

RUSSIAN NAVY & TECHNOLOGY GUIDE

Special analytical export project of the United Industrial Edition

№ 10 (41), 2019

FSMTC of Russia
*Rules and successes
of defense exports*



The best from Russia
*Navy innovations
at IMDS-2019*



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№ 10 (41), 2019

Special analytical export project
of the United Industrial Edition

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EDITORIAL



Innovations at the IMDS-2019

Russian navy technologies cooperation with
other countries is developing very actively. Ex-
perience in the supply of Russian technology
to countries in the different confirms the high
quality and reliability of these weapons and
military equipment, including ships and other
things for navy.

Today efficiency and reliability are the main
criteria. This is especially important given the
difficult situation on the world stage. Threat of
local conflicts to be evolved into global ones,
failure of worldwide system of safety and no-
nending crisis – all of this leads to an unstable
and dangerous situation. One can predict raise
of defense means market in times like this. But
together with developing of defense technolo-
gies in order to secure people's safety, rivalry
among sellers of weapons and defense sys-
tems increases in order to achieve such goals
as increasing profits and market share.

World experience shows that it is not about
how many weapons you have, but quality and
possibilities of every single one of them is what
leads to victory on the battlefield. Other signifi-
cant factor is technological independence from
seller – modern technologies make it possible
to shut down any device from any place of the
globe if you have appropriate access. With hi-
tech technology, solid aftersales service and
proven reliability of products, Russia is honest
and friendly partner for many countries, ready
for mutual work. At the exhibition IMDS-2019
Russia again represents their best products
and programs of modernization, prepared for
use all over the world.

Valeriy Stolnikov



CONTRACT WITH CUBA – TO IZHMASH MUSEUM



Alexander Mikheev, Director General of Rosoboronexport (part of the Rostec State Corporation), took part in a meeting with the Director and the employees of Kalashnikov Concern's Izhmash Museum held at the Army 2019 International Military and Technical Forum. In a solemn ceremony, a copy of the contract for the supply of a batch of AK-103 assault rifles of the AK-100 series to Cuba, signed personally by Mikhail Kalashnikov in Havana, was handed over to the Museum.

'Today, Rosoboronexport is handing over a copy of the contract document as a museum piece for the first time in history. This occurs in the year when we are celebrating the 100th anniversary of the birth of the great small arms designer. Mikhail Timofeyevich worked for Rosoboronexport for many years as chief adviser to the Director General on small arms and personally brought the company hundreds of contracts with foreign customers for the supply of weapons of his own design,' Alexander Mikheev said.

Lieutenant General Mikhail Kalashnikov, Doctor of Technical Sciences, twice Hero of Socialist Labor, and Hero of Russia, invented about 30 different weapons. Many of them became most popular in their market segments. The legendary AK-47 assault rifle turns 72 this year. Kalashnikov assault rifles are now used by the armed forces of almost 100 countries around the world, and this number is steadily growing. The AK-100 and AK-200 series, AK-12 and AK-15 assault rifles have been developed and are being promoted abroad, new weapons are under development.

'More than a million Kalashnikov assault rifles of various designs have been delivered abroad by Rosoboronexport. Of all Russian-made small arms, Kalashnikov assault rifles enjoy the greatest demand among foreign customers. In addition, the production of Kalashnikov rifles has been established in several countries with our assistance. In 2019, an Indo-Russian joint venture started manufacturing AK-203 assault rifles of the newest 200 series in India,' Alexander Mikheev added.

Fairuza Burganova, the curator of the Izhmash Museum, initiated the placement of this unusual item in the Museum exhibition, which will add another facet to the bright biography of the famous designer – his role in and contribution to the military-technical cooperation between the Russian Federation and foreign States.

Mobile Anti-Drone System Sapsan-Bekas

Avtomatika Concern (part of Rostec) has presented the Sapsan-Bekas mobile system for detecting and disabling unmanned aerial vehicles (UAVs) at the International Military-Technical Forum ARMY-2019.

The system can detect an UAV at a distance of 10 km, track its movement and disable it at a distance of over 6 km by suppressing communications and control of the UAV. The design has much better tactical and technical characteristics compared to all similar Russian and foreign systems that are currently available.

The device consists of three subsystems: signals detection and direction finding of drones, active radar, video and optoelectronic tracking, as well as a subsystem of radio suppression. Sapsan-Bekas is capable of round-the-clock monitoring of the



airspace and recognizing airborne objects using video and thermal imaging tools.

'One of the main advantages of the Sapsan-Bekas is its versatility and flexibility. The functionality of the sys-

tem is easy to adapt to the needs of customers. For example, civilian companies, including energy companies, are mostly interested in signals intelligence equipment, and often don't need radiolocation capabilities – the concern is ready to make a product for them in the required configuration,' said Vladimir Kabanov, CEO of the Avtomatika Concern.

The company is already prepared to deliver Sapsan-Bekas to civilian customers. Before supplying to security agencies is possible, the system must first pass the testing scheduled for autumn 2019.

Over 1000 Pieces at ARMY-2019

Rostec State Corporation presents over 1000 pieces of weapons, military and special equipment at the ARMY-2019 forum, which has been in Kubinka, near Moscow. These included tanks, IFVs, helicopters, UAVs, artillery systems and ammunition, advanced firearms, communications equipment, EW systems and many more.

Rostec's products were presented to the visitors at the pavilions of the Patriot congress and exhibition center and the open-air exhibition stands. Representatives of the State Corporation and its holding companies were negotiations with potential partners and took an active part in the activities of the business program. Signing of contracts for supply of military equipment were planned at the Forum.

'This year we've invited delegations from over 100 countries to take part in ARMY-2019, official meetings will be held with 70 of them on the sidelines of the Forum. I would like to point out, that the level of representation of partner countries is quite high this year: over 30 of them are headed by defense ministers, their deputies and chiefs of the general staff. We will present them over 1000 pieces of advanced weapons, armor, helicopter, artillery and other technology. We will also demonstrate modern ammunition, domestic firearms, communication, electronic warfare and intelligence systems. Russia confidently continues to occupy second place in the



world by the volume of arms exports. In 2018, Rosoboronexport's deliveries amounted to \$13.7 billion and export portfolio exceeded \$50 billion, which are a new record for us. In many ways, these numbers are achieved via active marketing through such platforms as the Army Forum,' said the CEO of Rostec Sergey Chemezov.

All key holding companies of the corporation, such as High Precision Weapons, UralVagonZavod, Tecmash, TsNIITochMash, Russian Helicopters, United Engine Corporation, KRET, Ruselectronics, Shvabe and Avtomatika, were presented at the Forum.

Among the new products presented at the Rostec's exhibition were the

unmanned 57 mm autocannon module AU-220M for land and naval platforms, POST-ZM signals intelligence station, Sosna missile system on the tracked BMP-3 chassis, Typhoon-K armored vehicle with Kornet-EM ATGM, military robot system Paladin, new 125 mm tank ammunition, Korsar UAV and new firearms, including several modifications of the Udv pistol.

The International Military-Technical Forum ARMY-2019 was held on June 25-30 at the Patriot congress and exhibition center of the Russian armed forces located in Kubinka, near Moscow. This year, around 1500 companies and over 1 million people were participated in the Forum.

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HON. DOMINIC NITIWUL, MP
MINISTER FOR DEFENCE



LT GEN OBED BOAMAH
AKWA CHIEF OF THE
DEFENCE STAFF



MAJ GEN WILLIAM AZURE
AYAMDO CHIEF OF THE
ARMY STAFF



AVM FRANK HANSON CHIEF
OF THE AIR STAFF

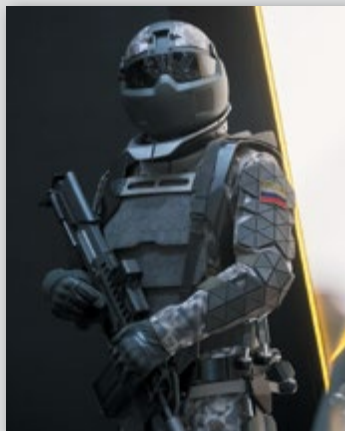
The Ghana Navy celebrates the 60th Anniversary this year under the theme "Celebrating 60 years of Naval Excellence: Securing the Maritime Domain for National Development." The strategic meeting will focus on interagency collaboration, curbing illegal activity on the Gulf of Guinea as well as identifying the essential solutions to achieve maritime security within the region.

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THIRD GENERATION COMBAT GEAR SOTNIK



JSC TsNIITochMash (part of Rostec) plans to start R&D work of new third generation combat gear for the military in 2020. This new equipment, replacing the Ratnik combat gear, will be called Sotnik.

