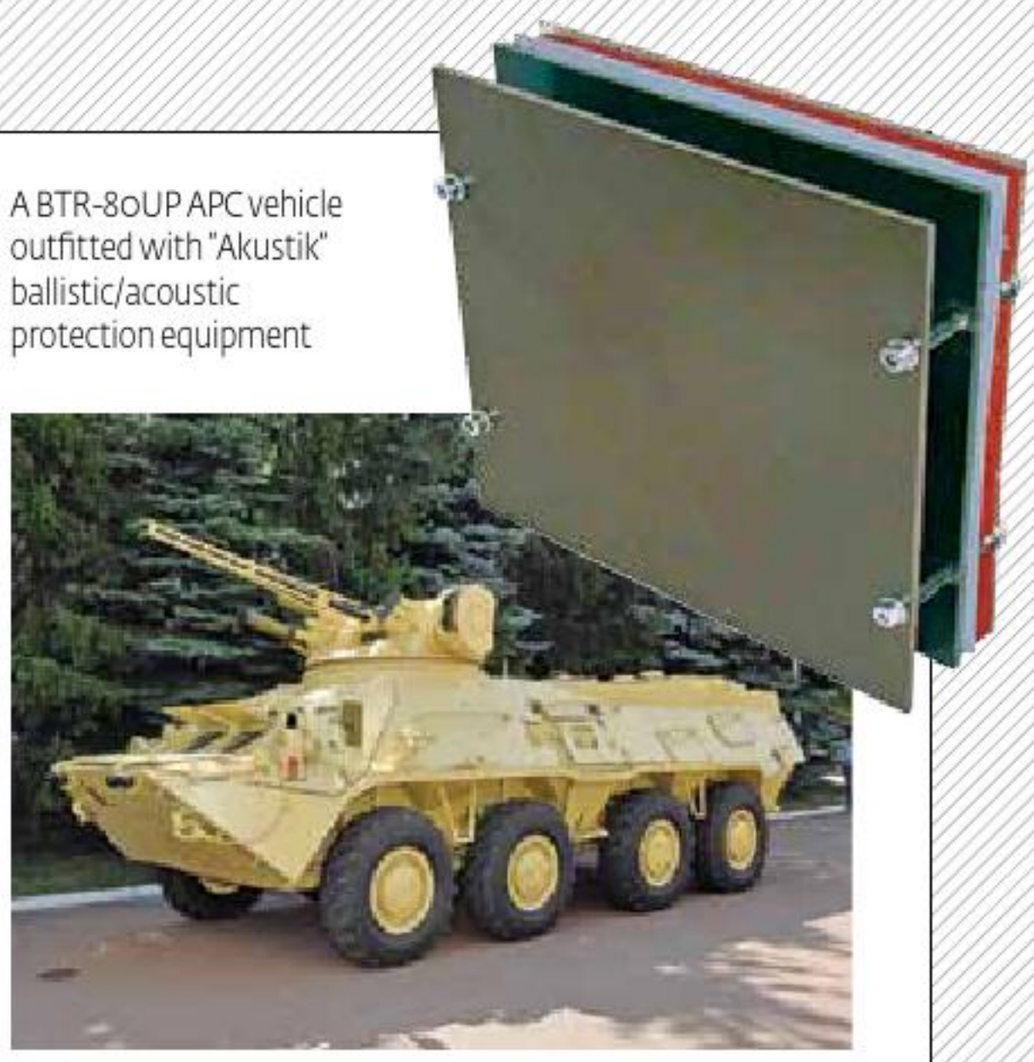
The Duplet was officially accepted for service use on 23rd July 2009. The Duplet is efficacious both against single-charge weapons and tandem shaped-charge rounds, as well as subcaliber armor piercing penetrator projectiles and explosively formed striking-nucleus-type impact rounds. Each ERA block is comprised of counter-HEAT devices KhSChKV-34P, KhSChKV-19, KhSChKV-19A, as well as ballistic components, a damping unit and a container. Each KhSChKV-34 device is made of 29 component parts, and KhSChKV-19 of 46 component parts.

The ERA protection is mounted on the tank's turret, upper forebody and sides. In case of the "Oplot" MBT, ERA panels are installed on the turret, upper forebody and sides in several layers (up to seven layers on the turret) that overlap each other, divided by damping strips of a composite material. The tank sides are protected with several layers of ERA protection with KhSChKV modules, allowing for a substantial increase in the thickness of protective screens.

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

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

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



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

When used in conjunction with active protection capabilities such as the Zaslin or Shershen, both the Nizh-L and the Raketka will also be efficacious against the tandem-charge antitank grenades RPG-30 "Kriuk" or RPG-32 "Khashim".

Microtech has also developed the passive ballistic/acoustic protection system designated "Akustik". Designed specifically to improve survivability of mounted infantry on wheeled AFVs, the Akustik is most effective in protecting against 7.62mm/12.7mm armor piercing munitions of the

B32 type, as well as secondary shrapnel, and it will also provide a 200 to 300 pct reduction of acoustic load on the crew and passengers. The Akustik weighs from 30 to 50 kg per 1m2 of the vehicle surface being protected. This type of protection has been implemented on the AFV types such as the BTR-80UP, BTR-80UP-R, BTR-80UP-KR, BTR-80UP-KB, BTR-80-UP-T and BTR-3E.

In addition to ERA protection, Microtech is working intensively in the field of active protection for AFVs. Specifically for MBTs and light AFVs, the Company has developed the active protection systems called "Zaslin" and "Shershen", respectively. Both employ non-launched-type countermunitions for intercepting incoming threats at short ranges. The two designs are based on the technical solutions as follows:

- The use of a multifunctional millimeter-wave 360-degree radar sensor for detecting inbound threats; if the threat poses a danger to the platform, the radar sensor will issue a command to launch a countermeasure to destroy or deflect the threat away from the vehicle being protected;
- The use of non-launched-type countermunitions that are sent to a precise point in space to intercept and destroy the approaching round; the radius of the kill zone will be determined based on velocity of the approaching threat;
- Automatic control of the radar sensor and the entire system; failure monitoring of the system and its elements.

