UKRAINIAN DEFENSE REVIEW

№2 [APRIL – JUNE 2014]

UDR

Defense express

POWERPLANT SYSTEM

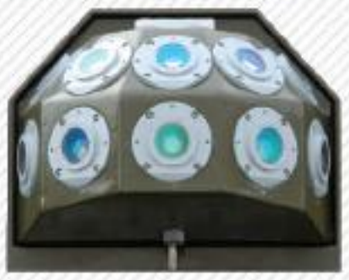
UKRAINE COULD BE JUSTIFIABLY CONSIDERED ONE OF THE WORLD'S ESTABLISHED TRENDSETTERS IN THE TANK DIESEL ENGINE AREA

MADE IN UKRAINE

THE UKRAINIAN BTR-4 APC FAMILY

FALARICK FOR COMMANDO

U.S. COMMANDO might be armed with Ukrainian ATGM



UKRAINIAN KASHTAN

Counter-precision weapons system

NEW WEAPONS FOR KAZAKHSTAN NAVY

Brand-new missile-and-gun ship of the Kazakhstan Navy. Ukrainian Contribution

UKROBORONPROM

The State Concern

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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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UKRAINE TO REDIRECT THE PATH OF ITS DEFENSE EXPORT TO EASTERN MARKETS

Ukraine is going to redirect the focus of its defense industrial export policies to eastern markets due to a halt in military-technical cooperation with Russia.

This follows from a statement made by First Deputy Prime Minister of Ukraine, Vitaliy Yarema on April 4, 2014.

"This is an issue that we address on a daily basis in order to redirect the path of our defense-industrial export to other countries, particularly to eastern markets," Yarema said.

The export of defense products to Russia accounts for 40 percent of Ukraine's overall defense exports, and for this reason it cannot be shut down overnight, Yarema explained, and continued, "A decision has been taken not to export armaments and military equipment to the Russian Federation's territory. As regards products for dual use, we are still uncertain because it would have a very severe impact on the Ukrainian economy, and because dual-use products are not products for direct military use".

Yarema pointed as an example to Zaporizhzhia's Motor-Sich – a manufacturer of helicopter engines that are suitable for use both on military and civilian helicopters. "Motor-Sich engines are twice as powerful and reliable as their Russian counterparts, and they are more competitive in the market; so operations of this factory should not be discontinued but, instead, increased further still. It's another matter that Russia acquires them for some purposes but later installs them on military equipment. There are nuances there which need to be settled", the Vice Prime Minister said.

At the same time, Ukraine will provide support for own defense-industrial complex via State procurement contracts. "We want these companies to change their specialization to the manufacture of armaments for the Ukrainian military forces. After all, we are in need of leading-edge technology, in need of new equipment. We have excellent tanks, excellent armored personnel carriers, but the only thing needed is that this all be taken under control to ensure that the money is not stolen," Yarema said.

UKRAINE RECREATES ITS NATIONAL GUARD

TOn March 13, 2014, the Verkhovna Rada (Ukraine's legislature) voted to pass the Law on the National Guard of Ukraine (Law of Ukraine No. 4393 on the National Guard of Ukraine). The legislation, which was proposed by the Verkhovna Rada Speaker, Oleksandr Turchynov, defines the National Guard as military organization with law enforcement functions that is overseen by the Ministry of Internal Affairs. Its purpose is to protect and preserve the freedoms and lawful interests of citizens and the country against criminal acts and to protect public order and safety as well as to collaborate with other law enforcement agencies in protection of the Ukrainian border. The National Guard's duties also include counterterrorism and defense against illegal paramilitary groups.

According to its charter, the National Guard cooperates with the Armed Forces of Ukraine in responding to armed aggression against the country and providing for its territorial defense. According to the Law, the Guard will employ up to 60,000 personnel. If necessary, this number can be increased or changed by the Ukrainian Parliament.

The Commander of the National Guard, who is appointed by the Verkhovna Rada based on its consideration of a nomination submitted by the President of Ukraine, will be responsible for direct military and administrative leadership of the Guard.

Note that the National Guard of Ukraine was originally created in 1992 and dissolved in 2000.

UKRAINE MAKING OVERHAULS ON MIG-21BIS AIRPLANES, MI-8 HELICOPTERS FOR CROATIA

The first MiG-21BIS fighter airplane arrived in Zagreb (Pleso airbase) on 12 April 2014 after having been overhauled and re-equipped at the Odessaviaremservice State Enterprise, a blogger named "bmpd" reported. The airplane, in a disassembled state, was travelling to Croatia via Hungary in a truck.

The second MiG-21BIS, overhauled and re-equipped, was delivered to the Customer later in the latter half of April. Three more fighter aircraft have passed post-overhaul trials and are now being prepared for transportation to Croatia. When ready they will be delivered to the Customer by truck transport.

It is to be noted that Croatia's "ZTK" Aviation Technical Center, assisted by Ukrspecexport and Sevastopol's Aviation Company (both are parts of the Ukroboronprom defense industries holding group) have delivered two overhauled Mi-8 helicopters to the Croatian Air Force customer. The third helicopter overhauled for Croatia's Air Force is now being prepared for flight trials. Overhauls on the Croatian Air Force's Mi-8 helicopters are being performed under a contract that was signed in July 2013 between Ukrspecexport and the Ministry of Defense of the Republic of Croatia. The contract covers the overhaul of a total of six Mi-8 helicopters.

UKROBORONPROM SUSPENDS DEFENSE SUPPLIES TO RUSSIA

Ukroboronprom, the State defense industries holding group, has suspended defense exports to the Russian Federation.

In a statement released on 11 April 2014, interim CEO of Ukroboronprom said the moratorium on the export of defense and dual-use products to the Russian Federation is a "conscious decision by the Ukrainian State, given the current conditions of bilateral relations".

At the same time, Yuri Tereshchenko said the government of Ukraine and Ukroboronprom are jointly developing a mechanism to compensate potential and current losses to individual companies affected by the moratorium.

"We realize the potential adverse impact on individual companies that will result from a halt in cooperation with the Russian Federation. We are now upgrading the domestic acquisition system in order to ensure that these losses are minimized and to ease tensions in employee collectives. On a parallel track, export contracts are being prepared, aimed at swift compensation of potential and current losses," Y. Tereshchenko said.

The interim CEO of Ukroboronprom went on to note that, "Ukroboronprom has switched over from the export/import operations to the provision of Ukraine's defense and security needs. The holding group will now focus on the development of command and control computer systems; aeronautical technologies; air defense means; intelligence, reconnaissance and surveillance (IRS) systems and precision-guided weapons".

UKRAINE DELIVERS NEXT QUANTITY OF UPGRADED AN-32 AIRCRAFT TO INDIA

Ukraine has delivered another five Soviet-era An-32 military transport aircraft to India following an overhaul and re-equipment at a Kiev factory under a 2009 contract.

The aircraft handover ceremony took place on the premises of"Civil Aviation Plant #410" in Kiev on 29 March 2014. Later on the same day, the aircraft departed Kiev for Kanpur, India. Taking into consideration the events in Crimea, "the European partners, as an exceptional case, have opened the sky for the military transportat aircraft, so that the vehicles will be able to arrive at destination place in time," Serhiy Pidreza, CEO of Civil Aviation Plant #410 has said.

The $400 M contract to overhaul and re-equip the IAF's fleet of 105 An-32 military transport aircraft was concluded between Spetstechnoexport (a subsidiary firm of the Ukrspecexport State arms dealer) and the Ministry of Defense of India in July 2009. As of this day, Ukraine has delivered 35 of the 40 aircraft it undertook to overhaul and re-equip under that contract. The initial ten aircraft, overhauled and re-equipped, were delivered to the Customer in 2011, with the next ten following in 2012 and another ten in 2013. Five overhauled aircraft arrived in India in August 2013, and the last five are scheduled to be delivered this summer.

UKRAINE SETTING UP JOINT ENGINE PRODUCTION VENTURE WITH RUSSIA

Russia's United Engine Corporation (UEC) and Ukraine's powerplant manufacturer Motor-Sich have submitted registration documents for founding a joint venture to be known as the International Engineering Center, Military-Industrial Courier reported on 2 April 2014.

The newly founded joint venture will be particularly tasked with developing a future helicopter engine (FHE). Cooperation in the network of the joint engineering center will cover both civil aviation and military transport aviation areas", the UEC said.

The UEC has drawn up an agenda for the engineering center. This document, which covers a mid-term outlook up to the year 2020, is of a preliminary nature and is slated for consideration by scientific and technical council within the Center. Future cooperation between the UEC and Motor-Sich, which will be designed to proceed milestone by milestone, will be focused on both the already ongoing projects and future private venture initiatives. The latter will include design and development for the future helicopter engine; the D-18T Series 3 family of engines for transport aircraft An-124-11 and An-124-100M; the D-436-148FM engine for the An-178 and An-148T transports, the AI-222 increased-thrust engine, as well as the new PD-14 engine tailored for the MS-21 airplane. Cooperation areas to be dealt with by the new Center will not include the development of engines for combat aircraft (including the Su-35 and T-50) or the development of rocket motors.

The OJSC "UEC" and Motor-Sich are founding partners of the United Engine Corporation's "International Engineering Center" joint venture company. This will be a 51/49 partnership, the UEC being the 51% partner. The joint venture company will also deal with R&D projects on gas-turbine equipment, including aircraft engines.

UKROBORONPROM HAS DEVELOPED A FEW UPGRADE PACKAGES FOR THE T-64 TANK

The State defense industries holding group "Ukroboronprom" has developed a range of upgrade packages for the T-64 main battle tank, the interim director general of Ukroboronprom said as quoted in a statement released by the holding group.

Yuri Tereshchenko said that, in the first instance, this is about upgrading the T-64B tank to the BM "Bulat" standard. In terms of its key technical and performance capabilities, the BM "Bulat" tank is comparable with the Russian tank T-90 and coming very close to the BM "Oplot". It has room for further developments, including a more potent powerplant with the 6TD-1/2 motor, an improved fire control system, an active protection system and more advanced communications and navigational facilities. A T-64 upgraded to the BM "Bulat" standard will be four times cheaper to buy than a new BM "Oplot".

The Kharkiv Armored Military Vehicle Factory has also developed a package to upgrade the T-64 tank the T-64E standard. The upgrade package includes a new fire control system and an antitank guided weapons system, in addition to an optional turret installation of two combat modules (including an antiaircraft gun) for enhanced operational versatility. Protection has been improved by adding the "Duplet" explosive reactive armor system or the "Zaslin" active protection system. The T-64E would be powered by the upgraded 5TDF engine developing 850 hp. Being arguably one of the best modern tanks in the world in terms of capabilities versus cost trade-offs, T-64E is far less expensive to buy than BM "Bulat", for example.

In addition to these packages, Ukroboronprom offers potential customers the T-64 V-1, an overhauled configuration of the T-64 tank, which is the least expensive option for customers experiencing budgetary pressures. In terms of the capabilities versus cost trade-off, the T-64BV-1 is superior to the overhauled and upgraded T-72 tank.

KHKBM INTRODUCES NEW DERIVATIVE OF ITS BTR-4E ARMORED TROOP CARRIER

The "Kharkiv Morozov Machne-Building Design Bureau" (KMDB), which is part of the Ukroboronprom State defense industries holding group, has completed development of the BTR-4E1 – the latest derivative of the BTR-4 armored personnel carrier equipped with additional armor protection, the Morozov KMDB announced in a press statement on 7 March 2014.

The BTR-4E1 is a new addition to the BTR-4 8x8 wheeled family of armored fighting vehicles already in quantity production. The KMDB has completed a prototype equipped with an appliqué armor package for enhanced protection of the crew and passengers. The additional armor can be mounted/dismounted by crew members in the field conditions as required by the type of the missions performed and the expected level of threats.

The first BTR-4 with additional armor protection has already been delivered to an export customer. Defense Express has learnt that this customer is a U.S. company that is closely engaged with the Armed Forces and defense industries. The U.S. order in question includes the supply of several BTR-4 vehicles in the BTR-4E1 configuration.

AUTOKRAZ RAMPS UP PRODUCTION

The "AutoKrAZ" heavy truck manufacturer (also known as Kremenchuh Automobile Plant) is making steady progress amidst difficult economical and political situation in Ukraine, the marketing countries and the component-supplying countries, the Company said in a press statement released on 2 April 2014.

In March 2014, "AutoKrAZ" manufactured UAH 60.7 M worth of products, 8.7 percent up on the previous month's figure. Sixty-seven trucks rolled off the main assembly line of the Kremenchug Automobile Plant during March.

In the APRIL-June period, the Company put out 192 automobiles – 73 percent up year-on-year.

Sales grew 82.7 percent year-on-year, with 201 trucks delivered to customers thus far this year.

The Company also reported an output growth in other product types in its portfolio. Particularly in the first quarter 2014, the output of casting products grew 20.6 percent over the same period year-on-year.

"DESIGN BUREAU "ARTILLERY ARMAMENT" TESTING NEW DERIVATIVE OF ITS KBA-117 AUTOMATIC GRENADE LAUNCHER

State Enterprise "Design Bureau "Artillery Armament" (DBAA), which is part of the Ukroboronprom holding group, is currently testing an infantry variant of the KBA-117 automatic grenade launcher, Vitaliy Mikhal, CEO of "Artillery Armament" told Defense Express on 9 April 2014.

For now, a prototype of the KBA-117 automatic grenade launcher's infantry variant has been completed and subjected to trials.

As previously reported by Defense Express, the infantry variant has a number of design engineering and construction features making it dissimilar to the baseline configuration, particularly as regards the addition of handles, a mount and a sighting system.

It is to be noted that the barrel of the KBA-117 grenade launcher was one time subjected to durability testing showing it can withstand 6,500 shots, compared to the Soviet-era AGS-17 launcher which withstood 6,000 shots.

V. Mikhal additionally recalled that his Company has also developed the 60-mm KBA-118 grenade launcher, but it hasn't attracted much of an interest from the Ukrainian Armed Forces because of its non-standard caliber.

Regarding possible supplies of the KBA-118 grenade launcher to export customers, Mr Mikhal said the DBAA has not been approached with offers of this kind so far.

UKROBORONPROM TO DELIVER 100 ARMORED PERSONNEL CARRIER VEHICLES TO THE NATIONAL GUARD OF UKRAINE – TERESHCHENKO

Ukroboronprom will, in the near term, deliver 74 armored personnel carrier vehicles of the total number of 100 vehicles slated for delivery to Ukraine's National Guard, the newly appointed interim CEO of Ukroboronprom, Yuri Tereshchenko said as quoted in a statement released by the holding group on 2 April 2014.

Particularly the Morozov Design Bureau in Kharkiv could be able to deliver 58 BTR-4 vehicles in various configurations, including 41 combat maneuver vehicles BTR-4E, seven command vehicles BTR-4K, two command post vehicles BTR-4KSH and eight battlefield ambulances BMM-4S. Of this quantity, 29 BTR-4E, five BTR-4K, six PMM-4S and two BTR-4KSh vehicles have been completed up to the full specification and are all in combat effective condition.

Furthermore, Ukroborobprom proposes to supply the National Guard of Ukraine with an additional 16 armored personnel carriers of other types. Particularly the military armored vehicle factory in Kiev could deliver 5 newly-built BTR-3E vehicles and as many overhauled and upgraded BTR-80 vehicles, the military armored vehicle factory in Zhytomyr could deliver 5 overhauled BTR-80 vehicles, and the military armored vehicle factory in Mykolayiv could deliver 1 BTR-70DI vehicle.

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Valentin Badrak, Director, Center for Army, Conversion and Disarmament Studies

COUNTER-WAR

ANTITERRORIST OPERATION IN EASTERN

On April 13, 2014, Kiev officially accused Russia of waging a war against Ukraine, and announced plans to launch a large-scale anti-terrorist operation (ATO) against the aggressor in Luhansk Oblast. In a statement on the same day, Interim President of Ukraine, Oleksandr Turchynov said that the National Security Council decided on the launch of a major counterterrorist operation involving the Ukrainian military.

A number of influential political officials and businesses in the country's eastern regions refused to support the resistance campaign, this being due to the mental diversity in Ukraine and the effective work being done by Russian intelligence services to create a network of agents in Ukraine. The situation has not improved any bit since the time the ATO was declared.