The new gear will include anti-mine boots, an anti-thermal suit hiding the soldier from infrared sensors and anti-radar camouflage suit. Other plans include introducing a tactical system using micro UAVs, where the camera stream from the UAV will be projected to the helmet's visor or separate goggles. The electric goggles can also be used to display tactical orders, maps of the area, etc.

'According to our plans, the third generation gear Sotnik will replace Ratnik already in 2025. This will be fundamentally new kind of equipment integrating the best high-tech designs of Russian enterprises, including those of Rostec. Thanks to the use of innovative materials and combining the functions of individual elements, the weight of the set will be reduced by 20%, amounting to about 20 kilograms', said Rostec CEO Sergey Chemezov.

Sotnik will use a 'chameleon' material that can be controlled with voltage – a joint design by TsNIITochMash and the Roselectronics holding company. This electrochromic material can change its color depending on the masked surface and its environment. A helmet with this kind of unique coating was demonstrated for the first time at the ARMY-2018 forum.

Rostec has been supplying the Russian army with a 2nd generation Ratnik combat gear since 2014. This gear consists of five integrated systems: life-support, control and communications, combat, protection and energy supply. It is designed for operations in varying climatic conditions at any time of the day. The equipment is being developed during operations and upgraded components are constantly supplied to the troops.

Current status and prospects for arms exports

Rosoboronexport (part of the Rostec State Corporation) discussed the current status and prospects for arms exports during the St. Petersburg International Economic Forum (SPIEF) 2019, which was held from 6 to 8 June in the Expoforum Convention and Exhibition Centre.

'Rosoboronexport's financial indicators suggest that our chosen development strategy is the right one: we have delivered \$5.7 billion worth of products to foreign customers since the beginning of the year. As one of the world's leading arms exporters, we are not only tracking and following global trends, but also introducing new areas of work that are unique for the market, including financial mechanisms for foreign trade activities. The St. Petersburg Forum is an ideal platform for us to present our competencies to opinion leaders of the Russian and world economies. These days we are going to discuss with them the current ongoing efforts and business development in new economic realities,' said Rosoboronexport's Director General Alexander Mikheev.

The St. Petersburg International Economic Forum has been held since 1997. Over this time, it has become the leading global platform for communication between business representatives and discussion of key economic issues facing Russia, emerging markets and the world as a whole.

At SPIEF 2019, Rosoboronexport's top management had meetings with leading Russian state financial organizations and business entities, as well as with representatives of the Company's partner countries in military-technical cooperation. It was intended to discuss the growth prospects for



Russian arms exports, the strategic development of its financial mechanisms, and state support measures for manufacturers and military-technical cooperation (MTC) actors.

The Company focused on seeking new horizons and discussing specific prospects for cooperation with countries in Asia, Africa, the Middle East and Latin America, and expanding cooperation in the SCO region. The adaptation of the MTC actors and defense industry enterprises to new challenges of our time and sanctions pressure is certainly be a key issue.

'For five years, Russia and Rosoboronexport have been facing serious restrictions from a number of international financial institutions, which turned out to be heavily dependent on the political will of some players on the world arms market. We can only perceive them as unfair competition and attempts to put pressure on us and our partners,' added Alexander Mikheev.

Line of Semi-Automatic Udav Pistols

TsNIITochMash research institute (part of Rostec) has for the first time presented four modifications of the new semi-automatic Udav pistol at the International Military-Technical Forum ARMY-2019, held on June 25-30 near Moscow.

The demonstration included special purpose pistols using the 9x21mm military cartridge as well as new tactical and sport modifications using the 9x19mm cartridge. The civilian version of Udav is designed for professional sportsmen in the field of shooting and its tactical and technical characteristics allow competing with foreign counterparts of famous brands.

'We have prepared a special dynamic demonstration for the new modifications of the Udav pistol at the ARMY-2019', pointed out Sergey Abramov, the Industrial Director of Rostec's firearms cluster. 'The new Udav pistol, designed to replace the Makarov pistol currently used by the army, has passed federal testing and received recommendations for mass production. The first batch of Udavs has already been delivered to the troops for trial operations. As for the civilian version, we have already begun preparing for its certification, which will subsequently allow us to export the gun. We intend to promote it to foreign markets, including in Latin America, the Middle East, India, China and Southeast Asia.'

The design of the semi-automatic 9mm caliber Udav pistol is completely Russian. The interdepartmental



commission, which decides on the admission of the Udav pistols to mass production, has completed its work, and the pistol received the classification letter '01'. Its magazine capacity is 18 rounds, which is 10 more than the Makarov.

Udav can use a full range of 9x21mm cartridges, including tracer, armor piercing and hollow-point rounds. In addition, two completely new cartridges were developed specifically for the pistol: subsonic and increased penetration. The pistol grip is made of modern composite materials, the strength of which allow it to be operated in temperatures from -50 to +70 degrees Celsius.

A T A N E W L E V E L

MAKS
2019

Organizers



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NEW RUSSIAN HELICOPTER



The VR-Technologies design bureau of the Russian Helicopters holding company (part of Rostec State Corporation) presented a model of a light multipurpose helicopter VRT500 at Fuorisalone exhibition, which was taking place during Milan Design Week from April 8 to 14.

The model was demonstrated at the exposition of the ItalDesign company, which was one of the developers of the VRT500 design. This engineering company was mainly known as an automotive designer. Since it had been found in 1968, ItalDesign has been involved in the development of a wide range of concept cars and the production of automobiles, among them international giants such as Alfa Romeo, BMW, Ferrari, Lamborghini, Maserati.

VRT500 became a competitive product in the market of light single-engine helicopters and allowed the holding to enter the segment in which it was not yet represented. 'Helicopters of Russia' was considering Europe as a potential market, and therefore we plan to apply for helicopter certification to the European Aviation Safety Agency (EASA) this year, and to begin testing the first prototype in 2020', said Alexander Okhonko the CEO of VR-Technologies.

To this date, specialists of Russian Helicopters have begun developing the working design documentation of VRT500. The release of the first production VRT500 helicopter is scheduled for the end of 2021. The VRT500 is a lightweight single-engine helicopter with a coaxial propeller layout and a take-off weight of 1600 kg. The machine has the most spacious passenger class cabin in its class with a total passenger capacity of up to five people and is equipped with a modern complex of interactive avionics. The helicopter can reach speeds of up to 250 km/h, have a flying range of up to 860 km, and take up to 730 kg of payload on board.



Breakthrough Products Presentation

Rosoboronexport (part of the Rostec State Corporation) is providing support to the largest international exhibitions of armaments and military equipment, which are to be held in Russia in 2019. The company is sponsoring the International Maritime Defence Show 'IMDS-2019', the International Aviation and Space Salon 'MAKS-2019', as well as the International Military-Technical Forum 'ARMY-2019'.



'The Maritime Defence Show, ARMY and MAKS are always memorable and meaningful events, which are attended by practically all our foreign partners and potential customers from the majority of the world regions. Here one can see all the trends of the Russian defence industry, assess the highest level of the development of technologies and design ideas. Rosoboronexport is an inherent participant and a traditional supporter of these exhibitions, which consistently enter the TOP-5 of the largest world shows in their respective segments. They constantly give us the maximum monetization out of all the exhibition events in the world,' said Rosoboronexport's Director General Alexander Mikheev.

The International Military-Technical Forum 'ARMY-2019', which will be held on June 25-30, presents the key newly-designed export products and bestsellers of the Russian defence industry for all the services and branches of the armed forces, as well as for special operations and anti-terrorist units.

This year the visitors of the ARMY will have an opportunity to see in the 'Patriot' park a number of newly-designed products, which are of

a potentially breakthrough character for the world market, i.e. the Kalashnikov assault rifles of the new 200th series, new generation special vehicle 'Tigr-2', the 'Viking' and 'Tor-E2' air defence missile systems, combat vehicle of a squad equipped with the 'Gibka-S' MANPADs, means to counter unmanned aerial systems, as well as new solutions in the area of electronic countermeasures.

For sure, the guests' attention will be drawn by the world famous brands, e.g. air defence missile system S-400 'Triumph', air defence missile and cannon complex 'Pantsir-S1', anti-tank missile systems of the 'Kornet' family, the 'Terminator' fire support combat vehicle and many other new products in the area of fire arms and close combat assets.

A number of newly-designed products are also prepared for the representatives of the naval forces of foreign states, who will visit the International Maritime Defence Show in Saint-Petersburg on July 10-14. The manufacturers will display the full-scale specimen of the 'Rubezh-ME' coastal missile system, multi-purpose integrated radar system 'Zaslon', air defence missile system 'Redut', different ships of Russian production, including

the 'Karakurt-E' small missile ship of project 22800E.