Being modular in architecture, the system includes a control panel accommodated in the tank turret, and several armored-shell modules arranged symmetrically along the perimeter of the vehicle for 360-degree protection. The modules can also be mounted on the turret roof for protection against top attack type rounds. The control panel carries out failure monitoring, indicates readiness status and ensures automatic control of the protective modules. In contrast to foreign counterparts such as Russia's "Arena-E" or Israel's "Trophy", the Ukrainian Zaslin is a low-signature system that only marginally adds to overall dimensions of the host platform. The system provides enhanced countermeasure resistance, is impervious to intercept by enemy's communications intelligence and is highly resistant to electromagnetic interferences.

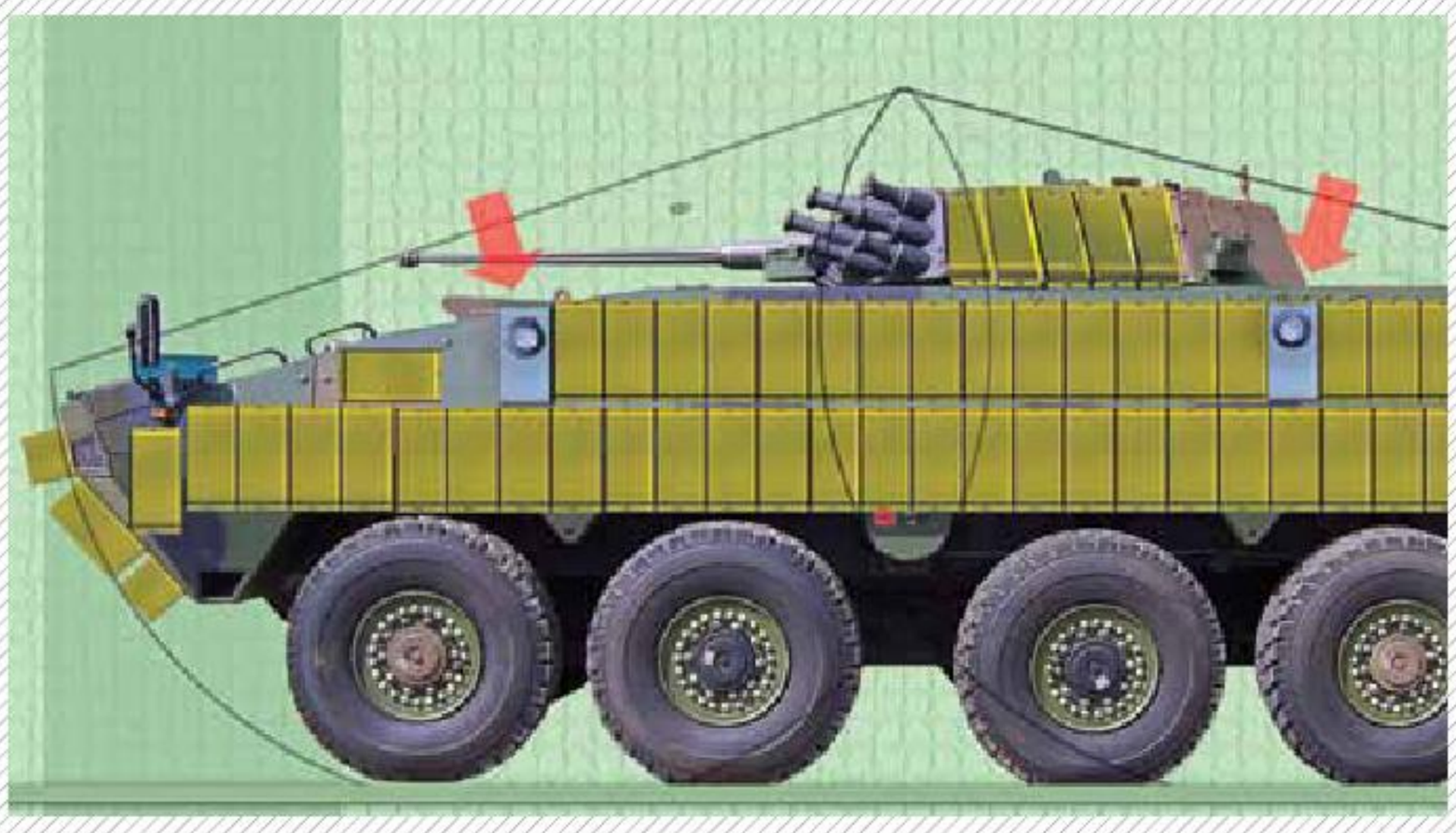
The Zaslin and Shershen both provide 360-degree protection of an armored vehicle against: single/tandem-charge antitank grenades, with 0.9 probability of success; ATG projectiles of all types, with 0.8 probability of success; 120/125mm shaped-charge armor-piercing munitions approaching at up to 1,200 m/s, with 0.6-0.7 probability of success. They are also efficacious against threats approaching from ranges of up to 20m or shorter, as well as multiple threats approaching from different directions.

Housed in armored shells, the modules Zaslin and Shershen have a massive amount of frontal protection securing against impacts of bullets and shell fragments, while the control panel occupies little volume within the host vehicle.

The Zaslin has been officially accepted for service use and is being offered to potential export customers.

The integration of the Zaslin system in the T-64BV MBT and the Shershen system in a few types of armored fighting vehicles is scheduled for 2014-15.

To maximize battlefield survivability of armored platforms, Microtech pursues a strategy that combines ERA protection and active protection, so that threats are detected and defeated without an impact on the core armor. In the current context of Ukraine, survivability of light AFVs is an issue of utmost priority. The major part of work on future ERA protection and active protection technologies for light AFVs has been completed. What is left is to adapt the technologies to specific AFV types and subject them to official qualification trials onboard vehicles. If and when there is interest on the part of Ukraine's MoD or potential export customers, the technologies will be launched into full-scale production so that to provide both the existing and future types of light AFVs with effective means of protection against most hazardous armor piercing threats.



[exactly on target]

THE WAY OF «KORSAR»

NEW MULTI-PURPOSE MAN-PORTABLE ATGW MISSILE LAUNCH SYSTEM

Serhiy Zghurets, UDR

In Ukraine, new anti-tank missile system and launcher, the Korsar, which was developed by State Design Bureau 'Luch' of Kiev, has successfully completed its test program. As claimed by the designers, this new multi-target defensive-offensive weapons system is superior in several performance parameters to the established world-market counterparts. The 'Korsar' man-portable anti-tank missile system was being developed with a clear perception that infantry units in Ukraine and other countries will demand more and more precision-guided multi-target systems that are light in weight but highly lethal.