It should be emphasized that, as things stood from 13 April to 2 May, the ATO was in general implemented ineffectively. The central government lost control of the situation in Donetsk and Luhansk regions. Decisions were made slowly, implemented only partially, and there were instances of sabotage where certain numbers of police personnel willfully refused to perform their duties. There were no episodes reported of the participating army, police or security service (SBU) troops successfully resisting the aggression.

Ukrainian special forces during the liquidation of checkpoints near Slavyansk, April 2014

UKRAINE. CAUSES AND EFFECTS

The firearm killing of the SBU's counterterrorist squad and the separatists' seizure of government buildings in several cities in Donetsk and Luhansk provinces were among the greatest failures, just to name a few. A group of Russian saboteurs supported by separatists from among Ukrainian nationals (mostly hired by Russia and the businesses that relied on fugitive President Yanukovych) actually took control over the cities of Slovyansk, Kramators'k and Horlivka. In a number of populated localities, the separatists ordered the broadcast of Russian TV channels in place of the Ukrainian channels. In some cities, a true persecution was raised against members of the Ukrainian media outlets, and cases were reported of peaceful civilians being subject to abductions and tortures. The Kremlin's hopes rested on chaos spreading into other areas of the country, on intimidation and killings of known supporters of united Ukraine.

Slovyansk found itself in an information blockade, which was part of a city capture scenario in new warfare conditions. Observers noted decreased morale in some Ukrainian military units. In one of the most egregious examples, soldiers of the 25th detached airmobile brigade of the Ukraine Armed Forces' Highly Mobile Airborne Force surrendered their weapons to the separatists. This inci-

Ukrainian special forces near Slavyansk, April 2014

dent was down to a criminal decision by the brigade commander (who did not allow his soldiers to use their weapons) and the soldiers being mentally unprepared to act when unarmed. Other examples that had most adverse consequences include the factual refusal by members of the SBU's Donetsk-based special task squad "Alpha" to perform their duties and the open going-over of some law enforcement officers to the separatists. Meanwhile, the Ukraine National Guard soldiers who used small arms against terrorists during an assault on a military base in Mariupol, Donetsk Oblast, demonstrated courage and power of the Ukrainian weapons. The Geneva 17 April talks had highly negative effects for the ATO since they effectively reduced to zero the initial successes of the operation.

Despite all the losses and concessions, Kiev launched a second, more intense phase of the ATO on the night of May 2. This phase proved to be more effective, even though government forces lost three helicopters and a few men. The key successes accomplished during the second phase include the mounting of a full blockade of Slovyansk, the regaining of government control of Luhansk Oblast and the stepping up of overall pressure on the separatists/terrorists. An extremely important success was the elimination of the first Russian saboteur, known by the call name «Daisy», who was supposedly involved in the killings of civilians during the people's standoff with the government of Yanukovych on the Maidan. Another important factor behind the continuation of the ATO was the strong support given to the Ukrainian government from the United States and Germany, as well as the condemnation of Russia's behavior expressed during a meeting of the United Nations Security Council.

Among the most serious factors on the negative side was that the terrorists and Russian saboteurs found support among part of civilian population. This can be ascribed largely to the effects of the Kremlin's extensive propaganda campaign, the new government's extremely inappropriate policies towards the country's eastern provinces and the direct bribing of people by the political men and business owners who are still loyal to Yanukovych. At that time, even the U.S. President, Barack Obama, acknowledged the success of the propaganda carried on by Russia via media outlets in Europe. Some experts on information operations began talking about an entirely new phenomenon which they term as "information terror by Putin". As a matter of fact, this is an acknowledgement of the exceptional importance of information warfare, even on the western expanse that experts hitherto considered fully secured.

Despite the outright sabotage of some senior police officers in Odessa, the city people decisively stood up to defend independent and united Ukraine. The victory won by the Ukrainians in Odessa became the most important episode in the standoff with Russia following the annexation of Crimea, and it derailed the Kremlin's plan aimed

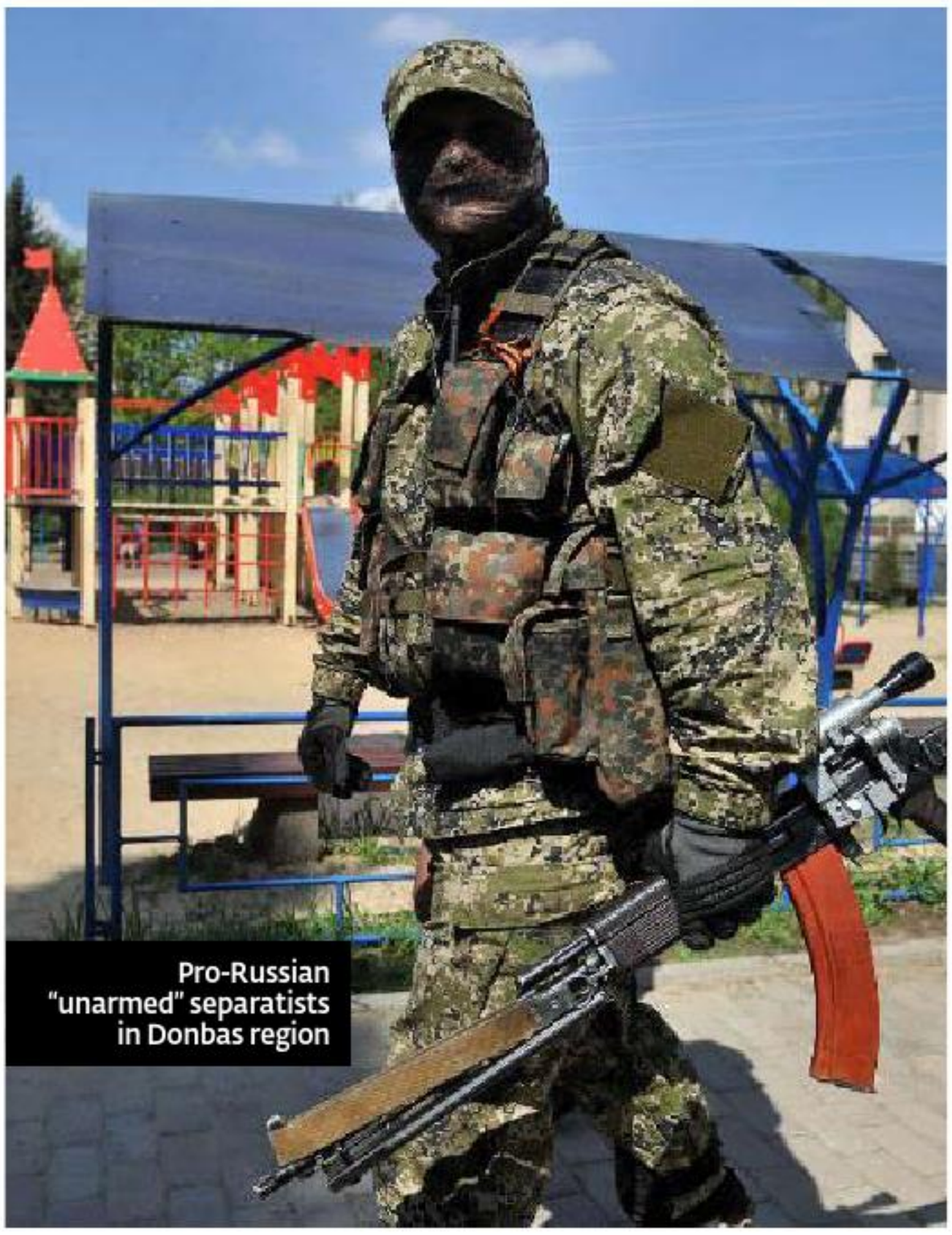
Pro-Russian "unarmed" separatists in Slavyansk

to divert the Ukrainian government from pressing ahead with the ATO in Slovyansk. The clash in Odessa between unarmed supporters of united Ukraine and infiltrated pro-Russia separatists, which took lives of over four dozen people, has significantly raised the morale of the population and the government forces.

There are several factors, both objective and subjective, behind the failure of the initial phase of the ATO. Overall, the government proved to be poorly prepared to face the enemy's asymmetric actions, many of which relied on support recruited from pro-separatist local people. Another factor was corruption that infected a considerable number of law enforcement officers in the country's eastern provinces, coupled with the direct influence wielded on them by members of the political elite and the big business community. Unfortunately, this attitude by policy makers, including most notably those from the Party of Regions, plays into the Kremlin's hands and facilitates Putin's men in going far deeper into Ukraine.

The objective factors include the following. First, it is for the second time that Ukraine is reaping the poisonous fruits of the territorial principle of the Armed Forces manning. What was prohibited in the USSR has become a tradition in Ukraine, this being due to the saving-money-on-the-army policy where all soldiers are doing service in their respective home regions. This was a major part of the reason why Crimea was surrendered without a shot being fired, and similar problems can now be found in Ukraine's eastern regions. Finally, and most importantly, this is the overall policy vis-à-vis the Armed Forces, which makes highly problematic the good use of the military in the ATO.

However, the main thing is that the covert wishes of the current government have matched with those of the local pro-separatist forces. The country's sitting government is still looking at the forthcoming presidential election in the first place, while viewing State defense as a second priority concern. This ex-



Pro-Russian "unarmed" separatists in Donbas region

plains why they are placing a premium on negotiations and soft power, including Western pressure on the Kremlin, as a major means of crisis settlement. In actual fact, however, this attitude is highly dangerous and harmful to successful waging of the ATO. These attitudes are felt very well by the local insurgents and commandos, so they are in no rush to push ahead with further action. It should be emphasized that the Ukrainian government placed expectations on support and assistance from members of the local elites and the big business sector, while the latter, having got engaged in the bargaining for powers with the central government, are actually bargain

the territory of Ukraine. However there are opinions that previous "shadow masters" of the region have lost control of the situation.

A major blow to the conduct of the ATO was the 13 April's ambush shooting of the SBU's anti-terror squad by Russian scout saboteurs. Analysts do not view this incident to be an accidental concurrence of circumstances. They rather regard it as a direct evidence of the superiority of the equipment available to employees of Russia's Chief Intelligence Directorate of the General Staff. In particular, experts of Ukraine's "Alpha" Group and military intelligence say the Russian groups have at their disposal far superior means of communication, intelligence-gathering and electronic warfare, by which, actually, the success of this attack was made possible.

OUTLOOK FOR THE FUTURE

There are two views prevailing as to the active phase of the ATO. Specifically, anti-terror experts insist that the ATO should be more focused on "surgical" attacks aimed to neutralize (eliminate) Russian reconnaissance and sabotage groups. That is, the operation is viewed as sort of a "duel situation" between special services of the two countries, where missions would be performed by special operations units of the SBU ("Al-

Ukrainian Armed Forces checkpoint near Slavyansk

pha"), the Chief Intelligence Directorate of the Ministry of Defense and the Foreign Intelligence Service – these aided by protection provided by special task force units of the Ministry of Internal Affairs. Those supporting an alternative opinion say the focus should be on ensuring that the ATO is controlled and coordinated from a single center. They also point to the need to address the lack of requisite equipment. For the ATO to be a success, it is necessary to urgently set up protection for the ATO units. This protection could be provided by special task force units of the Ministry of Defense ("Omega", "Gepard") as well as special task units based in Ivano-Frankivsk. It is also critically important to cater for the provision of latest-generation equipment, most notably communications, intelligence-gathering and electronic warfare systems, with due account taken of Russia's "order of magnitude" superiority in this regard. For the Ukrainian forces, one of indisputable advantages is that they operate on their home territory. Another significant advantage is the ability to provide numerical superiority of capabilities over the enemy. Such missions have been multiple times rehearsed during training; 2008 saw the largest interagency training session of this kind, with some 4,000 personnel participating in the event. It must be appreciated that, while training hitherto was focused on local actions of this kind, now the talk is about an operation that is large-scale and time-expanded.

An analysis of the situation suggests that, by tapping support from concerned members of the big business sector, it is possible to set up a potent, second front – consisting of well equipped and motivated militia units. So the separatists will have to confront not regular army units but people's self-defense units. It seems feasible that different mission-specific units be set up simultaneously, supported by squads of retired special operations experts – officers of air assault forces, Chief Directorate of Intelligence at the Ukrainian Ministry of Defense, naval infantry and SBU's "Alpha" and – where appropriate -- special task forces of the Ministry of Internal Affairs.

They need to be equipped not only with small arms weapons but have at their disposal man-portable anti-tank weapons systems of different types, the AGS -17, etc. They will additionally need a variety of civilian trucks. Finally, self-defense units should serve exclusively for self-defense purposes. Such self-defense units will be successful if coordinated and controlled from one and the same center as mentioned above. .

There is one more gap that needs to be addressed. Ukraine, unfortunately, is losing information war to the Kremlin because of its failure to wage wars on the information front. There needs to be an information center that would operate on-line providing information in English, German, French and, possibly, Chinese.

Self-defense militia and information counter-attacks are the two domains offering opportunities that still remain unexplored by Ukraine! UDR

[theory and practice]

ARMOR FOR SALE

NEW EXPORT-MARKET STRATEGY FOR UKRAINIAN TANKS

Ihor Fedyk, Defense Express

The delivery of T-64BV-1 tanks to the first export customer will mark the start for Ukraine's new export strategy aimed at promoting and marketing its armored military vehicles on the global marketplace. This conclusion is quite obvious as work has been launched on a contract involving the delivery of 50 overhauled main battle tanks T-64BV-1. The contract, which was signed by the State Enterprise "Ukroboronservice" in 2013, will be performed by the State Enterprise "Kharkiv Plant of Armored Tanks" (both are parts of the "Ukroboronprom" holding group).

The initial number of overhauled T-64BV-1 tanks is scheduled to be delivered to the Customer for acceptance as soon as by the end of March 2014. This speaks of the high rate of operations at the Company who previously did not have export contracts during a long enough period of time. The working staff and managers of the State Enterprise "Kharkiv Plant of Armored Tanks" have been consistent advocates for the export of T-64 tanks in various configurations, and it is positive that this initiative has found support among both the arms-trading community and managing staff at Ukroboronprom. It is realistic to expect that the current contract will be expanded with options for the overhaul of an additional number of T-64 tanks.

Designed and developed by the "Kharkiv Morozov Machne-Building Design Bureau", the T-64 tank was approved for service use in the Soviet armed forces in 1967. It was contin-

uously updated and produced in different configurations in the following decades. T-64 was the first main battle tank in the world to incorporate an automatic loader for its 125-mm gun, allowing a three-man crew size. This tank became a trendsettler in the field of main battle tank development for a few decades to come. A total of over 16,000 T-64 tanks were produced during a twenty-year production run. Some estimates indicate that there are more than 2,000 such tanks kept in storage depots and combat maneuver units in Ukraine. The T-64 tank was designed with outstanding technical and performance capabilities and a considerable room for further developments. T-64 formed a basis of more advanced tank designs such as the T-72, T-90, T-80 T-84 and BM "Oplot".

Ukraine, like the USSR previously, did not supply the T-64 tank and its configurations for export. The Democratic Republic of the Congo – it could now be said with a high degree of certainty – has become the launch export customer for T-64 in the T-64BV-1S configuration. That country already has a history of purchasing armored military fighting vehicles from Ukraine. For example, according to the 2010 UN Register of Conventional Arms, Ukraine exported a total of one hundred T-72 and 30 T-55MV tanks to the DRC. The fact that, in 2013, the DRC's military selected the T-64BV-1 for further acquisition could be explained both by the traditions of bilateral cooperation in military technology and that the proposed configuration of the tank is meeting to the maximum possible extent the specific requirements of the Customer. Particularly, the T-64BV-1 version was designed without an antitank guided weapon capability (antitank missiles fired through the gun barrel), making it cheaper to buy and easier to operate and train on than configurations with a guided missile capability. Being a second-generation tank, T-64BV-1 integrates in itself all the competitive advantages for which Kharkiv's school of thought on tanks is famous: lethality, maneuverability and protection, while offering substantial room for further improvement.

Ukraine is able to offer potential export customers a range of multi-level offer packages on the co-production, modernization and purchase of main battle tanks – designed to be matched to each customer' needs and budget. These offers cover a four-level price range from $250,000 to $5 million per vehicle.