For the delegations representing air force and for all the guests of the International Aviation and Space Salon 'MAKS-2019' in the Moscow region's town of Zhukovsky on August 27 – September 1, the following pieces of equipment will be presented: the newest Su-57 fighters of the fifth generation, light military transport aircraft Il-112V, multipurpose supermanoeuvrable fighters Su-35 and Su-30SM, training aircraft (combat trainers) Yak-130, combat helicopters Mi-28NE and Ka-52, military transport helicopters Mi-171SH and Mi-17V5, and other aviation systems.

'For Rosoboronexport, the International Maritime Defence Show, MAKS and ARMY are an important marketing tool. We invite to them the maximum number of foreign delegations, which have a perfect opportunity to satisfy the needs of their defence and law-enforcement agencies in the sophisticated Russian materiel, to receive as much detailed consultations as possible, related to the distinctive technical features of the weapons, as well as to the modalities and particularities of their combat use,' added Alexander Mikheev.

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Rosoboronexport, Rostec's member, had been named the organizer of Russia's joint exposition at the International Military Equipment Exhibition MILEX 2019 which had taken place in Minsk, Belarus, on May 15-18. 'Russia and Belarus are strategic partners in military and technical cooperation. Since 2001, the volume of cooperation between Rosoboronexport and Belarus has exceeded \$1 bln. The scope is unbelievable covering almost every line from the supply of end products and components to joint researches and defense projects,' said Rosoboronexport's Director General Alexander Mikheev.

The company's exposition occupied 500 m2 at MILEX 2019. It accommodated products of Russia's eight largest defense enterprises, including Almaz-Antey, Uralvagonzavod, and Tecmash.

Rosoboronexport's booth housed 220 pieces of military equipment – Yak-130 combat trainer, T-90S tank, BMPT tank support vehicle, Buk-M2E and TOR-M2KM SAM system to name just a few.

'Being one of the most representative and attended event, the exhibition in Belarus piqued our special interest. We saw a great opportunity to promote Russian equipment to Europe, Middle and Central Asia, and Transcaucasia,' added Alexander Mikheev. Rosoboronexport also expected foreign delegates to show a keen interest in Russia's equipment, designed for army, aviation and AD units, as well as special gear and systems. Top of the list of products attracting our partners included the Mi-171Sh military transport helicopter, T-90MS tank, BTR-82A personnel carrier, Khryzantema-S SP anti-tank system, Kornet-EM anti-tank missile system, Typhoon-K and Tigr-M vehicles, Smerch multiple-launched rocket system, Iskander-E tactical missile system, and various types of Kalashnikov assault rifles.

The special arms exporter planned a rather extensive business program at the exhibitions, expecting to meet representatives of the Armed Forces and other security agencies of the Republic of Belarus and other states coming to the event. Besides, Rosoboronexport's delegation took part in the 8th International Conference on Military and Technical Issues, Defense and Security, and Dual-use Technology Employment.

Repairing Helicopter Engines

The Center for Integrated Logistics Support for the UEC in Vietnam repaired five helicopter engines. The new center, certified this year by the aeronautical authorities of the Socialist Republic of Vietnam, is equipped with all the necessary equipment, spare parts and assembly units for repairing engines developed by UEC-Klimov.

The intermediate level maintenance and repair of engines as TV3-117 and VK-2500, which are operated in Vietnam, is carried out by specialists from UEC-Klimov.

The Russian side supplies parts and assemblies, spare parts, trains personnel to maintain engines and main gearboxes.

The Vietnamese side provided supporting staff to accompany the maintenance works.

Vietnamese experts have already received certificates of UEC-Klimov on successful familiarization with the

process of intermediate engines repair.

With their help, Russian employees successfully carried out a pilot repair of the first TV3-117VM series 02 engine for the Mi-17-1V helicopter, which is in service in Vietnamese civil aviation for passenger traffic.

The engine received damage due to intrusion of a foreign object.

The UEC-Klimov company and the Vietnamese company Helicopter Technical Service Company signed a distribution agreement for the maintenance of engines in October of last year.



Helicopter Technical Service Company, on the territory of which the integrated logistic support center is located, is engaged in servicing Russian-made helicopters. It serves as a distributor of TV3-117 and VK-2500 engines.

Promising MTC Projects

Rosoboronexport (part of the Rostec State Corporation) was showcasing the best selling and promising new products from the Russian defense industry at the IDEF 2019 International Defense Industry Fair, which was held from April 30 to May 3, 2019 in Istanbul.

'Military-technical cooperation (MTC) between Russia and Turkey shows a positive trend. We successfully deal with competitors' attempts to interfere with our relations,' said Rosoboronexport's Director General Alexander Mikheev. 'We have a number of joint projects for the development of advanced aircraft and helicopter systems, armored vehicle components, after-sales support of supplied weaponry. In addition, Turkey is interested in Russia's latest remote weapon stations, air defense assets of varying ranges, as well as ATGM systems.'

The exhibit profile of the exhibition was: Army, Navy, and Air Force military equipment, defense technology, space technology, onboard systems, helicopters, ships, electronics, security systems, transportation and logistics equipment and systems.

'Turkey is among the key partners of Rostec and Russia. The level of bilateral relations, including in industry, is growing rapidly. At the moment, we are discussing with Turkish partners the implementation of a number of critical projects in both military-technical cooperation and civil industry fields,' said Sergey Chemezov, Director General of

the Rostec State Corporation. 'Of course, we are ready for various formats of technology cooperation, including in such high-tech areas as the aerospace, helicopter and power industries.'

Rosoboronexport was the organizer of a joint Russian display at IDEF 2019, which included over 450 pieces of weaponry and military equipment from more than ten domestic defense manufacturers. Almaz-Antey Air and Space Defense Corporation, Shvabe Holding Company and Tehmash Holding Company were among the exhibitors.

Rosoboronexport's Stand 232 (Pavilion 2) provided information on more than 300 pieces of military equipment that had the best prospects in Turkey and the Middle East region, including new products from the Company's export catalog: the newest Kalashnikov AK-200 series assault rifles, 30-mm 32V01 remote weapon station, Viking SAM system and the 76.2-mm AK-176MA automatic naval gun.

The mock-ups of the BT-3F armored personnel carrier, KAMAZ-53949Typhoon-K vehicle, Su-35 multi-role super-maneuverable fighter and the Project 12061E Murena-E-class air-cush-



ion landing craft were on display at the Company's stand.

Numerous meetings and talks were expected to take place at the event with representatives of the Turkish armed forces and other security agencies of the country, as well as with partners from other countries in the region. Rosoboronexport planned to discuss the implementation of current contractual obligations and promising MTC projects.

'IDEF is among the world's top ten largest defense industry exhibitions and, along with Russia's ARMY, MAKS and International Maritime Defense Show (IMDS), is one of the most significant arms exhibitions in Europe. The event provided an excellent opportunity to study the trends in the world arms market, while foreign customers can see the best Russian weapons, known for their impeccable fighting qualities,' added Alexander Mikheev.

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REPAIR CENTER IN VIETNAM



Integrated logistics support center for repairing helicopter engines created by UEC-Klimov (subsidiary of the United Engine Corporation, part of Rostec) has begun operations in the Vietnamese city of Vũng Tàu. Pilot repair project of the first engine in the new center has been successfully completed.

The center is equipped with all necessary equipment, spare parts and assemblies to provide repairs for engines designed by UEC-Klimov. By the end of April four more engines in use in Vietnam went through repairs in the center. Specialists from UEC-Klimov performed medium repairs of TVZ-117 and VK-2500 engines operated in Vietnam. The Russian side provided the details and spare parts, and trains the personnel for engine and gearbox maintenance. The Vietnamese side provided support personnel to accompany the working process. The Vietnamese specialists had already received certificates from UEC-Klimov on successful familiarization with the medium repair process of the first engine: TV3-117VM series 02 used by the Mi-17-1V. A foreign object damaged this particular engine during operation by the Vietnamese civil aviation.

'Till the end of April, we were going to repair four more engines operated in Vietnam. We planed to actively expand the geography of our cooperation and start providing repair and support services of helicopter engines in India, China, Indonesia, Malaysia, Cambodia, Thailand, Vietnam, Myanmar, Laos, Australia, Bangladesh and Sri Lanka. Our partners in the region are highly satisfied with the approach and quality of services provided by Rostec, which included after-sale support for the whole life cycle of our products', said the Director for International Cooperation and Regional Policy of Rostec, Viktor Kladov.

The Aviation Administration of the Socialist Republic of Vietnam certified the new center. Certifying the support personnel was a mandatory procedure for ensuring the operation and repair process made by the center. Vietnamese specialists familiarized themselves with all the steps concerning medium repairs of the TV3-117 engines and their different models during a technological procedure of the certification. In October 2018 UEC-Klimov and the Vietnamese company Helicopter Technical Service Company signed a distribution contract concerning service maintenance of engines. Helicopter Technical Service Company, on the territory of which the new center is located, provided service maintenance for Russian-made helicopters. It also operated as the distributor of TB3-117 and VK-2500 engines.