The designers of the Korsar AT-GW missile system sought to produce a system that would meet all the requirements placed by potential users on weapons in this category, specifically, high probability of success, low cost, operational versatility, terminal effectiveness, practicality of carriage and low weight. The Korsar is designed to fire the R-3-type armor piercing missile, whose layout design, dimensions and guidance system have had their impact on overall image of the Korsar. The initial proof-of-concept examples of the Korsar that were demonstrated in 2006 looked bulky enough. So the configuration and equipment payload of the man-portable system underwent substantial improvements to make the system lighter weight and less bulky. The resulting configuration is a user-friendly, ergonomic weapon.

In its mass and size, the Korsar is coming closer to handheld anti-tank grenade launcher systems, being at the same time far superior in terms of effective range, first-round hit probability and lethality. With its 2.5-km rage (twice as longer as that of a handheld grenade launcher), the Korsar is designed to defeat hostile armored equipment, missile launchers, hostile guns operated from fortification works or urban buildings, enemy soldiers sheltered therein, and other types of small targets – under day and night conditions. Where appropriate, the Korsar can be used to engage hovering helicopters and remotely piloted aircraft.

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

Due to compact dimensions and low weight, the system can be configured into 'packs' for long-distance transport. The Korsar is transportable by all conventional transport facilities, and it is also airdroppable. When used autonomously, it is operated by 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 man-portable ATGW missile system Korsar is suitable for operation from both prepared and improvised emplacements; from the prone, from the sitting or from the foxpole standing positions; from different fighting vehicles and over the water surface. For operation from within buildings, a free space of at least two meters behind the launcher will be required.

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 struc-

tures. Sheltered targets can be defeated even without the need of penetrating the shelter, provided they are non-pressurized. The missile is also suitable for missions such as breaching safe passages through mine fields or non-explosive obstacles.

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

The Korsar missile launch system has excellent competitive advantages in terms of cost-effect ratio. At USD 130,000 plus some USD 20,000 per missile, the Korsar will be much less expensive than same-class counterparts originating in the U.S. or Israel, and low cost is what makes it particularly suitable for mass production. This ATGW system offers an optimal combination of performance and operational parameters, enabling the weapon to be used as 'effect generator' in land, air assault and counter-terrorism warfare scenarios. The extensive tests showed that the anti-tank missile launch system 'Korsar' is a highly lethal and highly effective multi-target offensive-defensive weapon. UDR

The fire from "Korsar" by unguided projectile

[flight capabilities]

IN PACE WITH

ANTONOV–
MARKET TRENDS

Despite the current conflict in the Donbas, Ukraine still enjoys self-sufficiency in the production of aircraft -- from the design and development phase to the construction of transport planes. State Company "Antonov" retains its position as undisputed leader in this field. As the Ukrainian aircraft industry is largely aimed at the export market, the Company seeks to forge and intensify its international cooperation in civil and military aircraft construction.

During its 68 year of existence, Antonov has built over 22,000 units of aircraft of more than 100 types and mission-specific configurations, of which 5,030 are still in operation in 78 countries worldwide. A significant number of these aircraft are employed for military operations. The Company is currently producing An-140-100, An-148-100, An-158, An-74 and An-32 aircraft for customers that include various international institutions of the security sector.

Antonov is now developing a number of new aircraft types and their derivative configurations, including the An-70/An-188, An-178, An-124-121/-200, An-148-300, An-132 and An-2-100. These aircraft types are all designed for different roles and will be offered both to military and civilian customers.

The Company is seeking greater international cooperation in areas as follows:

- in-service support (and maintenance) for Antonov airplanes;
- development of new Antonov aircraft types under collaborative programs with international partners in 15 countries;
- participation in international aircraft industry programs;
- provision of international air freight services.

The Company's cooperation in military technology is focused on the development and production of special-capability aircraft and military transport airplanes (of which best known is the An-70).

An aircraft with unique operating parameters, the An-70 became hostage to political tensions. Despite Russia's deliberate sluggish attitude toward the An-70 development program in 2009-2012, Antonov managed to do without Russian assistance in drastically improving the design of the aircraft and completing its flight-test program in 2014. With successful completion of government testing, the An-70 is now ready for the production stage, which requires government decisions in conditions of ongoing military conflict with the Russian Federation.

For potential customers, Antonov offers the creation of the An-188, a new medium-lift military transport aircraft based on the An-70 design but equipped with avionics equipment of Ukrainian and Western manufacture.

In terms of its cargo carrying capacity, the An-188 will occupy a niche in between the medium-lift transport aircraft C-130J-30 and the heavy airlifter C-17A. The An-188 will provide considerable advantages over its closest same-size rival – the A400M. When operated from a 915-m long runway particularly, it will be able to deliver a 20t payload to 40 percent longer range than the A400M, and a 37t payload (which is the max payload capacity for the A400M) to 11 percent longer range (of 300 km) than the A400M. Moreover, the An-188 will be capable of payloads up to 40 tons, as compared to 37 tons for the A400M.