First Level. The T-84 Oplot-M (Modernized) or BM "Oplot" – the top high-tech product of Ukraine's armored fighting vehicle industry – was approved for service use in Ukraine's Armed Forces in 2009 and is also being offered to potential export customers. Developed by "Kharkiv Morozov Machne-Building Design Bureau" and produced by "Malyshev plant", BM "OPlot" is assembled from all-new components and subsystems manufactured independently in Ukraine. This tank features a latest-generation fire control system, possesses a potent firepower capability (including domestically-produced antitank guided missile weapons), offers reliable protection against current-generation antitank munitions, provides good mobility performance and is favorably distinguished by a high level of automation of control functions. BM Oplot is able to compete as equal with most advanced counterparts on the international marketplace. BM "Oplot" will sell at an average price of between $4 M to $5 M.

Second Level. T-64B upgraded to the BM "Bulat" standard has been officially accepted into Ukrainian Army service. An export-market version could be created if and when there is an appropriate decision. In terms of its key technical and performance capabilities, the BM "Bulat" tank is comparable with the Russian tank T-90 and is

1 Accepted for service use in Ukraine's Armed Forces in 2009, BM "Oplot" is also available on the export market. BM "Oplot" will sell at an average price of between $4 M to $5 M.

2 BM "Bulat". An export-market version could be created if and when there is an appropriate decision. A T-64 upgraded to the BM "Bulat" standard will be four times cheaper to buy than a new BM "Oplot"

coming very close to BM "Oplot". It has room for further developments, including a more potent powerplant with the 6TD-1/2 motor, an improved fire control system, an active protection system and more advanced communications and navigational facilities. The upgrade could be performed by "Malyshev plant"or"Kharkiv Plant of Armored Tanks". A T-64 upgraded to the BM "Bulat" standard will be four times cheaper to buy than a new BM "Oplot".

Third Level. T-64 upgraded to the T-64E standard. Designed by Kharkiv's Armored Military Vehicle Factory, T-64E is offered as an upgrade option for the T-64 tank. For trade-offs, T-64E is far less expensive to buy than BM "Bulat", for example.

Fourth Level. T-64BV-1, the overhauled configuration of the T-64 tank, is the least expensive option for potential export customers, and it is potentially the most profitable area of focus for the Ukrainian contractors concerned, given a massive amount of T-64 tanks stockpiled in Ukraine and the ready availability of replacement parts and proven technologies and services for overhaul repair of main battle tanks in this category. The overhauled T-64BV-1 will be available at an average price of $200-250,000 per unit, which is comparable with the average selling price of the overhauled and upgraded T-72 tank (including the T-72UA1 modified with a new power pack) offered by Ukraine, Russia and some other countries.

Ukrainian arms-trading companies dealing with the promotion and marketing of main battle tanks in various price group categories must respond in a timely and flexible manner to changing market requirements in different regions of the world, and be able to pursue differing marketing strategies for products in different price group categories. It is necessary to take into account the fact that the MBT market is much less capacious than, for example, the market for aircraft or air defense weapons, and, besides this, it is extremely competition sensitive. However, even in these difficult conditions Ukraine supplied almost 1,700 units of light armored equipment to export customers during the period from 2005 to 2012 inclusive (relevant data for 2013 is yet to be released).

At the current time when the domestic market for armored fighting vehicles has been reduced almost to zero, export contracts have become the key source of financial resources needed for national defense industries to sustain development and growth. The country's armored fighting vehicle sector, which is currently structurally integrated under the armored vehicle division of the Ukroboronprom holding group, is one of few defense industries in Ukraine that enjoy self-sufficiency in the development and production of light and heavy armored military vehicles. Key elements in this chain – "Kharkiv Morozov Machne-Building Design Bureau" and "Malyshev plant" -- have maintained their capability to design and manufacture both upgraded and new types of armored fighting vehicles. UDR

3 T-64 upgraded to the T-64E standard. Being arguably one of the best modern tanks in the world in terms of capabilities versus cost trade-offs, T-64E is far less expensive to buy than BM "Bulat", for example

4 T-64BV-1, the overhauled configuration of the T-64 tank. The overhauled T-64BV-1 is available at an average price of $200-250,000 per unit

[trends]

FULLY AMPHIBIOUS WHEELED APC OFFERED BY UKRAINE

ANTON MIKHNENKO, UDR

MULTIFACE

TED BTR-4

The BTR-4 armored personnel carrier (APC) is one of the best known military vehicle designs developed in Ukraine since independence. This APC was developed from scratch by the "Kharkiv Morozov Machne-Building Design Bureau", rather than derived from Soviet-era designs. However, a number of political, economic and technological factors all had an impact on the success of this APC project. This notwithstanding, Ukrainian engineers are successful in their effort to expand the BTR-4 family of APCs by creating new, promising designs.

The BTR-4, a fully amphibious armored personnel carrier, which was designed as a private-venture by the "Kharkiv Morozov Machne-Building Design Bureau" (KMDB), was displayed multiple times at global arms exhibitions in various countries and demonstrated during military parades in Ukraine.

The vehicle is designed for battlefield troops transport and to provide fire support to dismounted troops. It is intended to support Army units operating in various battlefield environments and conditions, including NBC environments. The BTR-4 could form the basis of armored vehicle fleets of special operations/rapid reaction forces and marine forces. It has been designed to operate on road and cross country in extreme climates and adverse weathers, at day and at night.

The layout of the BTR-4 represents a dramatic change compared to the older BTR family of vehicles, including the BTR-60 /70/80/90. The vehicle hull is divided into three compartments, with the driving compartment in the front hull, the power pack compartment in the mid-center left hull and the fighting and personnel compartments at the rear of the hull. The power pack compartment is located immediately behind the driver's seat on its left, and it is linked to the troop compartment via a right-side passageway. The troop compartment in the rear hull has a two-part door (upper and lower parts which open outwards) for troop mount/dismount. The commander and driver can enter and exit the vehicle by side doors fitted with integral bullet-resistant windows. The windscreen is likewise of bulletproof glass-block construction, and it can be additionally protected with backfolding armor screens.

The BTR-4 layout design — which allows its fighting and troop compartments to be easily reconfigured without the need of rearranging the engine-transmission block — could be used as baseline configuration for a comprehensive family of armored fighting vehicles. The baseline BTR-4 design can form a basis for a family of specialist vehicles, including fire support vehicle, command/staff vehicle, armored medical evacuation vehicle, self-propelled anti-aircraft gun system, reconnaissance and observation vehicle and repair/recovery vehicle.

The APC's chassis has load carrying capability which not only allows for a broad variety of spinoff variants and AFV families to be designed on its basis, but also enables installation of appliqu armor protecting against automatic small-caliber gun fire.

This armored troop carrier can mount multipurpose above-hull weapons stations of various types, particularly the ones designed for lightweight armored fighting vehicles. The proposed selection of weapons modules includes the Ukrainian-designed BAU-23, SHTURM, GROM and PARUS. The instal-

lation of foreign-supplied counterparts is also possible if the customer demands so.

The baseline BTR-4 has combat weight of 17 tons (19.30 tons with the GROM weapons station), and with appliqu armor protection (against 30-mm gun fire) this can amount to 27 tons. The BTR-4 can carry a squad of eight personnel, in addition to its three-man crew (commander, driver and gunner).

The vehicle is powered by the 500hp two-stroke 3TD diesel engine integrated with an automatic hydrokinetic transmission, allowing for speeds of up to 110 km/h on paved roads. It can also travel off-road under severe dusty conditions, and has a swim capacity of 10 km/h.

However, the Ukrainian engine, while providing sufficient maneuverability, does not comply with the EU's ecological standards. Of course, the BTR-4 is designed to operate under conditions where the preservation of the environment is not a priority concern. An explosion of a tank round releases several times the amount of harmful substances than the Ukrainian diesel engine does. With a view to participation in potential European competitions, the BTR–4 could be made conforming to the EU's standards in two ways – either by equipping it with a western-supplied engine or upgrading the 3TD diesel to the Euro 3 standard. If the customer requires so, the vehicle could be equipped with a Deutz diesel engine rated at 489 hp or 598 hp.

After completion of government-commissioned trials, the BTR-4 entered service in the Ukrainian Armed Forces in July 2012. But, even after having approved the wheeled APC for service use, the Ukraine Ministry of Defense continued to be interested in having the baseline BTR-4 further improved as the core vehicle type of the Ukrainian Army's APC fleet. Improvements of interest included ballistic armor and anti-mine protections and more comfortable mount/dismount for the infantry squad.

The Morozov KMDB responded to these requirements by developing an improved and upgraded modification, the BTR-4MV, which was inaugurated at IDEX international arms exhibition in the United Arab Emirates by the Ukrspecexport arms dealer in 2013. The BTR-4MV incorporates several significant departures from the original design.

The baseline BTR-4MB is differentiated from its older siblings by virtue of providing a far higher level of ballistic protection in its front arc. The armor protection of the vehicle's body has been increased from Level 3 (12.7mm bullets over the frontal arc) in the original configuration to Level 5 (25mm rounds fired from 500m) according to STANAG 4569. As consequence, configuration of the frontal hull has changed substantially. Bullet-resistant windows and side doors for commander and driver have been sacrificed for the sake of increasing armor protection of the front hull. Additional armor protections (including explosive reactive armor and ceramic armor plates) are optional.

Anti-mine protection level of the BTR-4E was given as Level 3 according to STANAG 4569, which means the ability to withstand under-wheel detonation of 8 kg HE mines (the level of anti-mine survivability in case of an explosion under the hull has not been disclosed by the designer). An additional anti-mine floor protection is optional. For enhanced anti-mine survivability of the infantry squad, their seats are suspended from the ceiling rather than being bolted to the

floor as in previous modifications. The layout of the BTR-4MV, as is the case with the BTR-4E, allows for adding slat armor for enhanced protection against thin-walled RPG-type threats.

Accurate weight figures for the BTR-4MV have not been disclosed other than that the weight will be in the region of 17.5+3% t with standard bullet-proof armor protection kit and increase to 21.9+3% t with additional protection. It would be expected with a high degree of probability that the vehicle will be in the 19t category.

Furthermore, as claimed by the designer, the BTR-4MV, even with heavier armor protection than seen in the BTR-4E, still retained its swim capability at <10 km/h. The global market offers a very limited selection of amphibious APC types with corresponding armor protection levels. However, it can well be expected that with armor protection levels rising further, preservation of the vehicle's swim capability will become highly problematic if possible at all.

The BTR-4MV was displayed at IDEX 2013 featuring the PARUS weapons station that integrates the 30-mm ZTM-1 automatic gun defeating ground targets out to 4,000 meters; a 7.62-mm coaxial machinegun; a 30-mm AG-17 automatic grenade launcher capable of effective ranges of up to 1,700 meters; and antitank guided missile system BARYER with maximum launch range of 5,000 meters.

With the "Parus" weapons module, the troop compartment can accommodate seven personnel. The commander and driver can enter and exit the vehicle by side doors or roof hatches, or via aft door to troop compartment. The crew compartment is linked to the troop compartment via a right-side passageway. Visibility and observeability for the driver and commander are provided through triplexes. For an improved situational awareness, the commander can additionally use a 360o field-of-view camera installed on the roof of the weapons station, from where video is relayed to a black-and-white display screen in front of his seat.

One more dissimilarity with the previous model is a fully redesigned rear hull in the BTR-4MV vehicle. In contrast to the BTR-4E with its two-part door (upper and lower parts which open outwards), the rear hull in the BTR-4MV is fitted with a ramp that not only allows for easier troop egress/engress, but also enables transportation of bulk cargoes of various types, including additional ammunition allowances,

spare parts, etc. The ramp has an additional door for mount/dismount of the infantry squad.

In March 2014, the Morozov KMDB demonstrated the BTR-4E1, the latest modification of the BTR-4 APC equipped with additional armor protection. A prototype has been completed with an appliqu armor package for enhanced protection of the crew and passengers. The additional armor can be mounted/dismounted by crew members in the field conditions as required by the type of the missions performed and expected level of threats.

The first BTR-4 with additional armor protection has already been delivered to an export customer. Defense Express has learnt that this customer is a U.S. company that closely works with the Armed Forces and defense industries. The U.S. order in question includes the supply of several BTR-4s in the BTR-4E1 configuration.

Against the backdrop of all the difficulties now existing in Ukraine – organizational, financial, technological and political – the BTR-4 is still in demand on the export market. In 2009, Ukraine won a contract to supply 420 BTR-4 vehicles in baseline and mission-tailored configurations to Iraq. This contract facilitated the launching of a production line for the new APCs in Kharkiv. However, the contract failed to be completed as scheduled by 2012 for a number of reasons. Implementation of the contract is still in progress.

On 22 January 2014, Spetstechnoexport, a firm affiliated with the Ukroboronprom holding group, won the Indonesian MoD's APC competition and will be awarded a contract to supply five BTR-4 armored troop carriers to the Indonesian Armed Forces. Indonesia's Defense Minister Purnomo Yusgiantoro said his country would purchase 55 BTR-4s from Ukraine to replace the aging fleet of over 70 BTR-50P/M armored vehicles currently operated by the country's marine forces. It is foreseen that the BTR-50P replacement program would cover a timeframe from 2015 to 2019, but it is possible that the acquisitions of Ukrainian APCs under this program would be carried out within a shorter timeframe.

One more good news for the BTR-4 came out earlier this spring reporting that the vehicles would at last be purchased to meet the requirement of the Ukrainian Armed Forces. In April 2014, the newly appointed head of the Ukroboronprom holding group, Yuri Tereshchenko announced that his company would, in the near term, hand over 74 armored personnel carriers, including 58 BTR-4s to Ukraine's National Guards. It is expected that the armored vehicles to be made available to the National Guards will include 41 combat maneuver vehicles BTR-4E, seven command vehicles BTR-4K, two command post vehicles BTR-4KSH and eight battlefield ambulances BMM-4S. Of this quantity, 29 BTR-4E, five BTR-4K, six PMM-4S and two BTR-4-KSh vehicles have been assembled and ready for delivery.

As we can see, Ukraine – despite the need to deal with a whole tangle of scientific, technological, production and organizational issues – has been successful in creating new types of armored equipment that are not only modern by current standards but are also in demand on both the domestic and export markets. UDR

EXPERTS ESTIMATE THE WORLDWIDE MARKET FOR THE NATO COMPATIBLE BTR-4 ARMORED TROOP CARRIER AT 2,000 UNITS MINIMUM OVER THE NEXT TEN YEARS. THE VEHICLE WILL CARRY A PRICE TAG OF $1.5…2.0 M DEPENDING ON THE CONFIGURATION. WITH FULLY INTEGRATED AMERICAN TECHNOLOGICAL SOLUTIONS, THE BTR-4, IN THE OPINION OF DEFENSE SOLUTIONS, WILL BE THE LOWEST LIFE CYCLE COST VEHICLE IN ITS CLASS AND AN EXCELLENT CANDIDATE VEHICLE FOR NEW NATO MEMBERS AND FOR UN PEACEKEEPING OPERATIONS.

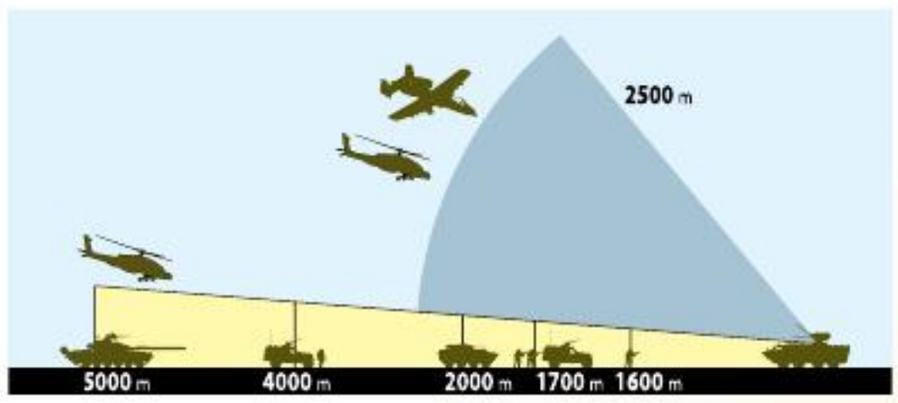
BTR-4
fully amphibious wheeled armored personnel carrier

Designed and developed by the "Kharkiv Morozov Machne-Building Design Bureau"

The BTR-4 was designed to conform to the Ukraine Ministry of Defense specification for armored military vehicles in this category

The BTR-4 "Ladya" APC is designed for battlefield troops transport and to provide fire support to dismounted troops. It is intended to support mounted and dismounted infantry operations in various battlefield environments and conditions, including NBC environments.