New Radio Stations

Ruselectronics holding of Rostec State Corporation is launching a new line of civil radio equipment for the European market. The European Union's Intellectual Property Office (EUIPO) issued registration certificates for six DMR standard devices: automotive, base, wearable and portable radio stations, as well as two antennas for a portable radio station.

A portable radio station provides high-quality communications at a distance of up to 10 km, and a base station – within a radius of up to 30 km.

The devices are resistant to external factors, such as vibration, shock, extreme temperatures, ingress of moisture.

In addition, they have increased noise interference immunity and protection against unauthorized listening.

Such radio stations can be used in railway transport, in the agricultural sector, by emergency and medical services, logistics companies, tourists and hunters.

The developers note that the devices are compatible with all existing domestic and foreign civil systems of DMR standard professional mobile radio. The obtained certificates give the right to the equipment developer the



'Constellation' Concern (a part in 'Ruselectronics') to sell equipment in the European Union.

Certification also guarantees the enterprise that there will be no analogues from other manufacturers prior to the actual beginning of sales of radio stations in the European market.

Demonstration at the Victory Parade

Rosoboronexport JSC (a part of Rostec State Corporation) is actively promoting modern Russian weapons and military equipment to the world arms market, which were presented on 9th of May at a military parade in Moscow which was dedicated to the Victory Day in the Great Patriotic War of 1941-1945.

Export-oriented analogues of the Russian military equipment chosen for the demonstration at the Victory Parade were also presented in the Rosoboronexport catalog.

In particular, these were the Buk-M2E and Tor-M2E anti-aircraft missile systems, the Pantsir-S1 anti-aircraft missile and gun complex, the Iskander-E tactical missile system, the Msta-S self-propelled howitzer, and Smerch multiple launch rocket systems, armored wheeled vehicles Tigr-M, Typhoon-K and BTR-82A, T-72 type tanks, BMPT tank support combat vehicle, Il-76MD-90A (E) military transport aircraft, a multipurpose front-line fighter MiG-29M, a super-maneuverable multi-purpose Su-30SME, a fighter-bomber Su-32 and a multi-purpose fighter Su-35 top maneuverable fighter, Mi-28NE and Ka-52 combat helicopters, Mi-26T2 heavy transport helicopter.

The Armata tank, the Boomerang armored personnel carrier and the Kurganets-25 infantry combat vehicle, which have a large export potential, also passed across Red Square on Victory Day. Participation of this machinery in the Victory Parade was a demonstration of the highest level of the latest technologies of military-industrial complex enterprises of Russia to foreign partners.

'Russia's military-technical cooperation with foreign countries maintains a positive trend.

'Russia's military-technical cooperation with foreign countries maintains a positive trend. According to the results of the first four months of 2019, Rosoboronexport delivered Russian arms and military equipment worth 4.9 billion US dollars, as well as signed new contracts for 5.2 billion US dollars', – said Alexander Mikheev, the general director of Rosoboronexport. 'This is the result of an immense marketing work of Russian par-



ticipants of military-technical cooperation and of manufacturing enterprises, an important element of which is the public demonstration of military equipment at parades and exhibitions.'

According to the Ministry of Defense of the Russian Federation, more than 1,600 units of military equipment took part in Russia's military parades. Foreign guests, primarily which were representatives of the military-diplomatic corps of foreign countries and correspondents of leading world mass media were able to personally see samples that were not only the basis of the combat power of the Armed Forces of the Russian Federation, but also domestic bestsellers of the world arms market.

Full-scale samples of Russian armaments and military equipment delivered for export by Rosoboronexport were presented to foreign specialists as widely as possible within the specialized exhibitions which are to be held this summer of 2019 in Russia: the International Military-Technical Forum 'ARMY-2019' (from 25-30th of June, Kubinka town), the 'IMMS-2019' International Naval Salon (from 10 – 14 July, St. Petersburg) and the 'MAKS-2019' International Aviation and Space Salon (from August 27 – September 1, Zhukovsky town).

VI International Exhibition of Defense and Technologies



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BRAINREADER NEURO INTERFACE

The 'Avtomatika' Concern of Rostec State Corporation will bring to the international market the BrainReader universal neural interface, which enables the 'exchange' of information between the human brain and any external device that has the required interaction interfaces (home appliances, computer, exoskeleton, artificial sense organs, wheelchair). The Concern has already begun obtaining permits for entering Asian markets. The Concern has already begun obtaining permits for entering Asian markets. Proposals from Asian companies, from Indonesia and Malaysia in particular, on distribution of BrainReader resulted from participation in the Medlab AsiaPacific & Asia Health 2019 exhibition, where the capabilities of the device generated great interest. The development of the device as part of the Rostec is the Institute of Electronic Control Machines (INEUM) named after I.S. Brook (a part of the concern 'Automation'). 'Breakthrough neurotechnology solutions, such as BrainReader, are the technologies of the future that change lives and open up new opportunities for the development of science and technology. Neuro headset can be used to control 'smart' systems and robotics, in medicine – for the rehabilitation of people with disabilities, in studies of the human brain, mental activity, sleep, and in many other areas. It is important to note that the device has a good export potential. The closest competitor in terms of characteristics, the American neuroheader, is priced about three times as much', said Oleg Evtushenko, the executive director of Rostec. Neuro headset allows registration of the surface electroencephalogram in vivo, without limiting the user's motion activity. The data is received using a non-invasive method via specially designed 'dry' electrodes that do not require the application of an electrically conductive gel. Due to the high quality of the recorded signal processing, the device operates stably even in places of large crowds of people, in transport, surrounded by a large number of transmitters and other interference. According to the study of Allied Market research, the brain-computer interface market is growing at an accelerating pace and in 2020 it will amount to an approximate of \$ 1.46 billion.



Russian Helicopters in SITDEF-2019

Russian Helicopters holding company took part in the seventh International exhibition of defense technologies, security and prevention of natural disasters SITDEF-2019, which was taking place in the Peruvian capital Lima from 16th to 21st of May on the grounds of the Peruvian Army's main headquarters.

This year, the holding presented the main line of civilian Russian helicopter technology – the lightweight Ansat, the medium Mi-171A2 and the medium heavy Mi-38. 'We were closely cooperating with our Peruvian colleagues in creating a mobile service center for servicing multi-purpose Mi-171Sh helicopters in the area of the Arequipa city. The holding under the contract with Rosoboronexport had completed the first stage of installation and commissioning. Further work on installation and commissioning of the equipment in agreement with the Peruvian side will continue in October. We plan to complete this work this year and assist our colleagues during the first repairs of helicopters', said Igor Chechikov, head of the holding's delegation at SITDEF, deputy general director for after-sales service. The service center consisted of three repair lines: the overhaul line for the airframe of the Mi-171Sh helicopters,



the line for the repair of assemblies of mechanical systems and the line for the repair of aviation and radio-electronic equipment. More than 370 Soviet and Russian-made helicopters, both civilian and military, were being operated that day in 12 countries of North and South America, from Mexico, Venezuela and Colombia to Argentina and Chile. More than 90 civilian and military Mi-8/17 helicopters of Soviet and Russian production were registered in Peru – more than anywhere on the continent.

Rostec Joined Vision Zero

Rostec joined the Vizion Zero international program of reducing industrial injuries to zero level. Until 2021, the State Corporation will conduct a set of preventive measures to achieve 'zero injuries' at its production sites.



Rostec received a certificate of entry into the program during the All-Russian Week of Labor Protection (VNOT), which was taking place in Sochi. Within the framework of VNOT, from April 23rd to April 24th, Rostec State Corporation held a strategic session on a culture of sustainable security for senior officials of health safety and security of holding companies.

One of the key events of the occasion was the accession of the State Corporation to the Vision Zero international program. The main idea of the Vision Zero concept is that all industrial accidents and occupational diseases have a reason, which means that they can be prevented. The International Social Security Association (ISSA) offers seven golden rules for achieving 'zero injuries':

leadership, risk management, setting clear goals, methodic work on improving occupational safety, ensuring the safety of industrial premises, improving the skills of workers and their motivation. The certificate of joining the program was presented by the Ambassador of Vision Zero Hans-Horst Konkolewski. 'We believe that Rostec, by joining, sets a good example for other companies, including its subcontractors and small commercial organizations, because most industrial accidents can and should be prevented', he said in his speech. According to the International Labor Organization (ILO) estimation, about 2.8 million people die every year around the world at their workplaces, and losses from fatal industrial injuries amount to 4 percent of the global GDP.

MC-21-300 certification flights

MC-21-300 aircraft completed the flight test program and flew from Irkutsk to Ulyanovsk, where it was painted according to production technologies.