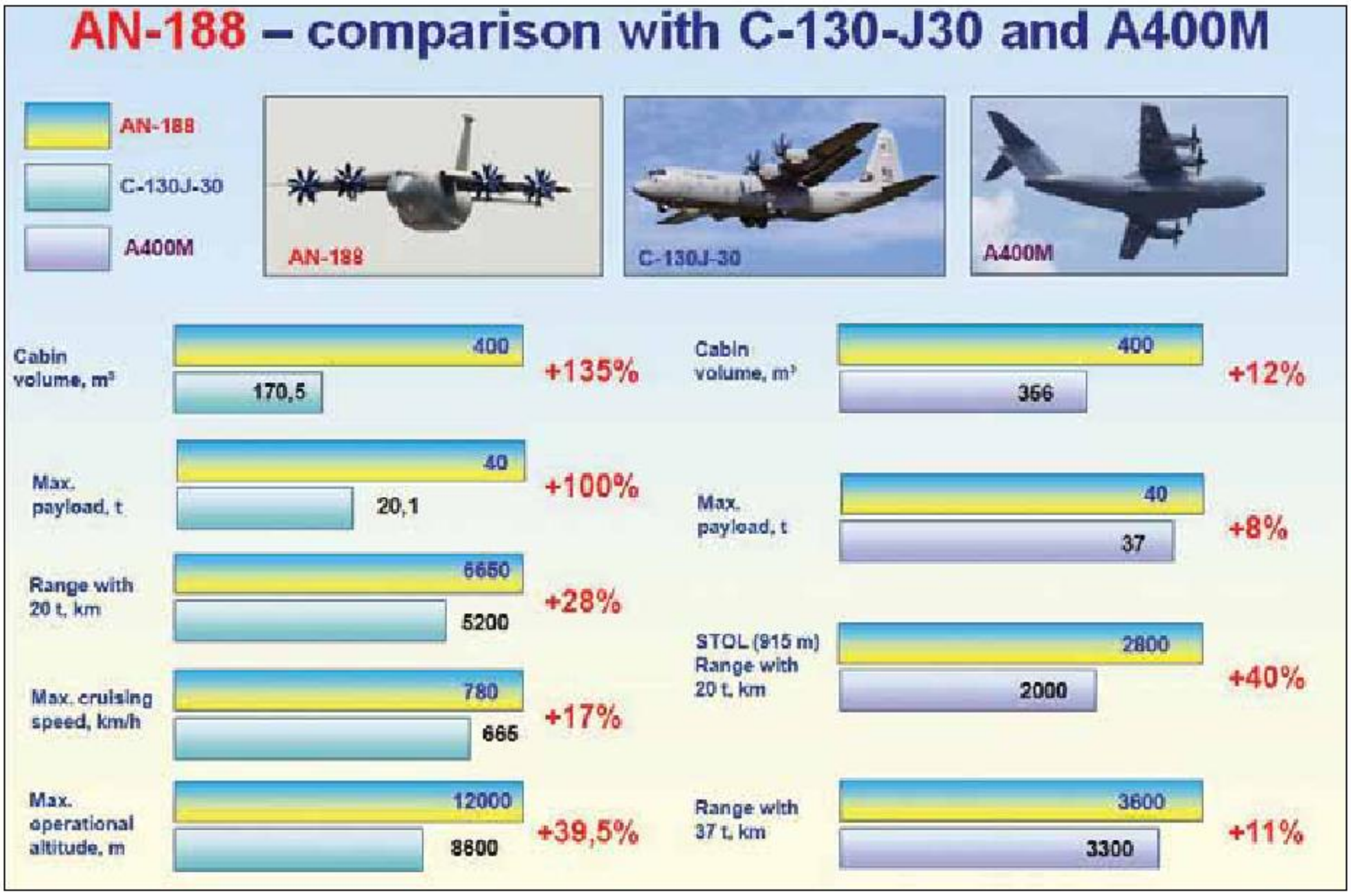
Another heavy-lift aircraft, the An-124, is now undergoing improvements to its performance. New versions of the aircraft with improved technical performances and economic benefits have been developed, named An-124--100M, An-124-100-150 and 124-100M-150. In particular, max payload capacity has been increased to 150 tons and single-piece payload capacity to 120 tons, and the crew has been reduced to four. The An-124 upgrade includes 80 percent service life extension to 2037-2040. Moreover, a comprehensive upgrade of the aircraft is planned to include engines and avionic equipment of Western manufacture.

It should be noted that the An-124 airlifter and the An-225, the world's heaviest transport aircraft, played a key role in the counter-terrorism operation Serval in Mali during January-March 2013.

Another near-term focus for Antonov is the development of the An-148 family of short-range passenger airliners and the construction of medium-payload cargo airplane An-178, including three militarized configurations:

- the An-148-300MR - maritime patrol aircraft with a capability to counter maritime border threats;
- the An-148T – light military cargo jet with a loading ramp;
- the An-178 – medium-payload military cargo jet with a loading ramp.

The An-178 is one of the key priority programs for Antonov,



completion of construction of the first prototype being scheduled for the beginning of 2015.

The An-178 is being proposed as a higher-tech replacement for the medium-payload cargo turboprop aircraft An-12 (over 1,400 units of the aircraft were produced during its production run), as well as Europe's twin-engine cargo turboprop aircraft C-160 (214 units were produced).

The new aircraft will sell at a much lower price than medium-payload aircraft such as the C-130J or the KC-390, and will be in approximately the same price range as light cargo airplanes such as the C-295 or C-27J.

Another area of focus for Antonov is upgrade of legacy types of aircraft in order to keep the aircraft in production and offer them to potential customers.

First is the An-74 – a light military cargo jet with a loading ramp, which is currently undergoing performance improvements with the addition of new configurations developed based on this proven platform.

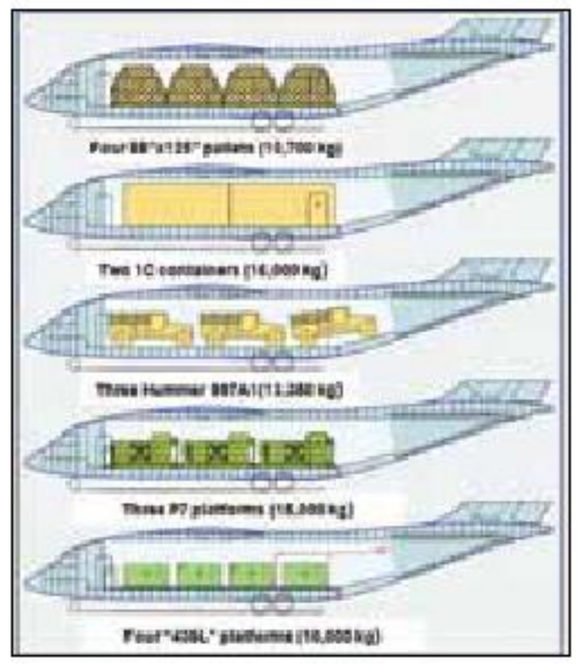
Second is the An-32 – a light turboprop multi-purpose cargo airplane (six such airplanes have recently been exported to the Iraq Air Force). An-32s in the Indian Air Force are now undergoing upgrade to the more capable An-32RE configuration.