ARMAMENTS



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. The BAU-23, SHTURM, GROM and PARUS – the most potent combat modules in firepower terms – integrate identical weapons kits comprised of:

- 30-mm ZTM-1 automatic gun defeating ground targets out to 4,000 meters;
- 7.62-mm coaxial machinegun;
- 30-mm AG-17 automatic grenade launcher capable of effective ranges of up to 1,700 meters;
- antitank guided missile (ATGM) system BARYER with maximum launch range of 5,000 meters.

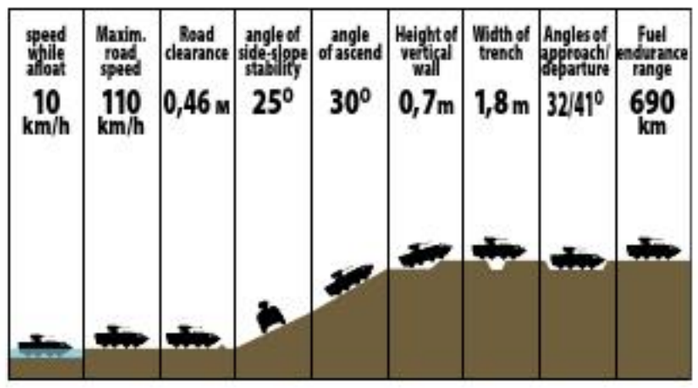
STRATEGIC MOBILITY

18t + 3%

The BTR-4 with additional armor protection may weigh up to 27 tons

The BTR-4 is air-deployable on the Antonov AN-70-class military transports or similar types of aircraft; transport configuration would depend on specific configuration of the vehicle being transported

RIDE CHARACTERISTICS



POTENTIAL CONFIGURATIONS:

- **BTR-4 armed with the GROM remote weapons station**

- **Armored command and control vehicle**

- **armored medical evacuation vehicle**

- **fire support vehicle**

- **reconnaissance and observation vehicle**

- **armored recovery vehicle**

CARRYING CAPACITY

BTR-4MV

WHEELED 8X8 ARMORED PERSONNEL CARRIER

Price-tag for the BTR-4MV will be on a par with the BTR-4E's and vary with the number of vehicles contracted for delivery under each specific deal as well as required equipment fits and armor protection levels. On an average, per-unit price-tag may vary between USD 1.2 million and 1.5 million.

Designer

Federal budget-supported enterprise «Kharkiv's Morozov Machne-Building Design Bureau», Kharkiv

The BTR-4MV is the youngest sibling in the BTR-4 family of armored personnel carriers. In its baseline configuration, it is designed for battlefield troop transport and to provide fire support to dismounted troops. It offers increased protection levels and more comfortable operational environment for the infantry squad as compared to its older sibling, the BTR-4E.

Commander

For an improved situational awareness, the commander can use a 360o field-of-view camera installed on the roof of the weapon station, from where live video is relayed to a black-and-white display screen in front of his seat.

Driver

Steers the vehicle during mounted combat, using a periscope for visualization. During travel, viewing is through an open hatch

The vehicle will weigh

17,5 t + 3%

with standard bullet-proof armor protection kit, and 21.9+3% t – with additional armor protection

Crew

Paratroopers

Rear hull

In contrast to the BTR-4E with its two-part door (upper and lower parts which open outwards), the rear hull in the BTR-4MV is fitted with a ramp that not only allows for easier troop egress/engress, but also enables transportation of bulk cargoes of various types. The ramp has an additional door for mount/dismount of the infantry squad.

BTR-4MV. Rear view

BTR-4MV. Rear view

The Gunner

The gunner's station with a collapsible control console for above-hull weapons is located in the depth of the troop compartment in the left aft section of the hull. Passengers' seats are suspended from the ceiling for minimizing the shockwave impact from a HE mine detonation.

Remote weapon station Parus

Is accessible for control by both the gunner and commander. The proposed selection of above-hull weapon stations for the BTR-4MV includes BAU-23, SHTURM, GROM and PARUS

Waterjet

Propels the vehicle when afloat at 10 km/h.

Powerplant

German-supplied six-cylinder Deutz BF6M1015CP diesel engine rated at 450hp/330kW that allows the vehicle to travel at up to 110 kmph to the maximum range of 670 kilometers per charge.

The BTR-4MV would withstand the explosion of 8 kg of TNT under any of the wheels

Wheels are of the Central Tire Inflation System (CTIS) type with Michelin 335/80 R20 or Kormoran 295/80 R22,5 tires or newly designed Ukrainian tires

BTR-4MV with remote weapon station Parus. Frontal view

BTR-4MV. Frontal view

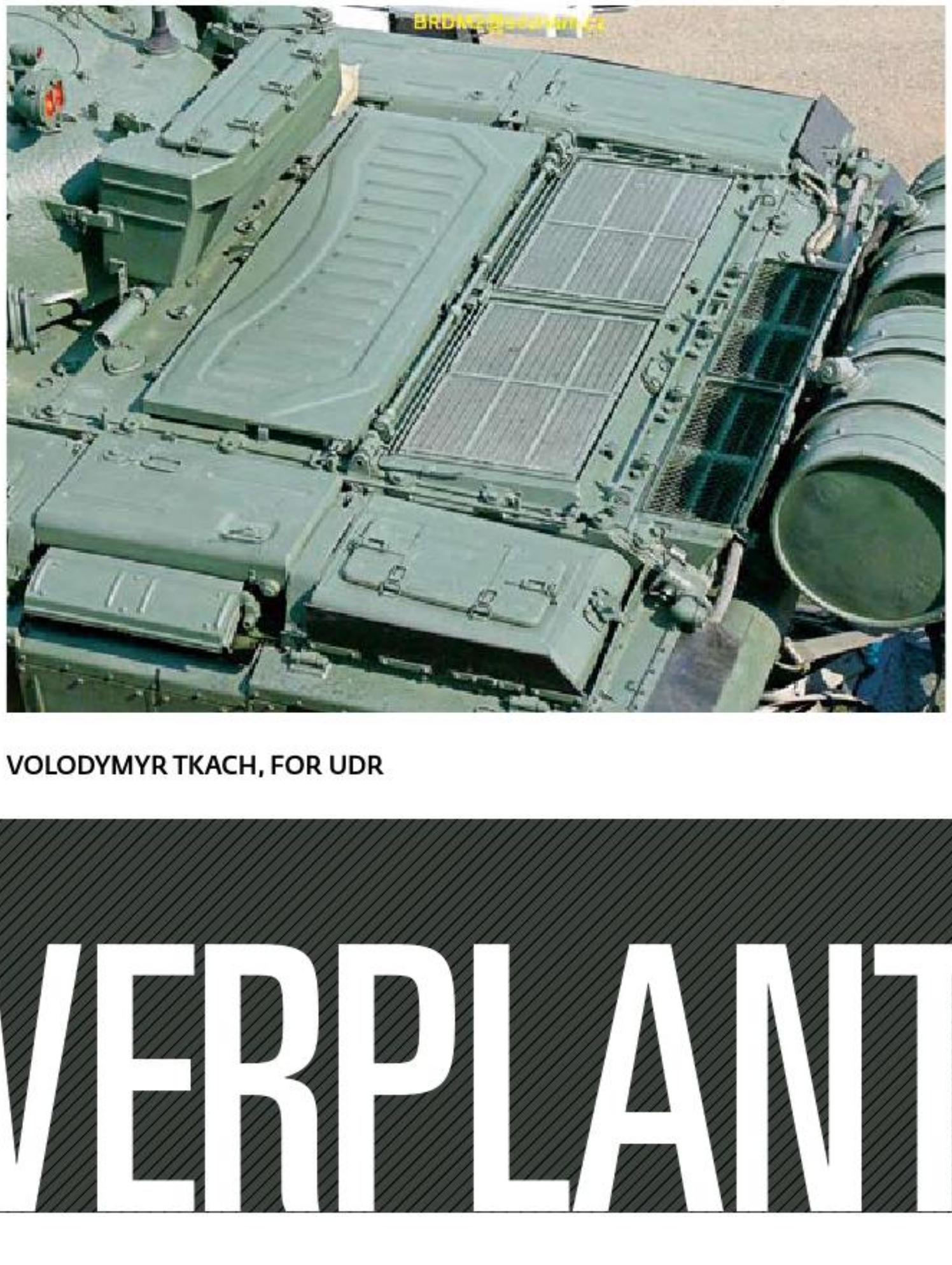
Frontal view

Bullet-proof windows and side doors for the commander and driver have been sacrificed for the sake of increased armor protection over the frontal arc. The BTR-4MV is protected against 25mm rounds fired from 500 meters over the frontal arc. The BTR-4E withstands attacks with 12.7mm weapons over the frontal arc.

[technologies]

Ukraine could be justifiably considered one of the world's established trendsetters in the tank diesel engine area. The global main battle tank [MBT] fleet consists of tanks of two types: diesel engine tanks and gas-turbine-powered tanks. Diesel-driven tanks are in service with 111 armies across the world, while only nine armies operate tanks fitted with gas turbines.

State-of-the-art tank engines developed by State Enterprise "Kharkov Engine Design Bureau" (KEDB) meet the most demanding standards in this field, and they integrate innovative solutions that could propel them to a new level of quality. KEDB has developed a



VOLODYMYR TKACH, FOR UDR

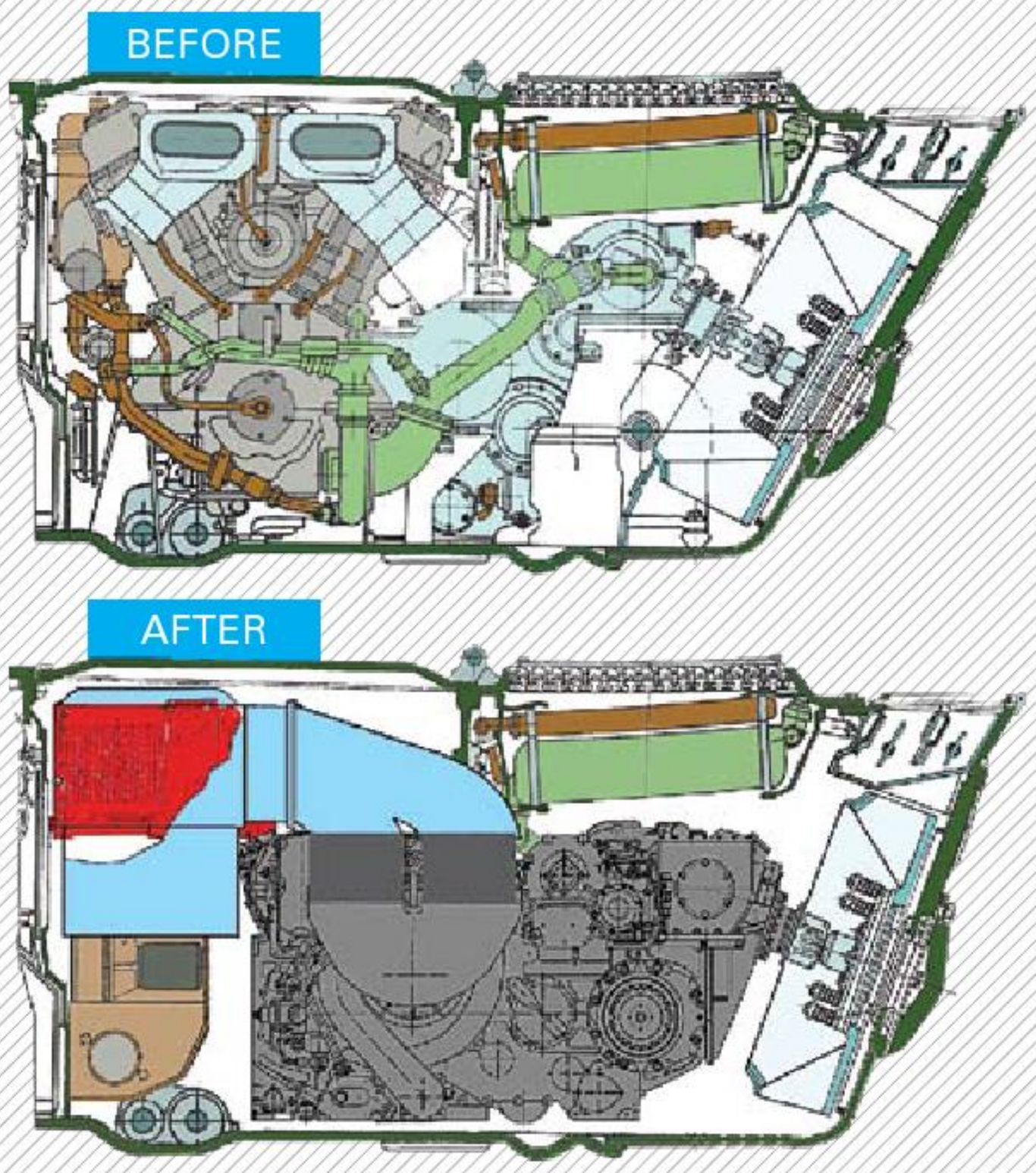
POWERPLANT SYSTEM

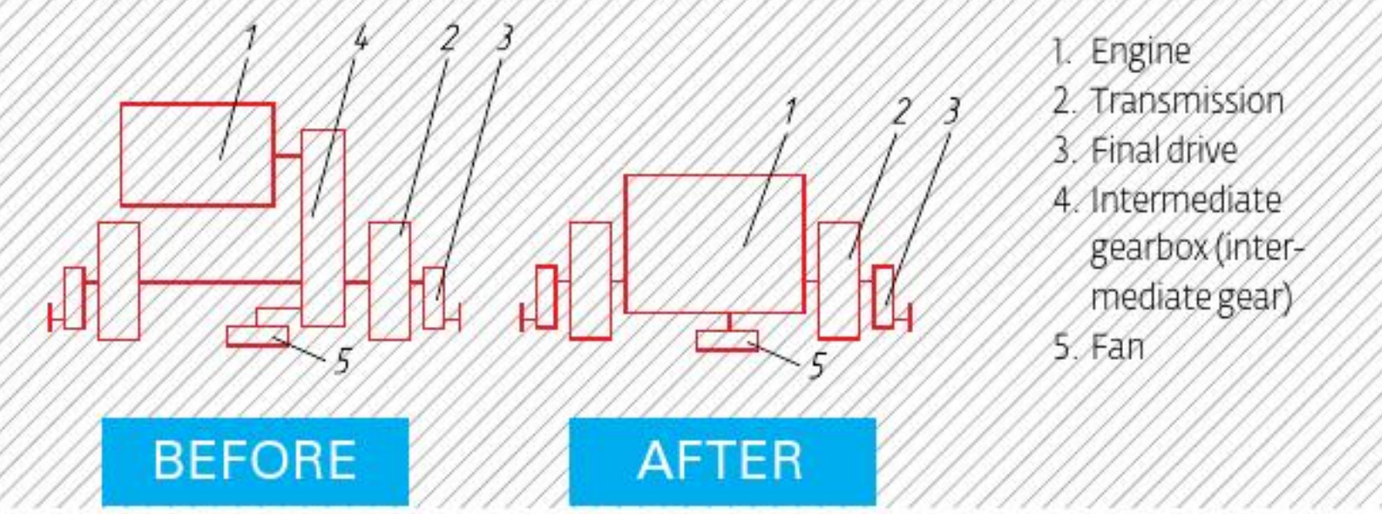
number of new items which have already earned themselves favorable reputation both on the domestic and export markets.

The Company has recently completed R&D on a new family of three-cylinder diesel engines generating 280 hp, 400 hp, 500 hp and 600 hp, designed for installation on lightweight ar-

The upgrade package for the T-72 MBT proposed by Kharkiv's KBD Engine Design Bureau includes replacement of a standard power pack with the 5TDFMA engine, which provides the following advantages:

- a 35 percent increase in the engine-transmission system's output power with no change of the engine compartment's space requirement;
- through a change in component arrangement, an extra space is released in the engine compartment, enabling the installation of an auxiliary power plant (a 10kW EA10U) and an AC compressor;
- medium soil-road speed of the host vehicle increases from 32...38 km/h to 45...50 km/h, and oil consumption falls to 2.5...3.0 kg/h from 5 kg/h.





mored fighting vehicles in the armored personnel carrier (APC) and infantry fighting vehicle (IFV) categories, wheeled as well as tracked.