On February 2, flight test experts of the European Union Aviation Safety Agency (EASA) completed the first flight session of the MC-21-300 certification program. During the certification tests, the behavior of MC-21-300 aircraft was evaluated in various modes, including high angles of attack and stalling. Flights duration from 2.5 to 4 hours were performed at altitudes from 3 to 10 km. Aircraft was piloted by EASA test pilot. Test pilot of the Yakovlev Design Bureau (a branch of Irkut Corporation) monitored the performance of flight modes. Flight crew also included Russian and EASA flight test engineers to analyze current flight parameters. In September 2018, EASA test crew completed a special course in theoretical and practical training, as a result of which they obtained permission to fly on MC-21-300 aircraft. On March 16, 2019, the maiden flight of the third MC-21-300 test aircraft took place at the airfield of Irkutsk Aviation Plant, the affiliate of Irkut Corporation (a UAC member). The duration of flight was 1 hour 30 minutes at an altitude of 3500 meters at a speed of up to 450 km / h. The plane was piloted by the crew of Andrey Voropayev and Roman Taskaev test pilots. According

to the crew report, the task was performed completely, the flight was in normal mode. Minister of Industry and Trade of the Russian Federation Denis Manturov said: 'MC-21-300 flight tests continue. Today the third aircraft joined to them. On this plane, in addition to special testing equipment, a passenger cabin was installed'. According to Denis Manturov, it was decided to hold the premiere public debut of the MC-21-300 aircraft with a passenger interior at the Moscow international aviation and space salon MAKS-2019. 'This allowed us to visually demonstrate to potential customers and future passengers one of the most important competitive advantages of the Russian airliner – an increased level of comfort,' – mentioned the Minister of Industry and Trade. Yuri Slyusar, President of UAC and Irkut Corporation, added that in 2019 the fourth MC-21-300 prototype, built at the Irkutsk Aviation Plant, should join the flight tests. 'Airplanes are built on new automated lines that provide high precision and quality of assembly,' – said Yuri Slyusar. Finally, on April 27, 2019 MC-21-300 test aircraft, equipped with a passenger cabin made the non-

stop flight from Irkutsk to Ulyanovsk Vostochny airport. In Ulyanovsk, MC-21-300 aircraft was painted according to production technologies, and then flew to Ramenskoye airport (Zhukovsky, Moscow region) to continue flight tests. The aircraft was piloted by a crew of Hero of Russia, honored test pilot Roman Taskaev and 1st class test pilot Vasily Sevastyanov. Roman Taskayev said: 'The flight was in normal mode, without complaint'. Ulyanovsk enterprises are the largest participants of the MC-21 program. Aviastar-SP Plant produces fuselage panels, empennage and many other units for MC-21-300 aircraft. AeroComposit-Ulyanovsk Company produces the wing made of composite materials. The painting of MC-21-300 aircraft was conducted by the Ulyanovsk company Spektr-Avia. The enterprises participating in the MC-21 program underwent technical re-equipment. The President of UAC Yuri Slyusar said: 'The Irkutsk aviation plant has completed the assembly and systems installation of the fourth MC-21-300 flight test aircraft. Joining the third and fourth aircraft to flight tests increased intensity of the certification program.'

ATTACK AND MULTI-PURPOSE HELICOPTERS

Rosoboronexport, a member of Rostec, was expecting the interest in Russia's military helicopters to spike in the wake of the International Helicopter Industry Exhibition HeliRussia 2019 which was taking place at Crocus Expo, Moscow, on May 16-18. 'We were facing a growing demand for attack helicopters in the helicopter market on a global scale. Rosoboronexport responded to this in a timely manner, figured out its major parameters and now offers to the customers the most advanced designs proven in combat, Ka-52 and Mi-28NE. Besides the dynamic was on the rise in the utility sector, where we had the Ansat and Ka-226T to offer. For production of the latter we had set up a joint venture with India's HAL,' noted Director General of Rosoboronexport Alexander Mikheev. At the exhibition, Rosoboronexport offered its customers Russian helicopters suitable for any task regardless of weather conditions. The company's booth advertised helicopters of all classes, required in the world market, as well as UAV systems. Apart from attack and utility helicopters, other types boasting high export potential included combat-transport, military transport and transport Mi-35P, Mi-35M, Mi-17V-5, Mi-171Sh, and Mi-26T2. They owed their popularity to the outstanding combat and operational performance, demonstrated in combat during anti-terrorist operations conducted by the Russian military. Combat and transport capabilities of Russian helicopters made them unique in many ways. Deployed in almost all regions of the world, they had proven to be suitable for operation in hard-to-access mountainous zones notorious for height variation and temperature fluctuation, as well as tropics and dusty environs. Rosoboronexport's list of partners included 70-plus states in the Middle East, Asia Pacific, Latin America, Africa, the CIS, and Europe. The company delivered helicopters to army, anti-terrorist, and special purpose units, as well as law enforcement and emergency agencies in foreign countries. Direct supplies to the customers being Rosoboronexport's major activity, the company also offered technological partnership options, construction of service centers and facilities for training of pilots and maintainers. Similar infrastructure projects had already been commissioned in a number of countries.

MILITARY TECHNICAL COOPERATION

In the Kremlin, Moscow, Vladimir Putin chaired a meeting of the Commission for Military Technical Cooperation with Foreign States.

The meeting was attended by Chief of Staff of the Presidential Executive Office Anton Vaino, Presidential Aide Yuri Ushakov, Deputy Prime Minister Yuri Borisov, Foreign Minister Sergei Lavrov, Minister of Industry and Trade Denis Manturov, Defence Minister Sergei Shoigu, Director of the Federal Security Service Alexander Bortnikov, Director of the Foreign Intelligence Service Sergei Naryshkin, Director of the Federal Service for Military Technical Cooperation Dmitry Shugayev, Rostec State Corporation CEO Sergei Chemezov, Deputy Head of the Presidential Foreign Policy Directorate Igor Nagorny and Deputy Finance Minister Leonid Gornin.

In the beginning of the meeting President of Russia Vladimir Putin

said: 'I would like to note from the very beginning that we exceeded the target for 2018 military goods deliveries abroad by two percent; this was made possible by consistently implementing the decisions we adopted at our previous meetings.'

Financial indicators of military technical exports have been growing for over three years in a row now and have almost reached \$16 billion. At the same time, we retained

positive dynamics in the first five months of 2019.

Foreign currency revenues from the export of military goods soared by 45 percent, while the overall portfolio of contracts reached almost \$54 billion, hitting an all-time high. Russia confidently takes second place on the global arms market.

Speaking of our tasks, I would like to note that the streamlining of financial, economic, organisational and other mechanisms of military

'We exceeded the target for 2018 military goods deliveries abroad by two percent; this was made possible by consistently implementing the decisions we adopted at our previous meetings.'

Vladimir Putin

technical cooperation is our key objective.

Apart from arms exports, including those of the most advanced models, we need to more actively upgrade previously delivered equipment, set up service centres on the territory of customer states, and reduce repair-service deadlines.

It is important to expand the successful cooperation experience

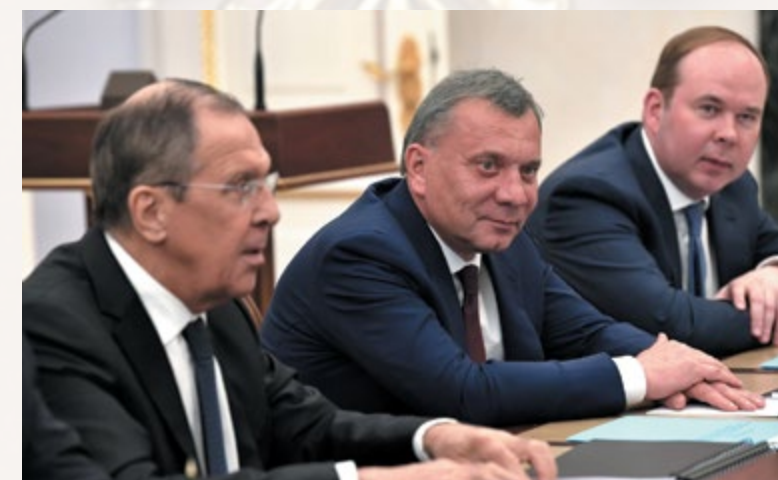


sphere, including a tougher competition struggle and the increasingly aggressive use of unfair methods of political blackmail and sanctions, plus we need to respond adequately to them.

Therefore a new military technical cooperation strategy stipulating well-coordinated political and diplomatic, financial economic and technical measures has been drafted in

'Financial indicators of military technical exports have been growing for over three years in a row now and have almost reached \$16 billion. At the same time, we retained positive dynamics in the first five months of 2019.'