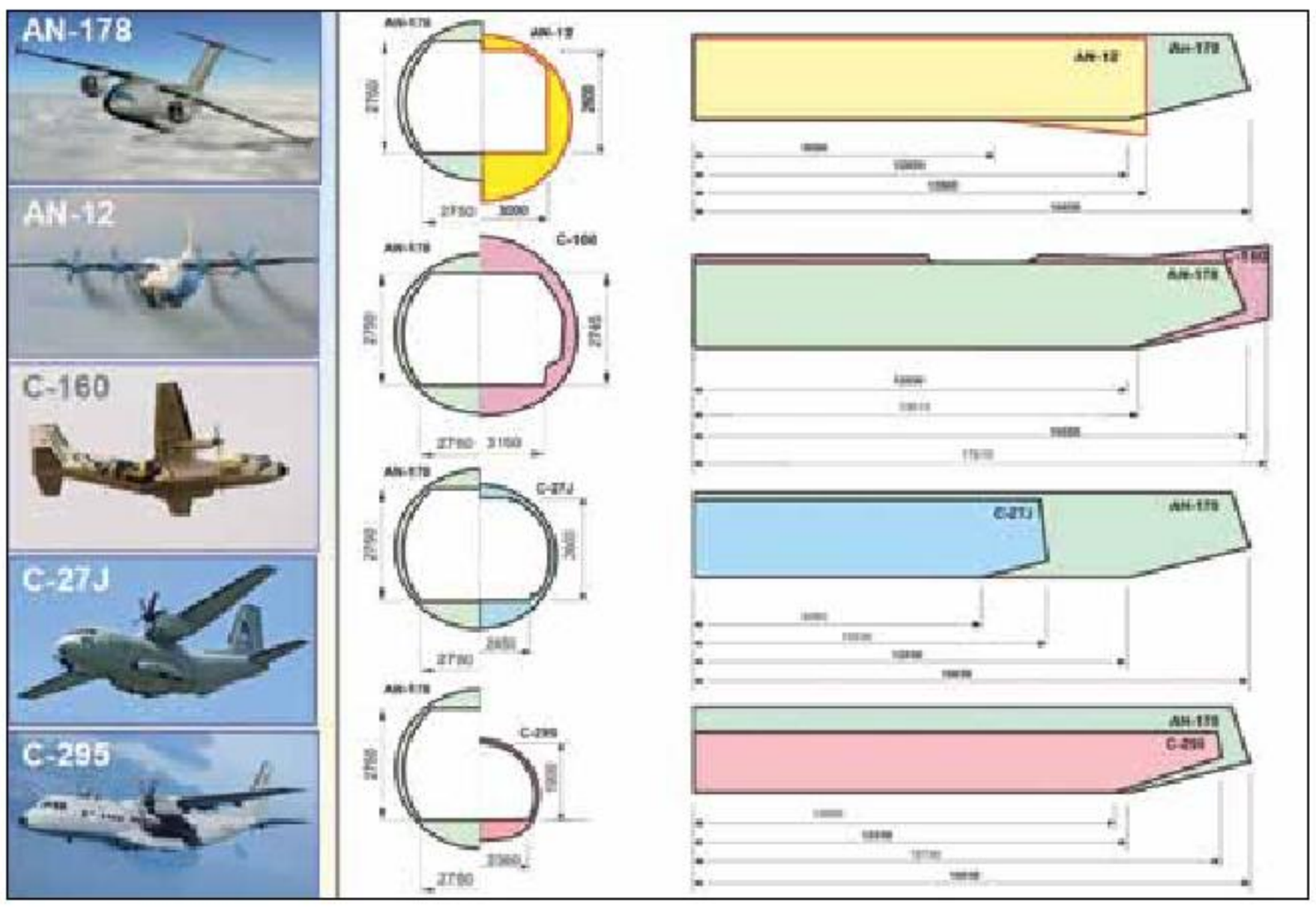
Replacement of legacy aircraft for more current generation platforms is the necessary prerequisite to maintain competitive ability in the global market for light turboprop military cargo aircraft with loading ramps. Antonov proposes solutions for two types of aircraft in this niche market.

One is the An-132 – a light multi-purpose turboprop cargo aircraft being developed to replace the An-32, which is renowned for its unique operating capabilities in high temperature/high altitude environments.

The An-132 will feature Pratt & Whitney Canada PW-150A engines and avionics equipment from suppliers in Canada, USA and the European Union. With cargo carrying capacity of 9.2 tons, the An-132 will be able to deliver payloads to a max range twice as long as that of the An-32. The An-132 was aimed at possible Indian Air Force requirement for 56 light cargo airplanes to replace the legacy AVRO HS-748 fleet, and it is also being offered to potential customers in the Middle East, Asia, Africa and South America.

For markets requiring lighter weight aircraft, Antonov offers





the An-140T – a new cargo turboprop designed to replace the An-26 twin-engine turboprop.

Being a strong actor in the heavy cargo aircraft market, Antonov has something to offer the market for lighter aircraft, as well. We are talking about multi-purpose turboprop aircraft An-28-100 and AN-38-120, as well as re-engining/upgrade of the multipurpose aircraft An-2 to the An-2-100 standard.

The Company intends to branch out into a new business venture such as the design, development and production engineering of promising types of unmanned aircraft systems (UAS). It should be noted that Antonov is no stranger to the UAV development industry. Particularly in 1975-1981, Antonov was the first in the USSR to design, develop and build a remotely controlled optical (TV) reconnaissance UAS with a live video footage transmission capability. The UAS consisted of an unmanned aircraft, mission sensor system, specialized datalink and ground control station.

To be able to develop and field a modern UAS as good as top foreign competitors, one requires to have extensive practical work experience, advanced R&D and manufacturing capabilities, as well as a well-developed after-sales service network – and this all is what Antonov does have. The Company also has experience as system integrator in UAS systems, which is particularly valuable given the complex construction of a modern UAS that includes a great variety of different-purpose sub-systems and components supplied by different manufacturers.