One of the Company's most recent designs is a two-stroke reciprocating 700-hp engine designated 5TDF, which offers unique performance capabilities in terms of power-to-weight ratio, weight and bulk, and is claimed to have determined the overall outlay design of the T-64 MBT. East-west mounting of the engine in the tank's power pack compartment, double-sided power take-off, decreased latitudinal dimensions and low heat release ensured that the tank has lower silhouette and reduced weight as compared to rival designs. The engine has undergone several improvements to its performance, producing an engine providing 1,000 hp.

Using a five-cylinder engine as baseline design, KEDB has developed more capable six-cylinder configurations – the 6TD-1 generating 1,000 hp and 6TD-2 developing 1,200 hp, intended for integration with the T-80UD MBT the T-84 MBT, respectively. Optimized for operation in desert-type environments heated up to +55°C, the two engines surpass all of the currently existing counterparts in terms of the power-to-weight ratio and engine compartment space requirement. These are two-stroke, multifuel, highly supercharged, liquid-cooled engines with direct fuel injection, counter-moving pistons and level-positioned cylinders, which can run on various fuel types, including diesel fuel, petrol, kerosene, jet-propulsion fuel or mixtures of these in various proportions.

DBK has recently added new design -- the 6TD-3 -- to its range of MBT engines. Weighing 1,210 kilograms, the 6TD-3 showed bench tested horsepower of 1,400,

BASIC SPECIFICATIONS OF THE 3TD FAMILY OF TANK DIESEL ENGINES

	3TD-1	3TD-2	3TD-3	3TD-4
Output, kW/hp	205.9/280	294.2/400	367.75/500	441.3/600
Number of cylinders	3	3	3	3
Displacement, l	8.15	8.15	8.15	8.15
Crankshaft rotation rate, min–1	2,600	2,600	2,600	2,600
Specific fuel consumption, g/kW (h/hp h)	224.49 (165)	224.49 (165)	224.49 (165)	224.49 (165)
Length, mm	1,231	1,231	1,182	1,182
Width, mm	955	955	955	955
Height , mm	581	581	581	581
Weight, kg	850	850	800	800

Ukrainian Defense Review

BASIC SPECIFICATIONS OF THE 5TD FAMILY OF TANK DIESEL ENGINES

	5TDF	5TDFM	5TDFMA
Output, kW(hp)	515 (700)	625 (850)	772 (1,050)
Number of cylinders	5	5	5
Displacement, l	13.6	13.6	13.6
Crankshaft rotation rate, min–1	2,800	2,800	2,800
Specific fuel consumption, g/kW (h/hp h)	231.14 (170)	227.21 (167)	227.21 (167)
Length, mm	1,413	1,413	1,413
Width, mm	955	955	955
Height, mm	581	581	581
Weight, kg	1,040	1,040	1,040

Ukrainian Defense Review

BASIC SPECIFICATIONS OF THE 6TD FAMILY OF TANK DIESEL ENGINES

	6TD-1	6TD-2	6TD-3
Output, kW(hp)	735 (1,000)	882 (1,200)	(1,400)
Number of cylinders	6	6	6
Displacement, l	16.3	16.3	16.3
Crankshaft rotation rate, min–1	2,800	2,600	2,850
Specific fuel consumption, g/kW (h/hp h)	214.8 (158)	217.7 (160)	(160)
Length, mm	1,602	1,602	1,698
Width, mm	955	955	955
Height, mm	581	581	581
Weight, kg	1,180	1,180	1,210

Ukrainian Defense Review

5TDF is designed for installation on the T-64 MBT | **5TDFM** is designed for installation on the T-64BM MBT | **5TDFMA** is suitable for installation on the T-72 MBT. The 6TD-1 is designed for T-80UD and BULAT MBTs, The 6TD-2 is designed for T-84 MBT.

meaning it is superior to the German Series 890 rival, which delivers a power-to-weight ratio of one horsepower per each kilogram. Consuming 160 grams of fuel per horsepower per hour, the new Ukrainian engine releases 30% less heat than a four-stroke counterpart. The new engine is currently being adjusted to a specific MBT type.

In terms of its dimensions, the 6TD-3 has little dissimilarity from the 6TD-2E motor on the T-84 "Oplot" MBT, and it has the potential to be used as the main power plant unit of engine transmission systems designed for upgrading the 'Oplot' and foreign-produced MBTs. With the 6TD-3, the engine compartment space requirement will not exceed 3.5 m3, enabling a record-high specific volume of 430 hp/m^3.

Apart from tank diesel engines, KEDB deals with the design and development of standby electric power units. Specifically for MBT applications, the KEDB has designed several compact auxiliary power units generating 8 and 10 kW to allow the vehicle to run key subsystems without the main engine running, to ensure a more economical use of the main engine's service life, and to provide electricity for battery recharging. Given that the modern tank engine operates idle during almost half of its service life, a standby electric power unit provides a 50 percent service life economy for the main propulsion, and also adds significantly to the vehicle's stealth performance (as acoustic and thermal signatures produced by supplementary engine are several times lower than the main engine's).

In addition to MBT engines, KEDB proposes its own innovative solutions for upgrading existing types of armored military vehicles. The KEDB's upgrade package for the T-72 MBT, for example, includes replacing the tank's standard engine with a power pack consisting of the main power plant, an auxiliary power unit and an AC compressor, all accommodated in the vehicle's power pack compartment. Most importantly, this package does not require any serious alternations in the overall layout design of the vehicle, which translates into reduced time and the cost of modernization, and also enables the upgrade to be performed under field conditions.

The upgrade package proposed by KEDB for the T-72 MBT would provide a single solution to three challenges facing tank designers. For one thing, replacing a standard engine with the newer 5TDFMA diesel would increase output up to 1050 hp. Secondly, the less bulky main propulsion allows for room for an auxiliary power unit to be accommodated in the power pack compartment. Thirdly, and finally, the compartment space released as a result of using a less bulky engine would allow for accommodation of an AC compressor. Upgrading the T-72 tank with the 5TDFMA diesel would provide improvements such as better maneuverability, increased fuel and lubricant economy, and, due to reduced vibration, a higher level of comfort for the crew and a more favorable working environment for onboard electronic equipment.

Meanwhile, the Fiscal Enterprise Morozov Machine Design Bureau [MDB] of Kharkiv, Ukraine's leading designer of wheeled and tracked armored vehicles, proposes its own solution to upgrading the Soviet-vintage T-72 MBT to more capable T72-AG configuration. The T-72AG upgrade is powered by the newly-designed 6TD-series engine which was developed specifically for the T-80UD "Oplot" MBT application , replacing a standard 780/840 hp engine equipping the baseline T-72, and enabling operation in hot-temperature environments. The 6TD engine has a highly compact layout design allowing it to be arranged east-west in the tank's power pack compartment and coaxial with transmission gear boxes, resulting in the power pack compartment's space requirement reduced to 3.1 m^3. UDR

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[on the leading edge]

NEW U.S. ARMORED VEHICLE COMMANDO MIGHT BE ARMED WITH ATGW MISSILE ROUND FROM UKRAINE

SERHIY HRYNCHENKO
FOR UDR

FALARICK FOR

Textron Marine & Land Systems (TM&LS), an operating unit of Textron Systems, a Textron Inc. (NYSE: TXT) company, has introduced the latest vehicle in its COMMANDO(TM) four-wheeled armored vehicle line-up.

The new 90mm Direct Fire vehicle is equipped with a CMI Defence Cockerill CSE 90LP weapon system, which offers day/night combat capability for tactical options ranging from counter-insurgency to conventional combat operations. The two-person, low-profile turret is lightweight and simple to operate and maintain, and is outfitted with a Cockerill Mk3 90mm low pressure gun. More than 2,300 guns in the Mk3 family are in service on vehicles across the globe and have proven themselves to be a reliable and accurate weapon.

In this context, it is important to note that, in 2013, State Enterprise "State Kyiv Design Bureau "Luch", Ukraine's lead designer of ATGW weapons, and Cockerill Maintenance & Ingénierie (CMI) of Belgium unveiled ATGW missile round Falarick 90. The new round can be launched from a Cockerill 90-mm gun turret to ranges of up to four kilometers, which is more than twice the ranges accessible to standard tank-launched munitions. Previously, the 16-t BTR-3E (8x8) armored personnel

FALARICK 90
90 MM GUIDED MISSILE ROUND

carrier (APC) from Ukraine was demonstrated fitted with the latest Cockerill CSE 90LP two-person turret. The latter is armed with a low-pressure 90mm smoothbore gun that can fire a wide range of ammunition.

COMMANDO

This project is being promoted by State Company Ukroboronservice, while State Enterprise 'Machinery and Repair Plant of Kiev' manufactured the baseline APC with an expanded-diameter turret ring to accommodate a heavier turret. According to statements made by CMI Defence officials at IDEX 2013 exhibition, the BTR-3 APC equipped with new Cockerill CSE 90LP turret will carry a price tag of some USD 2 million.

Now it seems highly probable that the Falarick 90 ATGW round will be used to augment the combat capability of the COMMANDO 90mm Direct Fire vehicle which meets growing international demand for significantly greater under-armor firepower integrated on a highly-mobile armored vehicle. "Our new vehicles are a direct response to multiple international customers seeking additional firepower in highly-protected, mobile and sustainable armored vehicles," explained Tom Walmsley, TM&LS senior vice president and general manager. "The 90mm Direct Fire vehicle uses our combat-proven COMMANDO Select platform and adds a trusted CMI Defence turret to deliver an effective package for a wide range of military and security applications."

Rigorously tested and proven in the toughest environments, TM&LS' COMMANDO family of armored vehicles utilize a V-Hull with all systems protected under armor to deliver superior mine-blast protection while also providing unmatched on-road/off-road mobility. These vehicles are easy to maintain and operate, with readily available parts, training and service support. TM&LS offers four lines of COMMANDO four-wheeled vehicles – COMMANDO Elite, COMMANDO Select, COMMANDO Advanced and COMMANDO Utility.

During the past two years more than 550 COMMANDO Select vehicles, in three variants, have been delivered for use by the Afghan National Army's Mobile Strike Force units. Overall, more than 8,000 TM&LS COMMANDO armored vehicles are in the inventories of nations including Afghanistan, Colombia, Iraq, Malaysia, Saudi Arabia, Taiwan, Thailand and the United States. An additional 600 vehicles are in various phases of production and delivery to militaries in Canada, Colombia and Afghanistan. UDR

[direct speech]

DENIS DANKO

UKRAINIAN DEFENSE CONSULTING

OUR FIRE CONTROL SYSTEM CAPABILITIES TO ARTILLERY

The latest trends seen on the international arms market demonstrate that artillery guns and howitzers, which had long been overshadowed by air-borne weapons, are gradually regaining their position, not least due to automation and computerization of fire control functions. Ukrainian Defense Consulting (UDC) has been actively engaged in this area. UDC has recently equipped artillery units of the Afghan Armed Forces (AAF) with its proprietary computerized fire control system. The following is an interview conducted with Denis Danko, CEO of UDC, by Defense Express on the Company's achievements and plans for the future.

ADDS NEW WEAPONS

DE: Denis, please give a few words about the Company, the history of its establishment and growth.

– To begin with I would like to note that Ukrainian Defense Consulting is rather a unique phenomenon on the Ukrainian market. It was by mere chance that we found ourselves in the defense technology business.

[direct speech]

It all started in 2004 when we were consulting some major American companies interested in purchasing some products from arms-trading companies in Ukraine. We established our Company, got a license for relevant operations and took upon ourselves some risks involved with the implementation of our contractual obligations. In the following years we were assisting American companies such as Lockheed Martin, General Dynamics, Northrop Grumman and Dynacord to establish contacts with manufacturing companies in Ukraine. The first major contract in which we were involved included the delivery of 110 BMP-1 [infantry fighting vehicles], assisted by Zhytomyr armored military vehicle factory and Ukrinmash corporation for the benefit of the U.S. firm BULOVA Technologies Group, Inc. Our mission was to reconcile all the differences between relevant regulations, procedures and requirements existing in Ukraine and the USA.

Afterwards, we began work with the Shepetivka Repair Plant who deals with repair of artillery rocket systems. This cooperation was driven by the plans the Americans had with respect to equipping AAF's artillery forces with weapons and military equipment, especially artillery gun systems. These included 82-mm mortars and 122-mm howitzers. This project was launched in 2008, but the progress was rather modest there. We assisted the arms-trading company and the Shepetivka Plant with implementing a few small contracts on the delivery of parts and components for 82-mm mortars and 122-mm howitzers. This work served as good practice for us and also for arms-trading companies and manufacturers, since it contributed to our experience of interaction with American customers. This was followed by a major deal between Ukraine and General Dynamics involving the supply of 44 D-30 howitzers, twenty-five pre-packaged kits, supplementary equipment and in-service support services for the benefit, again, of the Afghan army.

The Universal Ballistic Computer enables to rapidly convert artillery range tables tailored to both NATO and Warsaw Pact ordnance systems; to generate targeting data for gun aimers, and also allows variables such as firing conditions, the mode of artillery engagement or ordnance allocations to be factored into the firing solutions.

DE: What made you get involved in the field of developing devices for fire control?

– During the contract for the export of Soviet-vintage howitzers to Afghanistan, the Americans requested that we assist with "converting" the weapons from Warsaw Pact's 1/6000 mil scale to NATO's 1/6400 system. This was needed to enable U.S. military instructors to provide targeting data to Afghan gunner trainees using their conventional mils system. So we decided to create a dedicated device – a ballistic calculator that would compute the conversion values and generate data matched to a specific type of the weapon used – be it of the Warsaw Pact or NATO standard. We completed it in late 2008 and designated it "Universal Ballistic Computer" (UBC). We managed to convert artillery range tables, create relevant software applications and produce a computer capable of generating targeting data

in both the NATO and Warsaw Pact's mils and enabling variables such as firing conditions, the mode of artillery engagement or ordnance allocations to be factored into the firing solutions. The UBC accepts map references in either the universal transverse Mercator (UTM) or the Pulkovo-1942 (SC-42) coordinate systems.

DE: What is the Universal Ballistic Computer?

– Based on the PDA TDS NOMAD ruggedized hand-held platform, the UDC runs on the operating system WINDOWS Mobile 6; it is compatible with the IP67 and MIL-STD 810F standard requirements concerning resistance to environmental stresses; and it has GPS, Wi-Fi and Bluetooth functions for automated data exchange with the end-user devices.

Weather correction is enabled using the automatic 110-WS-16 Modular Weather Station for ground weather data collecting and averaging. The weather station is networked to the UBC via Bluetooth.

Developed specifically for the PDA NOMAD platform, the Universal Ballistic Solution (UBS) software application uses successive approximations (iterations) method for generating firing solutions. As weather corrections are calculated directly on the target, the UBS more reliably and accurately calculates the effects of longitudinal and lateral winds on the projectile's trajectory than using the method where firing solutions are generated based on ballistic correction charts. The interface enables input of variables such as coordinates of every artillery site or artillery group observation posts, targeting data and weather data, and it enables the corrections to be made during trial fire.

Weather data can be put in either manually or by means of automated data exchange with the 110-WS-16 Modular Weather Station. In generating firing solutions, the software application calculates and provides the best suitable, mission specific combinations of projectiles and charges, and automatically calculates the probability of success when engaging targets from defilade positions. GPS and an embedded sub-application are used for computing deployment coordinates both in NATO's WGS-84 and Warsaw Pact's SC-42 coordinate systems.

DE: What advantages does your system have over foreign-designed counterparts?