Vladimir Putin



order to more effectively organise our entire activities in the field of military technical cooperation with foreign states.

We have to do everything possible to preserve Russia's leading positions on the global arms market. I suggest that we conduct a detailed discussion of this document today in precisely this context and specify various priorities and guidelines of further expanding military technical cooperation with foreign states.

/RN&TG/

in the field of manufacturing arms and military equipment. We need to continue implementing joint R&D projects and transferring Russian technology to customers wherever this meets mutual interests. We realise that many of our partners are seriously interested in this. We need to pay more attention to our partners' wishes to establish their own defence industry.

It goes without saying that matters linked with strengthening the military technical potential of the Collective Security Treaty Organisation and helping its member countries strengthen their defence capability require high-priority attention.

We need to consider new factors complicating our work with partners in the military technical cooperation



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Vladimir Putin



FSMTC OF RUSSIA

Dmitry Shugaev: 'Our military equipment is highly efficient, quite easy to maintain and is much better than its competitors in terms of its unsurpassed ability to operate in severe geographical and weather conditions'



In accordance with the law of the Russian Federation, activities in the field of military-technical cooperation (MTC) with foreign countries shall be controlled and supervised by the Federal Service for Military-Technical Cooperation (FSMTC of Russia) that, among other things, shall ensure implementation of basic principles of the Russian government policy in the field of MTC. Dmitry Evgenyevich Shugaev, the Director of FSMTC, discusses main directions and tendencies in development of military-technical cooperation between the Russian Federation and foreign countries, the peculiarities of Russian military purpose product exporters' activities at the present stage in his interview to our magazine.

- Minister Shugaev, many countries need defense exports to capitalize on the economy of scale effect and make their systems more affordable. At the same time there is a considerable political component to arms trade. As for Russia is it more of a political or a commercial issue today?

– Well, the military-technical cooperation (MTC) is in essence a special area where economic and political interests of a country intertwine. It is the same for the majority of the countries no matter whether they export or import military purpose products (MPP). The economic aspect of MTC is certainly extremely important. Along with the scale effect, which you have aptly mentioned, for any country, not excluding Russia, successful military-technical cooperation contributes to the federal budget and helps us modernize the national industry. It is no secret that export contracts ensure work-load for domestic industrial enterprises all over our country increasing production and creating jobs. Importantly, global competition of defense producers forces them to analyze success stories of rivals as well as the requirements of their partners so that they can better understand global industrial and technological trends.

At the same time even from the economic point of view the military purpose products' market is substantially different from other global markets such as raw

Major areas of FSMTC of Russia activities shall be:

To perform control and supervision functions in the area of military-technical cooperation in compliance with laws of the Russian Federation; efficient functioning of the MTS system; implementation of MTC related international treaties; level of foreign trade prices for military purpose products.

Decision making on MPP import and export; issue of licenses for MPP import and export; authorizing MPP developers and manufactures to conduct foreign trade operations to supply spare parts and support materiel to MPP, their repair, certification, etc.;

Consideration of applications from foreign customers, their registration, record and control over their implementation;

Record and registration of foreign trade contracts;

Maintenance of the register of MTC entities and issue of appropriate certificates to them.

materials, end-goods and services. First, fluctuations are quite rare in global arms trade while military purpose products are traditionally in high demand. However, the demand for arms is usually subject to the influence of such factors as national armies' modernization programs, importer states' overall economic stability and, in particular, funds allocated to purchase arms. So, evidently, even in economic terms arms market is influenced by both economic and political factors.

And, of course, MTC is an extremely 'sensitive' area. Both for the Russian Federation and for any other leading exporter of military purpose products it remains an important foreign policy tool.

Therefore, it will be correct to say that in pursuing our military-technical cooperation with foreign states Russia proceeds from its strategic interests that have both an economic and a political component.

– What are the principles, the system of cooperation in the field of MTC is based on today?

– Today the system of military-technical cooperation of Russia is built as a vertical relationship where Rosoboronexport is the only exporter of final military purpose products. Concurrently, there is also a number of entities in the field of military-technical cooperation of Russia that are authorized to provide service of the equipment previously purchased by customers, to upgrade it and to supply spare parts for this equipment. These, in particular, include such integrated



'Russo-Turkish military-technical cooperation is fairly dynamic: the Turkish Armed Forces currently operate Russian-made APCs, helicopters, anti-tank missile systems and small arms of different designs. We also have joint projects in various phases of implementation and discussion.'

structures of the defense industry as the United Aircraft Corporation, the United Shipbuilding Corporation, Almaz – Antey Air and Space Defense Corporation and others. They obtained this right to service their equipment supplied to foreign customers as they represent defense industry itself, they embrace the factories that manufacture spare parts, components, etc.

Federal Service for Military-Technical Cooperation is an agency that controls and supervises all the activities related to military-technical cooperation and issues licenses. From strategic point of view the FSMTC of Russia plays the role of government policy 'conductor' in the field of military-technical cooperation and acts as a controlling and licensing agency at the same time.



However, all decisions regarding final supplies anyway are made at the highest level in Russia. That is, either an appropriate ordinance or instruction of the President or the Russian government should be issued. That's why I call it a 'vertical type of relationship.'

– How can you describe the development and dynamics of Russian activities in the field of MTC?

– First of all, I'd like to note that Russia is second in the list of world top exporters of military purpose products. It is not a secret that part of our export is made up by aviation equip-

ment; export of the equipment related to aviation varies in the range of 40-50% of the total volume. Of course, we positively appreciate this fact, and we wish exporters of other weapon types to achieve these figures as well.

At the same time we understand, that the market of military purpose products (MPP) is a very specific market having cyclic nature. A number of factors should be taken into account, including rearmament programs of armies, financial solvency of countries depending on their general economic health. Therefore, we do not expect any abrupt jumps, we are building long-term relationships that allow us

to speak with confidence about stable growth of export supplies.

It is important to participate in long-term programs, providing technical support to our clients and creating maintenance stations with an understanding that many of our clients aspire to improve their own industry, for example.

– What trends currently drive the development of Russian arms exports?

– Russia is a world-leading arms exporter. If we are to analyse Russian military exports over the past several years, the country has reached a steady level of weaponry and hardware exports at some 15 billion dollars per year.

Despite the sanctions which the USA and its allies keep piling up on Russia's defence companies and banking sector, and the threat of similar sanctions being introduced against our foreign partners, Russia continues successful military-technical cooperation with foreign countries in keeping with national norms, in strict adherence to the rule of international law, and in full conformity with its contractual obligations.

– Which classes of weapons and military hardware are particularly popular with foreign customers?

– Historically, or air force, air-defence and army equipment enjoys the greatest international demand. These three segments used to account for some 90% of Russia's entire arms export portfolio. We predict further growth in the military aviation segment, including as regards rotorcraft. We also expect an increase in orders for air defence systems. There is also good reason to expect the naval market to grow as the leading world powers are demonstrating an increasing interest in upgrading and bolstering their navies.

– You have mentioned the projected growth in demand for air defence systems. Which objective advantages make Russian systems particularly appealing in this segment?

– The experience of contemporary local conflicts demonstrates that the side which commands the more powerful air defences usually has an edge over the adversary. It is, there-

fore, only natural for Russia, which is a world-leading manufacturer of advanced air defence systems, to be looking to capitalise on this advantage in the global arms market.

This market segment is highly competitive. There are a number of countries that used to import air defence systems but are now entering the international market with indigenous products. These include India, South Korea, Turkey and South Africa, which could become our rivals in the future.

Despite the broad choice of air defence systems available in the global arms market, Russian products enjoy a steady demand. They surpass foreign equivalents in a number of important technical parameters, and their price is also more appealing. The optimal combination of these characteristics is what ensures the steady global popularity of our products, as conceded by US and West European military experts.

Foreign customers note that Russian air defence systems meet the highest contemporary requirements. They appreciate the reliability, low maintenance and excellent repairability of Russian products. In addition, Russia offers a broad range of air defence equipment, from complex solutions to more affordable but nevertheless equally effective options for those governments which require protection of their airspace while not commanding significant financial resources.

The greatest international demand is currently observed for the Kub, Buk, Tor-M2E and S-300PMU SAM systems; for the Pantsir-S1 gun-and-missile system; and also for the S-400 and S-300VM Antey-2500 SAM systems. The S-300PMU Favorit and the S-400 Triumf are worthy of special mention. They have performed



'We do not differentiate between countries that are members of military blocs and the rest of our customers. Russia sets no additional politico-military conditions in its bilateral relations when it comes to military-technical cooperation. Our country is open to mutually beneficial cooperation with all countries, irrespective of their affiliation with any military alliances.'

excellently in actual combat environments in Syria.

– How difficult is it for Russia to export weaponry and military hardware to countries that are members of military blocs (such as NATO)? Is politico-military affiliation a serious obstacle for those countries interested in procuring Russian weapons?