Indeed, Antonov – the only company in the world capable of producing the complete range of cargo airplanes from the light An-2-100 to the super heavyweight An-124-100M-150 – has great capabilities. However in the current conditions, it is critical that the Government take care of domestic industry development and provide viable incentives for partnership-based projects with potential export customers. UDR

XII INTERNATIONAL TRADE FAIR

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WHAT UKRAINE

As a result of the events in the Donbas, military and political leadership of Ukraine is urgently seeking to reform its armed forces and provide them with the required arms and military equipment types -- both upgraded and newly manufactured. These requirements are mainly provided by the national defense industries, but some defense articles are being procured from foreign suppliers.

In 2014, Ukrinmash – an arms-trading firm incorporated with the country's state weapons industry holding Ukroboronprom -- concluded a number of contracts with foreign suppliers. Particularly in December, deals were signed with Barrett Firearms (USA), ATN Corporation (USA), Defense Technology Inc (USA) and Thales Group (France) to provide the requirements of the Security Service of Ukraine (SBU), the National Guard and the Ministry of Defense. The exact types and names of most of the defense articles being purchased are not disclosed in view of the ongoing conflict in the east of Ukraine and the need not to reveal its capabilities to the enemy. However, one can easily assume what Ukraine is actually buying from foreign suppliers, based on nature of work and suppliers' areas of expertise.

For example, the American company Barrett Firearms is a specialist in the production of firearms, optical devices and ammunition, but its main focus is on large-caliber sniper rifles.

ATN Corporation, a leading designer and manufacturer of

Night Vision Weapon Sight from ATN Corp.

AN/TPQ-49 Lightweight Counter Mortar Radar (LCMR) system

IS BUYING

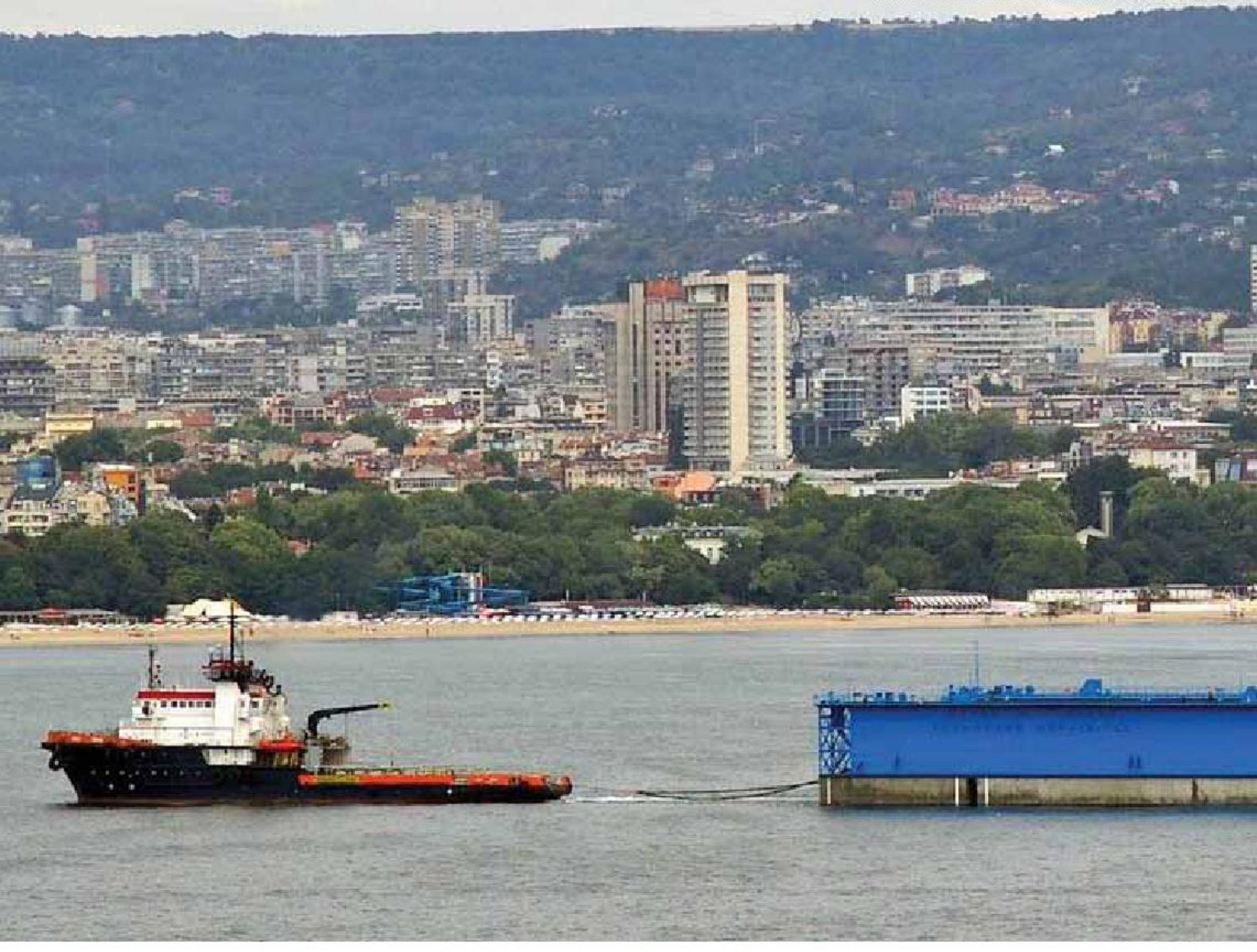
night vision devices and thermal imaging devices, supplies a full range of optical devices used by military forces around the world.

Thales Group is a global leader in information and communication security systems for aerospace, defense and naval industries. The companies that are parts of the Thales Group specialize in manufacturing a full range of military products, including communication systems, electronic warfare equipment, radar systems and much more.

Defense Technology Inc. is manufacturer of the AN/TPQ-49 Lightweight Counter Mortar Radar (LCMR) system, which is planned for procurement among other equipment types. The new radar will be integrated into Ukrainian Army service to provide effective counterfire radar and weapon locating capabilities.

In addition to these three contracts, SC «Ukroboronprom» signed a cooperation agreement with Poland's «LUBAWA SA» - a specialist in the manufacture of bulletproof vests and tactical covert vests, in addition to a wide range of soldier system products, including ballistic helmets, clothing and boots.