– I have never seen any direct equivalents. The key feature is that, if we compare this with manual techniques, these give a Circular Error Probable (CEP)

In the period from August to October 2013, we worked with students of the Ukrainian Land Forces Academy in order to field test UBLFDS equipment on D-30 howitzers at a firing range near Lviv. The students mastered the use of the UBLFDS equipment just after a 20-minute instruction session.

of 40 meters, while the algorithm implemented in the UBS application reduces this to 20 meters. This algorithm requires a significant amount of computation, which will take the artillery officer too much time to do manually. Our device will do this within a second's time. All the officer will need to do is to competently integrate the input data – the range, coordinates and the environmental conditions – and to generate the fire settings. Our software can be installed on any platform running on the Windows Mobile 6+ operating system. In addition, if the artillery range table is used in a digitized format, it can be expanded with additional data relevant for a wider range of artillery weapons types – Warsaw Pact's as well as NATO's. Finally, we have versions of the software applications developed for the 82-mm mortars 2B14, BM-37 and M69A; 120-mm mortars 2S12 and M-43, self-propelled howitzer 2S1, towed 122-mm howitzer M-30, towed 152-mm howitzer D-20, 122-mm MLRS system BM-21 "Grad" and towed 130-mm gun-howitzer M-46.

DE: What is your calculation as to how many such devices an artillery unit will need?

– If the Warsaw Pact's "doctrine" concerning the use of the D-30 howitzer battery is to be strictly pursued, we recommend two computers per battery – one for the battery commander and the other for the forward observer. If one employs the "doctrine" used by the U.S. in Afghanistan (where each gun in a battery is operating independently of others), there should be one device per gun. Furthermore, a weather station is required for the device to work. So it could be summed up that two to three our computers plus a weather station are re-

quired per each artillery gun battery. However it should be emphasized that choices are aplenty depending on specific modes of engagement of artillery guns or mortars.

DE: Jane's International Defence Review has reported that your Company equipped the Afghan National Army (ANA) with a gun battery fire control system – the Universal Battery Level Fire Direction System (UBLFDS). Could you elaborate on that, please?

– This marked a new milestone in our Company's work. The UBLFDS is a higher level system that enables real time dissemination of data across a network, which is intended to speed up the fires process and improve efficiency. The system automates the preparation and fine targeting of the various artillery pieces. A UBLFDS set is comprised of a handheld computer at the battery command level, position sensors (fitted to the ordnance), and a tablet computer for each artillery piece's commander. All of the system's components are linked on a wireless network. The battery commander is provided with weapon position and orientation data from the sensors and after inputting target, weapons, ammunition, and other relevant mission data, is able to issue weapons placing commands and create fire settings for each of the weapon commanders' tablet computers. Real-time weather data support of battery operations is provided using the modular 110-WS-16 weather station.

DE: How many UBLFDS equipment sets have been exported to Afghanistan?

– Around 300 systems have been delivered, of which 45-50 are now used for training, the others being used with the ANA's 122-mm D-30 howitzers.

Around 300 equipment sets have been exported to Afghanistan, of which 45-50 are now used for training, the others being used with the ANA's 122-mm D-30 howitzers.

DE: Is the Ukrainian MoD interested in products of this kind? Have there been any trials? Have there been any opinions or requests expressed?

– The first question asked by potential export customers is, whether the equipment is accepted for service use in the Ukraine army, and this used to be a seri-

ous stumbling stone in our work with export customers. While developing our devices we, indeed, had them tested in Ukraine and worked together with the Ministry of Defense.

At one time, our Company approached the Chief of General Staff of the Ukrainian Armed Forces with an offer to provide computers with the UBS software application to troops in the field for user evaluation. The offer was accepted and then two sets of TDS Nomad platforms with UBS software and the modular 110-WS-16 Weather Station were allocated on a temporary basis to a D-30 fire unit of the Lviv-based airborne/air mobile regiment for testing and user evaluation. Upon the expiration of test period the users gave positive feedback about the TDS Nomad computer with UBS software and the modular 110-WS-16 Weather Station.

In the period from August to October 2013, we worked with students of the Ukrainian Land Forces Academy in order to field test UBLFDS equipment at a firing range near Lviv, using D-30 howitzers.

The students mastered the use of the UBLFDS equipment just after a 20-minute instruction session. During November 2013, UDC employees tested the UBLFDS on the Grad MLRS at the Rivne firing range. These trials took place during a field exercise for the Ukrainian Army's 80th Aeromobile Regiment. At this time, work has commenced to draw up a program of state trials required for the TDS NOMAD with UBS software and 110 -WS–16 Modular Weather Station to be approved for service use in the Ukrainian Armed Forces' artillery gun units. Time will tell how cooperation with the MoD will proceed in the future, but in general it should be said that the MoD is interested to purchase and field our devices, but all will depend on the funding of the Ministry's budget…

I just want to point out that – if we want our army and artillery weapons to be modernized – the device that we offer is a readily available solution, and the use of the UDC technology would certainly remove the compatibility and interoperability issue where joint operations with NATO forces are concerned.

DE: What do you think will be the significance of the weapons such as artillery guns at a time when most of target engagement missions are currently assigned to airborne weapons?

– Field artillery has long been overshadowed by aircraft-carried weapons. But even the Americans, with all their money in their hands, have seen that a huge amount of missions can be done without them. Indeed, the use of air-launched weapons is an expensive luxury in some cases. Add to this issues such as potential civilian casualties and limitations on the use of aircraft during night hours or adverse weather conditions that make safe flights challenging. So most countries are now placing an emphasis on the development of precision-guided munitions. With modern fire control capabilities in place, the use of artillery gun systems and mortar batteries would be much more effective and efficient.

DE: Now the last question is, which markets hold most promise for your Company?

– Of course, India and markets in Africa are indeed of much interest. But there is still much work to be done there... UDR

Interviewed by Anton MIKHNENKO, UDR

UBLFDS

UNIVERSAL BATTERY LEVEL FIRE DIRECTION SYSTEM

At this time, the system is being prepared for state trials required for the TDS NOMAD with UBS software and the 110-WS-16 Modular Weather Station to be approved for service use in the Ukrainian Armed Forces' artillery gun units.

Designer
Ukrainian Defense Consulting,
Kiev

The Universal Battery Level Fire Direction System is designed to automate the pre-firing preparation and fine targeting of various artillery pieces and mortars. The system enables real time dissemination of data across a network, which is intended to speed up the fires process and improve efficiency. A UBLFDS set is comprised of a handheld computer at the battery command level, position sensors (fitted to artillery guns), and a tablet computer for each artillery piece's commander.

The Universal Ballistic Computer (UBC)

Based on the PDA TDS NOMAD ruggedized hand-held-platform, the UDC runs on the operating system WINDOWS Mobile 6. The interface enables input of variables such as coordinates of every artillery site or artillery group observation posts, targeting data and weather data, and also enables the corrections to be made during trial fire. In generating firing solutions, the UBC software application calculates and provides the best suitable, mission specific combinations of projectiles and charges, and automatically calculates the probability of success when engaging targets from defilade positions. GPS and an embedded sub-application are used for computing deployment coordinates both in NATO's WGS-84 and Warsaw Pact's SC-42 coordinate systems. It has GPS, Wi-Fi and Bluetooth functions for automated data exchange with the end-user devices.

The automatic 110-WS-16 Modular Weather Station

Provides real-time weather data support of battery operations. The weather station is networked to the Ballistic Computer via Bluetooth.

Position sensors

Two sensors are fitted to every artillery gun. One is digital elevation error sensor (1) with LAN capability and the other is digital azimuth error sensor (2).

Application Range

The Battery Level Fire Direction System is suitable for use with the 82-mm mortars 2B14, BM-37 and M69A; 120-mm mortars 2S12 and M-43; self-propelled howitzer 2S1, towed 122-mm howitzer M-30, towed 152-mm howitzer D-20, 122-mm MLRS system BM-21 «Grad», towed 130-mm gun-howitzer M-46 and other types of artillery weapons.

All of the system's components are linked on a wireless network via Wi-Fi/Bluetooth technology.

Tablet computer of the artillery piece's commander

Provides the artillery piece's commander with the firing settings and other relevant mission data from the battery commander

[cooperation]

UA WEAPONS

BRAND-NEW MISSILE-AND-GUN SHIP OF THE

DMYTRO BOGDANOV FOR UDR

Over the past few years, Ukraine and the Republic of Kazakhstan have significantly expanded the horizons of military-technical cooperation in the field of naval shipbuilding. Defense industries in both countries have received invaluable experience of mutually beneficial cooperation . In 1993, Kazakhstan decided to create its national naval forces to secure its interests in the Caspian Sea region. Bought from foreign suppliers, the first vessels of the new naval force were added to the already existing fleet left behind by the Soviet era. Later on, however, the Republic decided that ships for its naval fleet should be built domestically. In that endeavor, Ukrainian shipbuilders and manufacturers of naval technology provided a considerable amount of assistance to their Kazakh counterparts.

FOR KZ NAVY

KAZAKHSTAN NAVY. UKRAINIAN CONTRIBUTION

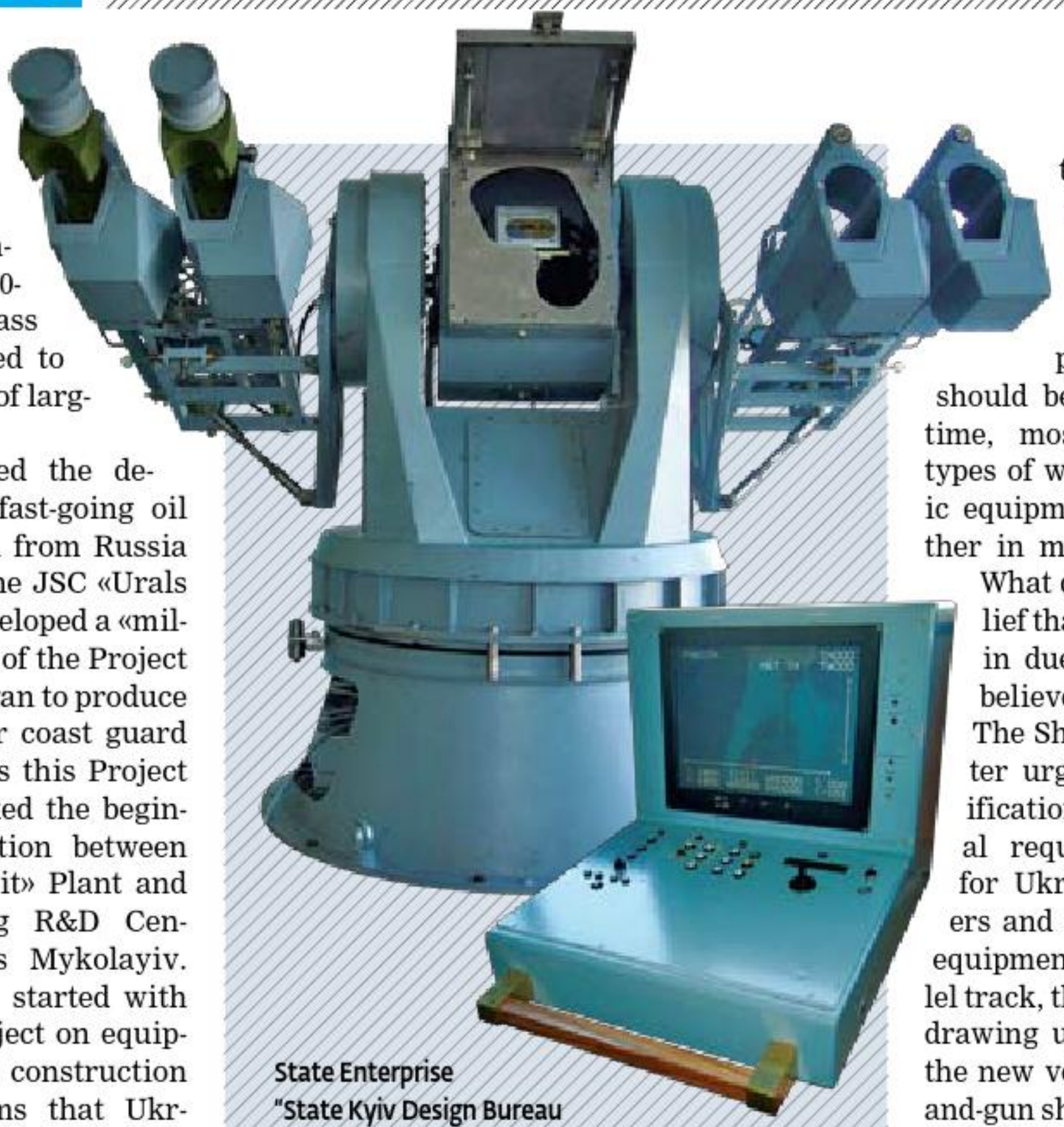
The initial number of "Barkyt" Class attack craft (Project 0200, the Kazakh version of the combat proven Project 1400M «Grif») were built for the Kazakh coast guard units by JSC «Urals 'Zenit' Plant". The latter, now part of JSC NC "Kazakhstan Engineering", was, in 1941, relocated to Kazakhstan from Leningrad where it was known as "Dvigatel" Plant which was subordinated to the Torpedo Weapons Department at the USSR Ministry of Shipbuilding Industry. Copies of working drawings of the prototype craft were "procured" by Vyacheslav Valiev, enterprising and energetic director of «Zenith», from archival repository of the former Soviet Ministry for Shipbuilding Industry in the town of Uralsk. Experience then showed that the machinery plant – with some upgrade and retooling – would be able to produce vessels with launching weights of

up to 250 tons. After Zenit had mastered the construction of 40-ton "Barkyt" Class craft, it proceeded to the construction of larger ships.

Having ordered the development of a fast-going oil rig supply vessel from Russia (Project 22180), the JSC «Urals 'Zenit' Plant» developed a «militarized» version of the Project 0300 craft and began to produce it in quantity for coast guard customers. It was this Project 0300 which marked the beginning of cooperation between the Kazakh «Zenit» Plant and the Shipbuilding R&D Center in Ukraine's Mykolayiv. This cooperation started with a small R&D project on equipping ships under construction with gun systems that Ukrspecexport was supplying to Kazakhstan.

The proven 230-ton coast guard craft did attract the interest of the Kazakh Navy officials, but they wanted a more heavily armed ship. This is where the idea originated to use the Project 0300 design as basis for a new missile-and-gun ship, the first version of which, known as Kazakhstan, was built in 2012. Due to a limited time budget allowed for constructing Kazakhstan, this new ship had to be armed with already available but obsolete weapons systems rather than current-generation systems. The ship passed all the required tests and trials and was accepted into the fleet. But even then, there was understanding that the Kazakh Navy requires a different type of ship.

Shipbuilding R&D Center and Ukrspecexport convinced Zenit and the Kazakh Navy that the Project 0300 hull has the potential to be modified into a modern warship that would well suit the requirements of the Caspian Sea region. It should be noted that, at that time, most of the proposed types of weapons and electronic equipment did not exist either in metal or in drawings. What did exist was firm belief that all this will be done in due time. The Kazakhs believed it, and didn't lose. The Shipbuilding R&D Center urgently drew up specifications and operational requirement documents for Ukrainian arms designers and suppliers of relevant equipment types. On a parallel track, the Center itself began drawing up documentation on the new version of the missile-and-gun ship (Project 250 «Bars-MO»). Ultimately, in April 2013, the missile-and-gun ship, named «Oral» (or «Uralsk» in Kazakh) was launched and then transferred by the Ural River to the Caspian Sea for trials. Not all faired well at the beginning,



State Enterprise "State Kyiv Design Bureau "Luch" is a flagship company of Ukraine's defense-industrial complex in terms of the design, development and manufacture of new-generation weapons as well as the development of proprietary technology types. Over the past two years, the Company has launched a new business activity – the development and manufacture of armaments for small warships.