– We do not differentiate between countries that are members of military blocs and the rest of our customers. Russia sets no additional politico-military conditions in its bilateral relations when it comes to

military-technical cooperation. Our country is open to mutually beneficial cooperation with all countries, irrespective of their affiliation with any military alliances.

That said, the global arms market generally remains highly politicised. Quite illustrative in this respect was the introduction of sanctions against Russian defence enterprises by the NATO member states and their allies. The sanctions have caused direct economic damage to many hi-tech manufacturers in NATO countries. This is why the political component and bloc mentality should not be disregarded.

Nevertheless, Russia is prepared to continue dialogue on military-technical cooperation with all interested partners. We continue such cooperation with Bulgaria, Greece, Slovakia and Turkey, all of which are NATO member states, and we discuss further prospects of this cooperation with the respective governments.

/RNATG/

The Federal Service for Military-Technical Cooperation (MTS) is a key element of the power vertical managing the MNS system. As federal executive authority. Federal Service for Military-Technical Cooperation (FSMTC of Russia) performs MTS control and supervision functions. FSMTC of Russia reports to the Russian Federation President. FSMTC of Russia is subject to jurisdiction of the Russian Federation Defense Ministry.

MASTERPIECES FROM RUSSIA

Rosoboronexport continues defence and security MTC-projects in all over the world

Rosoboronexport (part of the Rostec State Corporation) will be showcasing the best selling and promising new products from the Russian defense industry at the IMDS-2019. Company will provide information on more than 300 pieces of equipment for defence and security, including the best models from the Rosoboronexport's catalog: the newest Kalashnikov AK-200 series assault rifles, 30-mm 32V01 remote weapon station, Viking SAM system and the 76.2-mm AK-176MA automatic naval gun and many others.

Among the Russian products that Rosoboronexport is actively promoting in global market can be called for example the Yak-130 combat trainer, MiG-29M multirole tactical fighter and Su-35 multirole air superiority fighter. Russian helicopters that catch the interest of foreign customers include the Mi-28NE, Ka-52 and Mi-35M attack helicopters, Mi-26T2 heavy transport helicopters, Ansat light multirole helicopters and Mi-17 military transport helicopters. Russia's partners in the world are also interested in such AD systems as the

Rosoboronexport supports the Russian defense industry, which is especially important under difficult conditions in the global market. High-tech products are in increased demand in the world arms market today and thus the company is interested in developing smart manufacturing in Russia.

Pantsir-S1 air defense missile/gun system, Igla-S man-portable air defense system, Antey-2500 air defense system and others.

Rosoboronexport also presents a number of popular military equipment designed for the armed forces and special counterterrorist and anti-corruption units. The equipment includes the VPK-233136 Tigr armored vehicle, BTR-82A and BTR-80 armored personnel vehicles, BMP-3 infantry fighting vehicles, various Kalashnikov rifles and Pecheneg Kalashnikov-designed machine-gun. Navies experts particular interest in

the Project 14310 Mirazh, Project 12200 Sobol and Project 12150 Mangust patrol boats. Several countries show interest in the Russian equipment designed to operate in the Arctic Region, in particular, hydrographic survey vessels.

One of the new pages of the exhibition's activity of Rosoboronexport is the presentation of a new series of Kalashnikov assault rifles, which Rosoboronexport started promoting from beginning this year. 'Export permits for the newest Kalashnikov AK200 series assault rifles have been obtained. From now on, Rosoboronexport may offer its partners the AK200, AK203, AK204 and AK205 versions,' said Rosoboronexport Director General Alexander Mikheev. Rosoboronexport hold presentations of these rifles in the course of negotiations with foreign customers on the supply of small arms. 'We expect strong demand for them around the world,' Alexander Mikheev said.

The Kalashnikov AK200 series assault rifles are in line with all current trends in small arms development, while retaining the best qualities of the AK-47, the legendary brainchild of the great Russian gunsmith Mikhail Kalashnikov, whose 100th anniversary of the birth will be marked in 2019.

'Currently, AK200 series assault rifles are supplied to government customers in Russia and are also ready to be exported abroad to partners who impose more stringent requirements on small arms. The Kalashnikov AK200 series rifles are our strategic product in the export area,' commented Vladimir Dmitriev, Director General of Kalashnikov Concern.

'The newest Russian Kalashnikov rifles have a considerable export potential,' said Sergey Abramov, Industrial Director of the Armament Cluster at Rostec.

The AK200 series rifles have retained all the advantages of the traditional AK pattern: reliability, durability and ease of maintenance. The rifle is equipped with integral Picatinny rail and can be fitted with necessary detachable equipment for the effective use of the weapon

Only Rosoboronexport has the right to supply the world market with a full range of arms and military equipment manufactured by Russia's defense industrial complex and approved to be exported. Rosoboronexport accounts for more than 85% of Russia's arms exports. Rosoboronexport is among the major operators in the world market for arms and military equipment. Last year Rosoboronexport marked its 18th anniversary.

in various conditions, including in reduced visibility.

The length-adjustable buttplate and a number of ergonomic solutions for optimizing controls enable the users to fully realize their shooting skills, regardless of their anthropometric indicators and the availability

of a variety of personal clothing, gear and equipment. The AK200 series has successfully passed the testing program, meets all the requirements for modern small arms and is an effective small arms system.

The second famous new product from Rosoboronexport is the Pantsir-



ME shipborne air-defence missile and artillery system developed and produced by the Instrument Design Bureau JSC KBP named after Academician A.Shipunov (High-Precision weapons Holding, part of Rostec).

'The current trends in the development of the navies force the maritime powers to equip their ships with reliable assets to counteract air threats, i.e. cruise missiles, unmanned aerial systems, helicopters and planes. A sophisticated system of counter-acting practically all the possible aerial kill assets has been developed in Russia. Pantsir-ME can be installed on most Russian warships and is very well fit for ships manufactured by other countries. I am confident that it has very good export prospects in the Arab countries, South-East Asia and Latin America,' said Rosoboronexport's Director General Alexander Mikheev.

The Pantsir-ME air-defence missile and artillery system can be set up on ships with water displacement of more than 300 tons. The system provides a reliable protection of vessels from all the existing and prospective air assault weapons in the whole spectrum of their combat capabilities with an unconditional probability of kill, which is practically equivalent to one, including low-flying anti-ship missiles and unmanned aerial vehicles.

'Currently the Pantsir-ME air-defence missile and artillery system has no direct counterparts in the world market in the segment of shipborne air defence systems, and such will hardly pop up in the near future,' noted Sergey Abramov, the industrial director of the Armaments cluster in the Rostec State Corporation.

The high effectiveness of intercepting anti-ship missiles is explained by high performance tactical and technical characteristics

of the Pantsir-ME air-defence missile and artillery system. The system is capable of simultaneous firing at four targets attacking the ship while the kill zone for guided anti-aircraft missiles reaches 20 kilometers in distance and up to 15 kilometers in height. Besides, Pantsir-ME can first utilize its missile weapons, and then, in case of a miss, the target will be hit by the artillery fire with a 100 percent guarantee.

The system includes a high-intelligent multimode adaptive radio-optical control system. All the stages of operator work – from the target acquisition to the firing – are completely automated. A combined use of the radio and optical control system provides for the all-weather and round-the-clock operability of the system. All this permits a guaranteed elimination of targets at long distances and in close proximity.

In Paris Rosoboronexport plans to discuss the implementation of current contractual obligations and promising MTC projects. Numerous meetings and talks are expected to take place at the event with representatives of the armed forces and other security agencies of many countries, as well as with traditional partners from many regions of the world.

It is important to remember that only Rosoboronexport has the right to supply the world market with a full range of arms and military equipment manufactured by Russia's defense industrial complex and approved to be exported. Rosoboronexport accounts for more than 85% of Russia's arms exports. Rosoboronexport is among the major operators in the world market for arms and military equipment. Last year Rosoboronexport marked its 18th anniversary.

Rosoboronexport was set up by RF President's Decree as a federal state unitary enterprise tasked to implement the national policy in the area of military-technical cooperation between Russia and foreign countries. Since 1 July 2011 Rosoboronexport has been operating as an open joint stock company. Rosoboronexport operates under the strict supervision of the Russian

The main result of biography of Rosoboronexport, despite the difficult economic conditions and fierce, often unfair, competition in the global arms market, that company have managed not only to carry its sales, but also significantly enlarge its footprint in the traditional and new arms markets. Through integrated marketing strategies, company have ensured that order book today exceeds US\$ 46 billion. The special exporter makes painstaking efforts on a daily basis to increase Russian arms exports resulting in more than a thousand contract documents signed with foreign customers every year. Over the period of its operation in the international market, Rosoboronexport has delivered hundreds of thousands of units of military equipment and weapons worth more than US\$ 120 billion to 115 countries.