It therefore can be seen that Ukraine is now making its first significant moves toward meaningful engagement with Western partners. And not only does it declare the desire to change policies and raise the standards of the Ukrainian defense industries, but emphasizes its willingness to acquire new technologies and develop new modern industries. UDR



FLOATING COMPOSITE DR SIMPLE ANSWER TO

YDOCKS FROM UKRAINE: DIFFICULT QUESTION

Dmytro Bohdanov

To maintain ships for various purposes in a proper operating condition and to ensure that warships and submarines are readily available at all times, a well-developed ship-repair infrastructure is needed. Ship repair process has its specific nature which distinguishes it from the shipbuilding process. While shipbuilding companies tend to use stationary docks for building their ships, a rational organization of the ship repair process requires the employment of floating drydock structures. In Ukraine, there is a company – State Plant "Pallada" of Kherson – which creates docks that have no equivalents in the international practice of dock-building.

ACCOMPLISHMENTS OF TODAY

With the introduction of steel-hull ships in naval fleets, the use of steel drydocks became a frequent practice. However, Ukrainian engineers from the Central Design Bureau "Izumrud" and State Plant "Pallada" of Kherson went further and launched a new floating dock construction process using heavy marine reinforced concrete (RC). Beginning in the late 1950s, construction of all-RC drydock structures in the Soviet Union gave way to structures of so-called "composite construction". In Ukraine, construction of composite type drydocks is speciality of State Plant "Pallada" of Kherson. In 2011, State Plant "Pallada" of Kherson became part of "Ukroboronprom". Pallada is lead manufacturer of floating drydocks in Ukraine. Overall, floating repair docks make a substantial percentage of the product types being manufactured and successfully exported by Ukraine.

Floating composite type RC docks built by State Plant "Pallada" of Kherson are operated with success in countries with different climatic conditions. The Company has among its customers countries with traditionally strong, well-developed shipbuilding and shipping industries such as Russia, Japan, South Korea, Finland, Bulgaria, Turkey, Algeria and Croatia.

During its years of existence, SP "Pallada" of Kherson has built over four dozen drydocks, which are still in operation in almost all regions of the globe. Pallada's drydocks were used in an operation to recover the sunken Russian nuclear submarine "Kursk", and they are currently employed in the removal of spent nu-

A covered dockyard enables ship maintenance and repairs regardless of climatic conditions

clear fuel from nuclear-powered icebreakers and submarines of Russia and France.

In addition to floating drydocks of composite construction, Pallada is building conventional docks of steel. In 2005, SP "Pallada", with the KB "Izumrud"'s input, developed a new drydock (Project 1760KR) with 8500-t lifting capacity. This is a highly efficient drydock, with an expanded technological capability range and all costs kept to a minimum. The Project 1760KR drydock fully conforms to all applicable requirements and the Russian Maritime Register of Shipping's Rules and Regulations for the Construction and Classification of Sea-going Vessels as well as Rules and Regulations for the Construction of Sea-Going Ship Hulls and Structures of Reinforced Concrete. The Project 1760KR drydock offers an extended internal clear between towers, allowing docking of almost all ships with docking weights of up to 8,500 tons. The drydock is designed with a lifespin of fifty years. In 2006, the lead drydock of Project 1760KR type was delivered to the Customer and has been successfully operated in Qatar (Port of Doha).

In 2010, SP "Palada" and Central Design Bureau "Izumrud" jointly developed a new drydock construction process allowing for a 10-15% reduction in the construction cost and time budgets. A new metalworking line was launched, permitting cutting time to be reduced by 3-5 times. The introduction of a new process for in-water vertical/horizontal gluing of precast modules in the construction of high-capacity docks gave Pallada the capability to build floating drydocks with lifting capacities of up to 50,000 tons. In this case, integration works for floating drydocks with lifting capacities in excess of 30,000 tons, using modules prefabricated by Pallada, can be performed in waters of the Customer's country. In 2012, Pallada was contracted by a Kazakh customer to build a composite 8,500-t floating drydock for operation in the Caspian Sea. The drydock will be constructed from two halves, which will be towed through the Volga-Don Canal to the Caspian Sea and glued together in water without the help of caissons. The drydock is scheduled to be ready for operation in the third quarter of 2014.

Recovered from the Barents Sea bottom, Russian nuclear submarine "Kursk" is seen here in a floating drydock manufactured by "Pallada" Plant

THE BENEFITS AND OPPORTUNITIES

Composite type drydocks have a number of advantages over conventional steel docks in terms of operation and maintenance. A floating composite type drydock consists of a reinforced concrete pontoon and steel towers. The use of heavy shipbuilding concretes based on sulphate resisting Portland cement makes underwater part of the drydock extremely resistant to corrosion. The bottom, external sides, berth-deck and bulkheads of such a dock are well protected from the corrosive effects of salt water. This eliminates the necessity of putting the drydock out of service when underwater maintenance works are needed (docks of steel require regular dry-docking for painting), resulting in benefits such as reduced maintenance cost and lowered cost of ship repair at the dock. Despite having its steel structures protected from rust and corrosion, steel docks quickly corrode in water. For this reason, to ensure that a steel dock serves its full life, engineers have to provide for a compensation for corrosion by increasing the thickness of steel elements in addition to their effective thickness. As a result, effective thickness of steel elements increases by an average 30 to 50%, leading to excessive consumption of steel in structural members and also excessive labor consumption. To slow down corrosion in docks of metal, its steel members are covered with protective coatings. During service life of a floating drydock of steel, maintenance works should be performed on its submerged structures at some regular intervals of time, requiring dry-docking of the dock itself or some of its individual parts, which causes considerable difficulties. During the period when a steel dock is undergoing maintenance, its intended use becomes impossible in part or in full. The advantage offered by Ukrainian engineers of composite drydocks is that reinforced concrete, of which part of the drydock's pontoon is made, works well in compression, while its work in tension is ensured by reinforcing steel, which is shielded from corrosion by a protective layer of concrete. So, less rolled steel is consumed than in the case with a dock of steel. In addition,

reinforcing steel bars are cheaper to buy than profiled bars or flat steel. Because concrete is not corroded in seawater, the composite drydocks' pontoon does not require to be dry-docked or painted. Steel towers of the drydock, if necessary, can be painted and maintained without the need to put the dock out of service, which brings significant economic benefits to owners throughout the long life of the structure. In a composite type drydock, elements of its reinforced concrete pontoon can be of considerable thickness, thus contributing greatly to its performance potential. Such a drydock can hold ships that lost their longitudinal strength or, for example, it can be used for cutting a ship into pieces without worrying about the dock being got damaged by shock loading, or a vessel can be placed on the dock slipway at any place without any damage risk for the dock or the vessel.