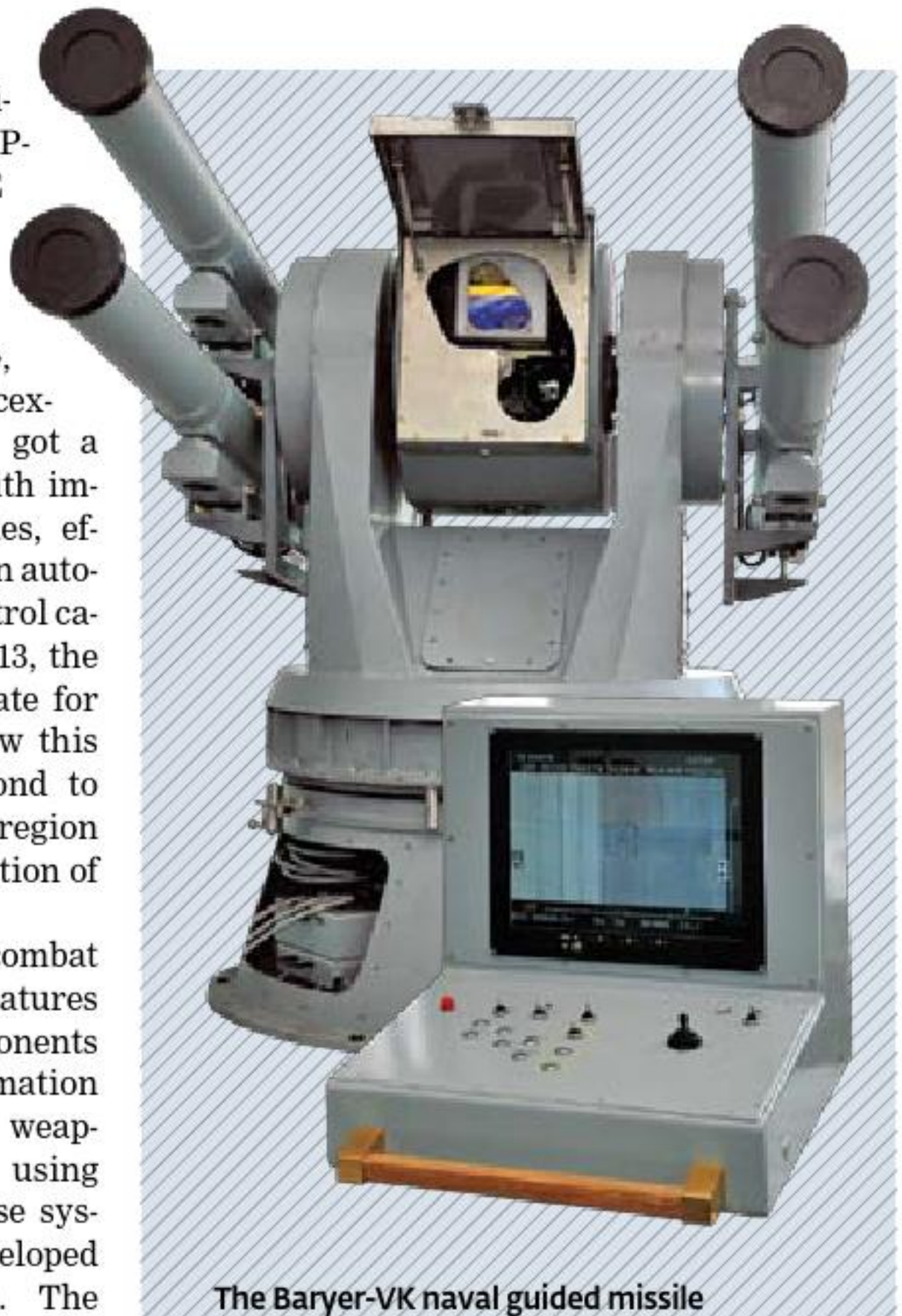
The short-range naval air defense missile system Arbalet-K uses Igla-series man-portable air-defense (MANPAD) missiles to engage jet-powered, turboprop and prop aircraft as well as helicopters at visual ranges of up to 12 km in daylight and up to 7 km at night. The system comprises a platform with drives, a guidance unit with thermal imager, and a turntable mounted launcher assembly

but, due to well coordinated work by the SE «IP-TsK», SE "NII Kvant", SE «NII Kvant-Radiolocation», SE «State Design Bureau 'Luch' of Kiev", CJSC «Transas-Ukraine», PE «Ostov» and Ukrspecexport, the Kazakh Navy got a modern compact ship with improved attack capabilities, effective air defenses and an automated command and control capability. In December 2013, the final acceptance certificate for the ship was issued. Now this 250-ton platform is second to none in the Caspian Sea region in terms of the concentration of brand-new armaments.

Each of the ship's combat equipment modules features some innovative components from Ukraine. Automation of use of all shipboard weapons systems is ensured using the integrated self-defense system "Kaskad-250" developed by Kvant-Radiolocation. The Kaskad-250 is designed to analyze threats, prioritize most hazardous threats, deliver target information to operator stations of the AK-306 gun mount and Baryer-VK and Arbalet-K missile launchers, to generate control signals and to control the engagement of designated air and surface targets with the AK-306 6-tube gun system. The Kaskad-250 system includes: the Delta-250 radar system with a dedicated operator station and a target allocation/designation unit; a small-caliber gun fire control module, as well as the Commander's remote control unit.

The system receives navigation information and uses a meteorological sensor that enables wind corrections to be factored into the firing solutions. The Delta-250 is a naval solid-state 2D coherent pulse omnidirectional radar with a digital signal processing capability. It is designed for air/surface target detection and location as well as for the provision of navigation and routing support for ships in high-risk waters. Operating in the 3-cm (150 MHz) frequency band, it has an instrumented range of 96 km and detects small-size aerial targets at ranges of 8...30 km. However, detection range for surface targets is limited by line of sight. The radar, which is controlled in a fully automated way and has a built-in self-monitoring capability, can track up to 50 targets simultaneously. It also has the capabilities for recording operator action events, operating modes and trajectories of the targets being tracked.

The ship is equipped with a current-generation optoelectronic gun fire control system, the NII Kvant's Sens-2. Using preliminary target information from the Radar, Sens-2 then delivers accurate target data back to the Kaskad-250 sys-



The Baryer-VK naval guided missile system is designed for attacks against hostile ships, armored ground targets (stationary or moving), as well as helicopters and permanent fire emplacements. It fires automatic laser beam riding RK-2V-type missiles to ranges of up to 7.5 km, with 30s time of flight to maximum range. The system comprises a platform with drives, a guidance unit with a thermal imager, and a turntable mounted launcher assembly

tem for generating the firing solution and engaging the selected target. The Sens-2 optoelectronic fire control system has television and 7.5...13 μ infrared imaging sensors and a laser rangefinder capable of measuring target ranges with 5-m accuracy at distances of up to 7 km. The Sens-2 also provides the crew with all-round close-range situational awareness.

The ship's combat package includes most innovative weapons systems such as Arbalet-K and Baryer-VK which were designed and manufactured by Luch in cooperation with companies of the Ukroboronprom holding group.

The short-range naval air defense missile system Arbalet-K uses Igla-series man-portable air-defense (MANPAD) missiles to engage jet-powered, turboprop and prop aircraft as well as helicopters on overtaking and lead-collision courses. A total of four ready to fire missiles are carried on a turntable type launcher assembly of a proprietary design. The system has a dedicated IR imaging sensor that can detect targets at ranges of from 8 to 12 kilometers, the output data being displayed on the fire control screen.

The Baryer-VK naval guided missile system is designed for attacks against hostile ships, stationary ground targets, lightly armored targets as well as helicopters at ranges of up to 7 km. It fires the RK-2V missile with laser beam riding guidance, which makes it extremely difficult to jam. With tandem-charge

MISSILE-AND-GUN SHIP "ORAL"

KEY SPECIFICATIONS:

Defense Express

Dimensions:	42,2x7, 8x2,5 M
Loaded displacement:	240 t
Sea-going ability:	up to Sea State 7
Rate of sailing:	up to 29 knots
Powerplant:	2xMTU4000, 2×2560 kW
Economical cruising speed range:	1,200 nm
Capacities fuel:	16.5 t
Capacities oil:	0.3 t
Capacities fresh (drinking) water:	about 3.5 t
Crew	25

ARMAMENTS: Kaskad-250 fire control system supported by Delta-250 radar; Sens-2 optoelectronic fire control system; 1x6 30-mm AK-306 gun mount; Arbalet-K short-range naval air defense missile system (2x2 Igla-type MANPAD missiles); Baryer-VK guided missile system (2x2 RK-2V ready-to-fire missiles); Communication, control and navigation equipment.

DUE TO WELL COORDINATED WORK OF THE SE «IPTSK», SE «NII KVANT», SE «NII KVANT-RADIOLOCATION», SE «STATE KYIV DESIGN BUREAU «LUCH», CJSC «TRANSAS-UKRAINE», PE «OSTOV» AND UKRSPECEXPORT, THE KAZAKH NAVY GOT A MODERN COMPACT SHIP WITH IMPROVED ATTACK CAPABILITIES, EFFECTIVE AIR DEFENSES AND AN AUTOMATED COMMAND AND CONTROL CAPABILITY

warhead, the missile is able to penetrate through 800mm+ thick armor, making it suitable for defeating permanent fire emplacements and timber-and-sand fortifications.

According to Commander-in-Chief of the Republic of Kazakhstan Naval Forces, Admiral Zhandarbek Zhanzakov, the warship "Oral» successfully withstood trials during the "Shagala-2013" naval training exercise. In an article published in "Kazakhstan Today" reporting on the outcome of the training event, the Admiral expressed confidence that «the ship will make a worthy contribution to security in the Kazakh section of the Caspian Sea region.» One more (but not the last) same-type sister ship is currently being built at a shipyard in Kazakhstan – again, with assistance from Ukrainian partner companies. Particularly in mid February 2013, Design Bureau "Luch" (currently part of the Ukroboronprom holding group), shipped the next batch of contracted defense supplies to the Kazakh Navy, which included an all-new short-range naval air defense missile system Arbalet-K and a naval guided missile system Baryer-VK, Serhiy Hromov, CEO of Ukroboronprom, reported on 17 February 2014. The weapons systems supplied previously as part of the initial batch have already been accepted into the Naval Forces of Kazakhstan and have been used for protection of national security interests of that country. UDR

[arsenal]

DMYTRO BOGDANOV FOR UDR

«VIPER SNAKE» ATTACK

It so happened that the Ukrainian Navy has lost a significant number of its vessels of war as a result of the events in Crimea. But, as a saying has it, every cloud has silver lining. Today, the Ukrainian government has got a chance to finally revive the domestic shipbuilding industry and to refurbish and renovate the country's naval fleet. Of course, creating one single craft, even it is going to be the world's best warship, will be clearly not enough. What is actually needed is a set of comprehensive, complex solutions that take into account current realities. One of the solutions could possibly be the construction of a fleet of small littoral combat ships, particularly such as the armored boat «Giurza-M».

At the end of 2012, the keels for the first two Project 58155 "Giurza-M" Class small armored gunboats were laid at the "Leninska Kuznya Plant" in Kiev. Commissioned by the Ukraine Ministry of Defense, the two vessels were intended for service with the Ukrainian Navy. The construction was funded under the Ukrainian Armed Forces' Arms Development Program. A total to nine such vessels were to be built by 2017 under this program. Experts estimate the Ukrainian Navy's requirement at 12 to 14 vessels in this category. The contract with Leninska Kuznya provided that two such vessels should be built by 2013 at the total cost of UAH 120-130 million (about $8 M per boat).

However, it was evident, even then, that all was not so simple. During the keel-laying ceremony for the first two vessels, Defense Ministry officials said the number of the boats built "will depend on the availability of funding". Later on, the Defense Ministry gave up its previous plans of having the already laid down Giurza-M boats constructed at Leninska Kuznya. At some point, the shipbuilders in Mykolayiv were ready to "take up the fallen flag", but, after having become known of the defense department's manner of doing business, finally refused this noble but (financially) thankless undertaking.

In these new realities where the Ukrainian Navy has lost almost 90% of its fleet as a result of the Russian military campaign in Crimea, revitalization of the Giurza-M project seems highly relevant and useful.

After all, these armored boats can operate in littoral waters of the Black and the Sea of Azov. They are suitable for policing rivers and sea areas out to 20 nautical miles offshore. In addition to policing border waters and coastal sea areas, these craft could do the tasks such as the protection against smuggling and trespassing at sea; engagement of small-size ground targets (armored fighting vehicles or bunkers); defense of waterside structures; tactical raiding support, as well as the provision of navigational support for individual vessels. Shallow draft allows the boat to operate in most waters and to move very close to the shore. The boats designed for the Ukrainian Navy will be produced in two modifications: the baseline modification designed to the requirements of the Ukrainian special operations forces, and the counter-terror modification characterized by the presence of a light and compact sonar for detecting hostile underwater swimmers. Modifications configured for other missions are possible. The Ukrainian Navy does require boats in this category.

Leninska Kuznya, where the new boats were to be built for the Ukrainian Navy, already has experience with manufacturing vessels of this type. In 2004, the shipyard built two Project 58155 "Giurza-M" Class boats (the Giurza-M is a further development to the Project 58150 "Giurza" design), under a $5.6 M contract from the Uzbekistan Border Guard Service, which was funded by the U.S. Government. The "Giurza" Class boats, which were commissioned with the Uzbek Border Guard Service, are currently used for policing the Amu Darya River on the border with Afghanistan. This is a shallow-draft boat powered by a high-speed engine, its design being specially tailored for use on the Amu Darya. The boat is equipped with a sensor suite providing all-weather and round-the-clock surveillance capabilities.

Afterwards, political factors intervened, effectively bringing the advancement of the "Giurza" project to a complete halt. Events

in Andijon and their condemnation by Europe and the USA drove Uzbekistan back to Russia's sphere of influence, thus putting paid to the Ukrainian boat together with the prospect of its further advancement in Uzbekistan and other markets in Central Asia. Prior to the Andijon events, Ukraine hoped for an additional order for 6-8 such boats that were to equip two more squadrons of the Uzbek Border Guards. When promoting this new patrol boat, Ukrainian designers and shipbuilders always emphasized that this vessel type is fully indigenous and built without any foreign participation (not excepting Russia's) or the use of foreign-supplied component parts. The configuration of the "Giurza" boat exported to Uzbekistan is armed with a 30mm doubly-fed automatic gun, a 7.62mm machinegun and an antitank missile launcher (all integrated in a fore-mounted combat module adopted from the BMP-2 IFV); plus one 14.5mm and one 7.62mm machineguns installed on a stern-mounted turret adopted from the BTR-70 APC. The boat was originally designed with a Shkval-type combat module, which was eventually rejected.

The Giurza-M is larger than its baseline counterpart. It displaces 50.7 tons, is 23.0m long and 4.8m wide, and has a water draught of 1.0 meter. The boat is powered by two U.S.-supplied Caterpillar diesel engines enabling speeds of up to 25 knots, a cruising range of 700 nautical miles and a cruising capacity of five days. The crew is set at five. The commanding officer's cabin, crew's accommodations and sensitive areas are all protected with bulletproof plates. The Giurza-M's armaments package includes two remote weapons stations BM-5M.01 "Katran-M" supplied by Mykolayiv Machinery and Repair Plant. The BM-5-M.01 "Katran-M" is a naval counterpart of the BM-3 "Shturm" weapons station originally designed for armored fighting vehicles. The "Katran-M" system is comprised of a 30-mm ZTM1 rapid firing gun, a coaxial 7.62mm machine gun, an automatic 30mm grenade launcher, an "Igla" MANPAD system with eight ready-to-fire missiles, and two "Baryer" class antitank laser-guided missile launchers. Previously, "Katran-M" BM-5M.01 stations were installed on the Ukrainian-designed "Bata" Class patrol vessel of the Equatorial Guinea's Navy in 2012. Control of the weapons is performed with an optronic fire control system.

Next vessels of the "Giurza-M" Class will be built with an augmented armaments package that will include a fundamentally different combat module, officials of the Weapons Procurement and Development Department at the Ukraine Defense Ministry say.

Of course, the Ukrainian Navy no longer has the capabilities it had previously. But the challenges to be dealt with at sea remain as numerous as before. Ukraine's shipbuilding industry is still capable of not only developing ships and craft, but also building them. Whether and when Ukraine will be able to start purchasing vessels to meet the requirement of its own Navy (at least for protecting its littoral sea areas) will depend on the will of statesmen, the domestic industry support policies, the understanding of the current situation and the unity of the tradition-adherent seamen. UDR

The Project 58150 "Giurza" (or "blunt-nosed viper snake") boat displaces 35 tons. It is 20.0m long and 4.8m wide, and has a water draught of 0.85m. The boat is powered by two diesel engines enabling speeds of up to 30 knots, a cruising range of 500 miles at 11 knots and a cruising capacity of five days. The crew is set at 6.

GIURZA-M

SMALL RIVER-GOING ARMORED GUNBOAT

The range of missions for the small river-going armored gunboat "Giurza-M" could include river and lake policing, operations in littoral sea areas, attacks on hostile ships and fast attack craft on rivers, fire support for ground operations, marine landing support, transportation of ammunition and armed personnel, mine countermeasure operations at sea.

Navigation radar
"Delta-M" radar system supplied by Kvant-Radiolocation, Kiev

The boat is equipped with a capability to detect and warn the crew of the presence of laser radiation, enabling the commanding officer to take countermeasures such as setting up smoke obscuring screen, for example

Optronic system «Sova»
Includes a TV camera, a laser rangefinder, an IR thermal imager camera capable of detecting threats and other objects out to 6.5 km during night hours

Flying bridge

Mykolayiv

The boat is equipped for mine countermeasure operations at sea

«Katran-M» BM-5M.01 remote weapons station

The Giurza-M boat is powered by 2 x 1200-hp Caterpillar diesels

Habitability conditions
The boat has living compartment with noise/vibration dampening, ventilation and heating systems, fire alarm system, flooding sensors, kitchen with an electric cooker and refrigerator, and a shower cabin.

Bullet-proof
8-mm-thick armor protection withstands the impact of small arms/machinegun fire and shrapnel

60-65
mln UAH
price tag

15 **years**
Expected lifetime

50,7	25	700	7	1,0
Load displacement, *m*	Full speed, *knots*	Operational range, *nm*	Cruising capacity, *days*	Water draught, *m*

Crew
5 personnel, including commanding officer

9 **«Giurza-M»**
boats are scheduled
to be manufactured
by 2017

Rudder house

«Katran-M» BM-5M.01
remote weapons station

Designer
State Research and Design Shipbuilding Center,
Mykolayiv

Manufacturer
OJSC «Leninska Kuznya Plant»,
Kiev

ATGM system BARYER

800 mm | **tandem/ cumulative warhead** | **15,7** kg | **5** km

"Katran-M" BM-5M.01
remote weapons station accommodates two ready to fire guided missiles armed with shaped-charge or thermobaric warheads

The State Enterprise
«State Kyiv Design Bureau «Luch»,
Kiev

[close-up]

KASHTAN

COUNTER-PRECISION WEAPONS SYSTEM

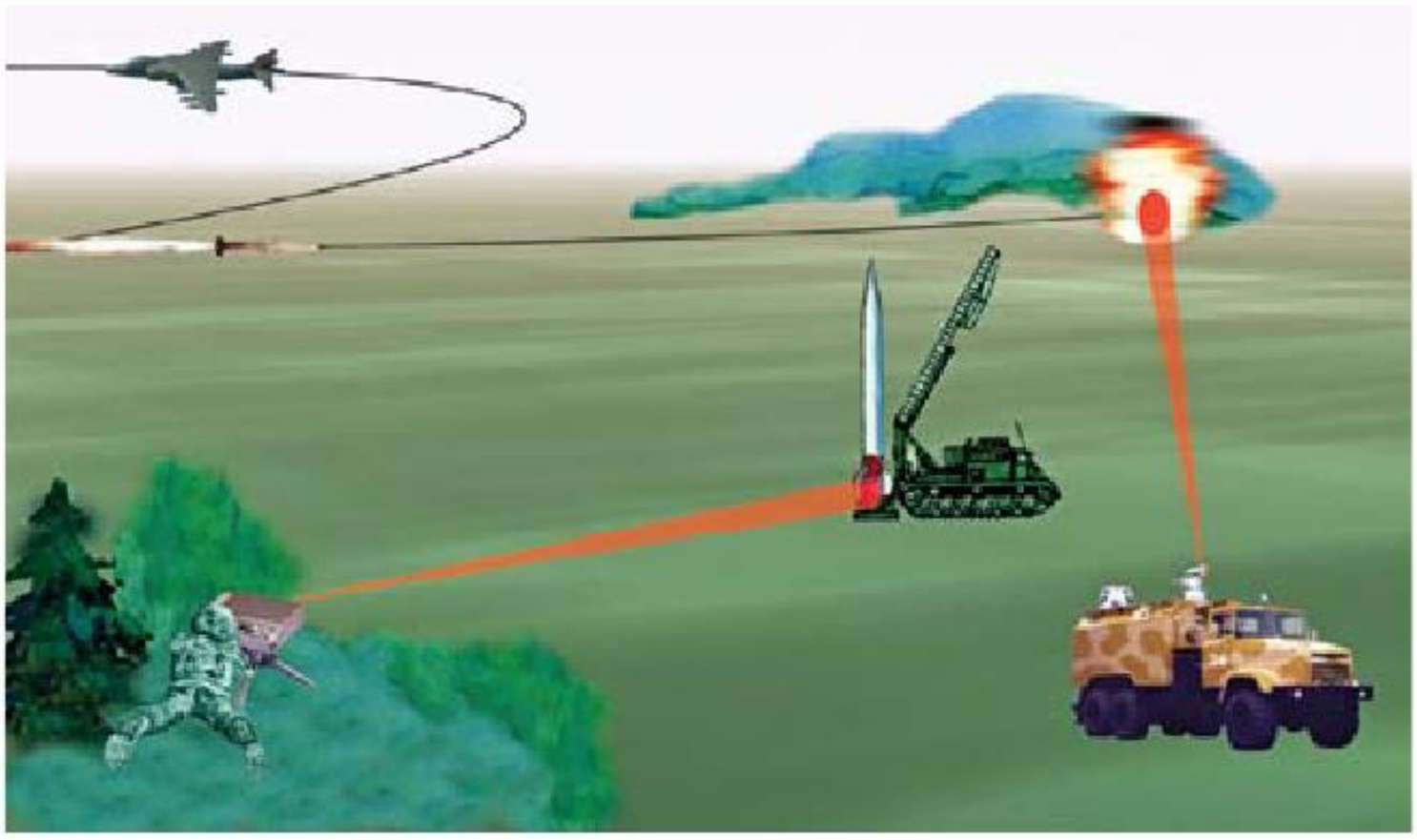
The recent decade has seen once traditional views of and approaches to security issues changing dramatically. Large scale wars and regional conflicts are becoming part of history now, as people are more used to thinking in terms of «military conflicts' or 'acts of terrorism'. Modern civilization has brought about new threats that put securing very important facilities either military or civilian high on the agenda. And it is high technology which gave birth not only to supercomputers but precision weapons as well that makes military designers worldwide to search for effective means of protection.

In Ukraine, history of counter precision weapons systems dates back to Soviet era days, with the State Enterprise Research Institute (RI) "Kvant" in Kyiv being the lead developer. These days, RI "Kvant" retains its place among the world's leaders in the optoelectronic counter precision weapons system development area. The company is offering the Ukrainian Armed Forces its new design the optoelectronic suite Kashtan-3.

Ukrainian weapons designers were set to the task of building up a technology to counter laser-guided weapons, as it is precisely laser guidance that most of precision guided weapons are using today. By virtue of its physical properties, effective range, beam divergence, resistance to jamming and stability under unfavorable weather conditions, the laser beam is a reliable means of target designation or, speaking in military terms, target illumination. He who invented a laser-guided weapon ("Kvant" was onetime developer of guidance systems for missile weapons) can as well engineer an adequate technology to counter it. This well exemplifies one of military laws of the dialectic: a new weapon is produced, then an adequate countermeasures technology is invented in response, just to be followed by the development of a weapon resistant to this countermeasures technology and this race is never ending. Based on this law of the dialectic, Kvant has built an optoelectronic counter precision weapons system that is now known as Kashtan-3.

It would be untrue to maintain that Kashtan is a purely Ukrainian design, as advanced technologies of this kind all originate from similar designs developed back in the days when Ukraine was part of the Soviet Union. The Kashtan-3 has only culminated the multiyear work of research, development and trials. The USSR, which had never saved on its defense spending, invested more than 50 million rubles in research and development for Kashtan alone, in addition to the 35 million rubles it later spent on testing program for the item, which was completed by Kvant during the years after Ukraine regained independence. During the trials, precision munitions were all deflected by Kashtan to safe distances from their designated targets.

In the USSR, the previous configurations of the Kashtan system equipped aircraft carrying cruisers and other large combatants. Considering that craft of this kind are nonexistent in the Ukrainian Navy (which fleet mainly consists of corvette class vessels), using this protective technology would be unfeasible, not only from the tactical

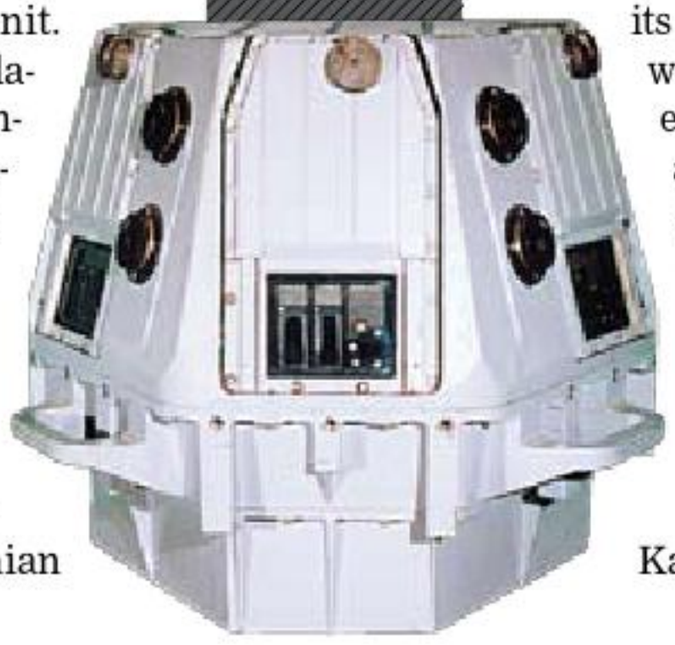


viewpoint but for financial reasons as well. But maritime configuration of this technology remains in service with the Russian Navy, and it was once supplied for other navies as well.

The Kashtan-3 can intercept a laser beam from an incoming guided missile to divert it to a safe distance from its intended target by emitting a more powerful deceptive illumination beam. According to the technology designers, the Kashtan-3 can shield against 20-30 precision missiles launched from a hostile aircraft, leading its pilot to think that something is wrong with its airborne guidance system. This protective technology does not require expendable munitions to be used, as lock in failure of precision guided munitions is achieved by means other than engagement of those munitions by fire, thus reducing considerably the use of the technology in combat.

The key elements of the Kashtan-3 suite are a laser light detector and a target protecting laser emitting decoy unit. Each potential target may be fitted with one, two, three or four such systems, depending on its type, the degree of importance, the size and position. The suit also includes a control panel, instrumentation consoles for target protecting laser emitting decoy units (one console for each such unit) and a primary power source control and switching unit. The Kashtan-3 detects laser irradiation and confuses or diverts an incoming threat with a probability of success of no less than 90% and 80%, respectively. The two figures have been proved during lengthy trials, which puts the Ukrainian design on the number one position among the best examples of counter precision weapons systems available on the global market, as none of international producers has got similar designs materialized in a specific technology, at least officially, so far. And there are several reasons for this. For the first thing, parties in conflict, real or potential, use different weapons systems: one of the parties may employ the most advanced weapons, while the other can only afford second generation or third generation weapons systems at best, thus being more vulnerable to threats involved with the use of precision guided weapons. At the same time, those needing target protecting facilities most do not have adequate production technologies for such facilities.

The Kashtan3 detects laser irradiation and confuses or diverts an incoming threat with a probability of success of no les than 90% and 80%, respectively



The need to secure troops and very important facilities from precision guided weapons has made Ukraine's Ministry of Defense look at the Kashtan. Unlike its maritime variant that was produced in Ukraine earlier, the country's armed forces need a protective system for ground facilities such as battle headquarters, missile complexes and important infrastructural assets.

An example of the Kashtan-3 system designed specially for the Ukrainian Armed Forces has already been bench tested and is now ready for the next phase of state testing.

RI Kvant is now completing work to draw up the necessary documentation to launch user (Ministry of Defense) trail in the first quarter of 2007. If the trial is a success, the Kashtan-3 may be introduced into service with the Ukrainian Armed Forces, with the required funds to be provided from the country's defense budget 2007. At this point, it is hard to predict when the testing program for the equipment (which involves the use of testing grounds, fighter aircraft and more expensive facilities) may be completed, given that the amount of funding requested by the Ministry of Defense for testing new weapons and military hardware types has been cut by fifty percent by the parliament. The testing results will drive the Ministry of Defense' decision as to when to commission this badly needed technology and procure this for the national armed forces. The funding needed for the next phase of the testing program will be provided by the Ministry of Defense, and the top military authority, if really interested in the Kashtan-3, will likely do what it can to ensure that this job is preceding as fast as possible. UDR

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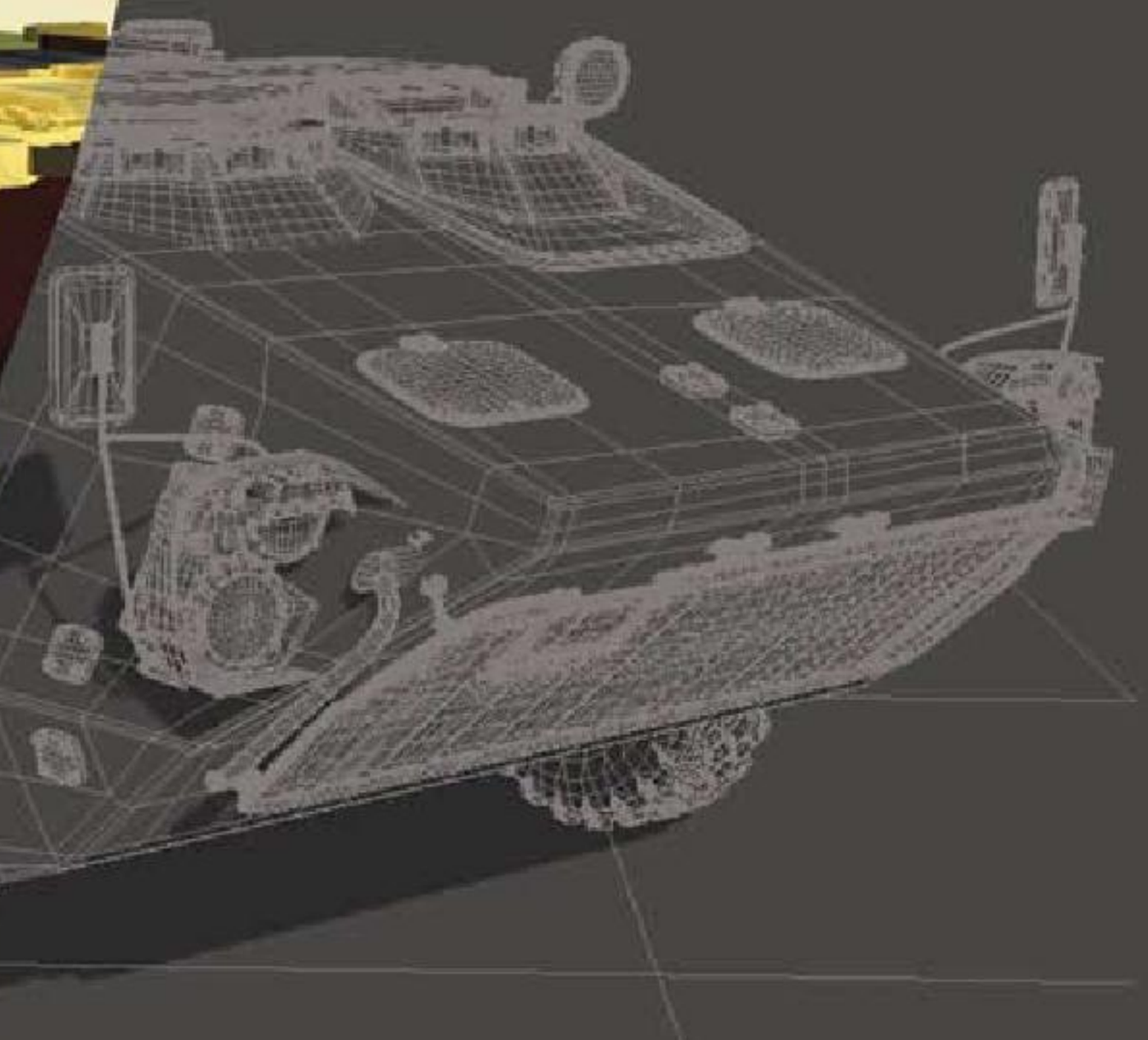

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