The unique process developed by Ukrainian engineers for integrating a floating drydock from precast modules while the dock is in water, which does not require the use of caissons, makes it possible to build structures of almost any size meeting specific customer requirements and the requirements of all Registries of Shipping. Such docks have strength characteristics that enable transportation to anywhere in the world. Among the contracts recently completed by SP "Pallada", there are composite drydocks with lifting capacities ranging from 8,500 to 25,000 tons – enough for accommodating, for example, Panamax-size ships that can have 245.5 meters in length and up to 43.7 meters in width. Moreover, mobility and sustainability are what distinguishes composite type drydocks favorably from graving docks or syncrolifts. In contrast to coastal hydraulic structures, they are wholly at the disposal of the owner, are out a reach of local authorities and can be quickly relocated to the right place.

MSC Mirella in a floating Project 1760KR dry-dock in Croatia, 2012 (Photo courtesy of Victor Lenac)

At their own time, Soviet Union's Naval Forces were purchasing unique dockyards which Western media dubbed "the miracle of the twentieth century". The covered dockyard "Sever" (or "North") was intended for maintenance and repair of Soviet submarines in the Far North environments. At thirty-degree frost, the dock, protected from the elements by a roof and doors, created its own microclimate with temperatures of plus 15 ... 18° C.

Covered dockyards allow ships to be maintained and repaired regardless of the ambient temperature or humidity of the outside environment, or weather conditions in their base locations. Docks of this type can also be useful in very hot and humid climates.

Selecting between a "conventional" dock of steel – which is more commonly used but requires a greater amount of maintenance and substantial investment during its lifecycle – and a composite type drydock which offers an array of clear advantageous in many aspects – is a question to be answered by potential customers for products by CDB "Izumrud" and SP "Pallada". Ukrainian dockbuilders and those foreign companies that have many years of successful experience operating these products are sure they know the correct answer to this key question. UDR

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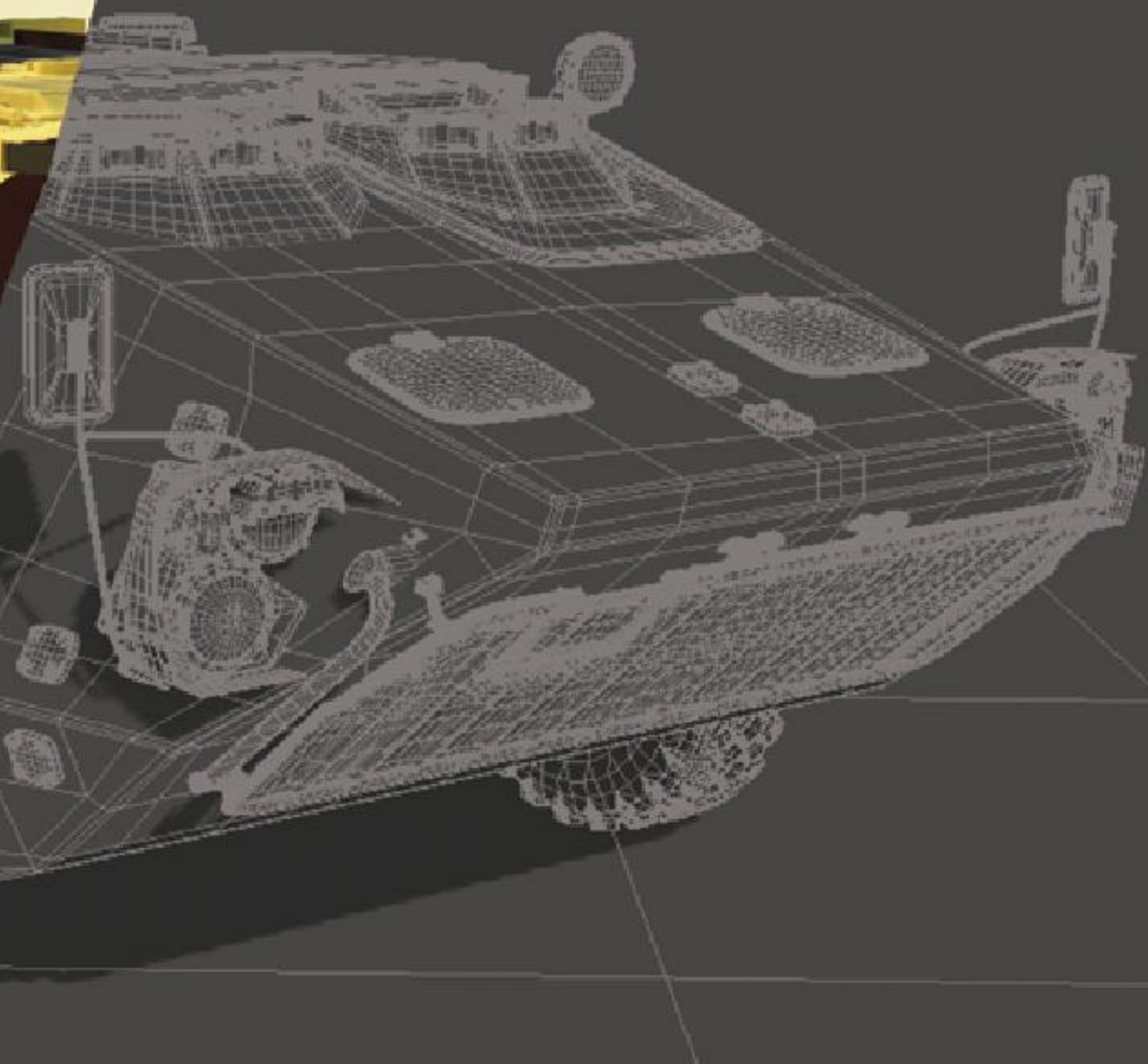

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