President, the Russian Government and in full conformity with the UN arms control treaties and the relevant international agreements.

The official status of the exclusive state intermediary agency gives Rosoboronexport unique opportunities to expand long-term mutually beneficial cooperation with foreign partners, provide guaranteed state support of all export-import operations, and strengthen Russia's leadership in the world arms market.

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Rosoboronexport pays great attention to both major billion dollars contracts and small deals. The company seeks to operate flexibly and efficiently by using modern and advanced marketing and cus-

tomers settlement methods. The special exporter cooperates with more than 700 Russian defense-industrial enterprises and organizations, which enables it to offer partner countries the comprehensive and cost-effective solutions for strengthening their defense capability and national security.

By concluding export contracts, Rosoboronexport supports the Russian defense industry, which is especially important under difficult conditions in the global market. High-tech products are in increased demand in the world arms market today and thus the company is interested in developing smart manufacturing in Russia. In addition, Rosoboronexport is actively involved in a number of charitable and sponsorship projects. The company provides assistance to military hospitals, military historical museums, and children's educational institutions. Rosoboronexport supports major sporting events and various sports federations, acts as sponsor and partner of the largest industrial exhibitions and cultural events held in Russia and abroad.

Rosoboronexport pursues a marketing strategy targeted to expand the geography, range and volume of export deliveries. A number of special programs and projects for exporting products to specific countries have been developed based on a comprehensive analysis of the arms markets and foreign partners' needs. Rosoboronexport seeks to operate flexibly and efficiently in the market, using modern and advanced mar-



keting and customers' settlement methods.

Foreign customers are offered package solutions for national systems intended to defend land, air and seaside borders, which feature the optimal trade-off between cost and performance. These solutions may include both the supply of military products and services and organization of licensed production in customer countries, the setting-up of joint ventures to manufacture and maintain equipment, as well as joint R&D efforts. Rosoboronexport widely uses the optimal offset programs. With regard to foreign customers' interests and the opportunities of the Russian defense industrial complex to increase its exports, Rosoboronexport pays much attention both to major billion-dollar contracts and small deals worth the hundreds of thousands to several millions of dollars.

/RNATG/

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 **HIGH-PRECISION
WEAPONS**



NUDELMAN
PRECISION ENGINEERING
DESIGN BUREAU

MAIN PHOTO

PALMA

AIR DEFENSE MISSILE & GUN SYSTEM





IMDS-2019

9th International Maritime Defence Show

In accordance with the order of the Government of the Russian Federation №2403-R of 30.10.2017, the Ninth International Maritime Defence Show 2019 will be held in St. Petersburg from 10 to 14 July 2019. The Organizer of the exhibition is the Ministry of Industry and Trade of the Russian Federation. The Exhibition Operator is Morskoy Salon Co. Ltd. IMDS-2019 will be held on the united territory of the exhibition complex 'Lenexpo' and the berthing complex 'Sea Terminal' in the remained traditional format of the Salon. The Operator of IMDS-2019 invites Russian enterprises and organizations as well as foreign companies to participate in the Salon.



IMDS-2019 is held in cooperation with the Ministry of Defence of the Russian Federation, the Ministry of Foreign Affairs of the Russian Federation, the Federal Service for Military-Technical Cooperation, the Government of Saint Petersburg and Rosoboronexport JSC. The Exhibition Operator is Morskoy Salon Co. Ltd. The IMDS-2019 Organizing Committee is headed by Deputy Prime Minister of the Russian Federation Yury Borisov.

The Show's format enables to unite in the common exhibition space:

- exposition of defence production prototype;

- demonstration of armaments and naval equipment;
- conferences, seminars, round tables, presentations;
- visit to military-industrial enterprises and VIP negotiations.

The IMDS-2019 exhibit profile includes: naval and commercial shipbuilding, armaments and weapons, combat direction systems, navigation, communication and control, marine power plants, naval aviation, location and fleet supply infrastructure, new materials and promising technologies. Considerable exposition space is occupied by marine engineering enterprises, companies which supply marine accessory equipment, electronic elements, information technologies, consulting, financial and insurance services.

The exposition will occupy the halls of Lenexpo Exhibition Complex with total area more than 17000 sq. m., outdoor space, water area of the Finland Gulf and near the quays of the Sea Terminal. Official foreign delegations from 50 countries are invited.

Currently there are over 300 applications for participation including 21 foreign ones registered in IMDS-2019.

Among exhibitors there are the following companies: United Shipbuilding Corporation, Rostec State Corporation, Elektropribor CSRI Concern, Avrova Concern, Krylov State Research Centre, Shipbuilding & Shiprepair Technology Center,

IMDS-2019 is held in cooperation with the Ministry of Defence of the Russian Federation, the Ministry of Foreign Affairs of the Russian Federation, the Federal Service for Military-Technical Cooperation, the Government of Saint Petersburg and Rosoboronexport JSC. The Exhibition Operator is Morskoy Salon Co. Ltd. The IMDS-2019 Organizing Committee is headed by Deputy Prime Minister of the Russian Federation Yury Borisov.

ALMAZ Shipbuilding Company, Oceanpribor Concern, Zelenodolsk plant named after A.M.Gorky, Granit-Electron Concern JSC, Tactical Missiles Corporation, Almaz-Antey Corporation, Prometey Central Research Institute of Structural Materials, Morinformsystem-Agat Concern, Contactmodule Ltd. (Republic of Belarus), BrahMos Aerospace (India), BunSun Electronics Co. Ltd. (China), EAO AG (Switzerland), Icotek GmbH (Germany), ODU GmbH & Co. KG (Germany), SonarTech Co., Ltd. (Republic of Korea) etc.

The demonstration part of the exhibition at the quays of the Sea Terminal and water area will present over 30 ships and boats belonging to the Russian Federation Navy, the Border Guard of the Russian Federal Security Service and participating companies of the Show including:

- ADMIRAL KASATONOV frigate project 22350;

- STOYKIY corvette project 20380;
- MYTISCHI small missile ship project 22800;
- SERPUKHOV small missile ship project 21631;
- PETER MORGUNOV large landing ship project 11711;
- MORDOVIYA small air-cushion landing craft project 12322;
- MICHMAN LERMONTOV landing ship project 21820;
- Transport-landing craft BK-16 project 02510 D-2110;
- Patrol boat project 12150 P-389;
- Unmanned boat of Skanda type;
- EVGENIY GNITSEVICH large hydrographic boat project 19920;
- VALERY ROZHDESTVENSKY multifunctional modular boat project 23370;
- Inshore diving boat project 23040 RVK-1064;
- Tugboat project 02790 MB-96;
- Air-cushion craft SNV P-900;
- KAMCHATKA border patrol boat project 22120;



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- SOBOL fast patrol boat project 12200;
- MANGUST fast patrol boat project 12150.

Congress and business events will be held within the territories of exhibition complex and Severnaya Verf shipyard. There will be about 20 congress and business events including four scientific conferences:

- 10th International Conference on Navy and Shipbuilding Nowadays 2019;
- 20th International Conference MORINTECH-PRACTIC on Information technologies in shipbuilding-2019;

- International Conference PLM-FORUM IMDS-2019 on Shipbuilding product lifecycle management. Information support;
- 5th International Conference on Simulation and complex modeling in marine engineering and transporting systems.

The eighth International Maritime Defence Show (IMDS-2017) finished its work successfully being one of the world leading exhibitions in shipbuilding and naval armament.

The results of the Show demonstrate its high demand among marine industry enterprises. Event high status and place in the world system

of defense exhibitions were reconfirmed.

IMDS-2017 exhibitors became 443 enterprises of 31 countries including 50 foreign companies. The exposition occupied 17,000 sq. m. of exhibition space in halls as well as outdoor display, Sea Terminal quays and water area of the exhibition complex. All leading marine enterprises of Russia were participants of the Show. The great part of the exposition was occupied by manufacturers of component equipment, appliances, electronic elements, information technologies and double purpose products.

IMDS-2017 broad format allowed to present enterprises' products on

stands and full-scale models near quays, on outdoor and water areas as well as to demonstrate maritime artillery weapons in action on the artillery range.

Demonstration part of Sea Terminal quays included 17 ships and boats of the Russian Defence Ministry, the Russian Federal Security Service, the Russian Emergency Ministry and over 30 boats of exhibitors.

There were 10 naval artillery systems and small arms successfully demonstrated for official foreign delegations and mass-media representatives on the Rzhevka artillery range of the Russian Defence Ministry.

IMDS-2017 brought 57 official delegations from 52 countries. Almost all countries dealing with production and exploitation of naval equipment attended the Show. The President of Socialist Republic of Vietnam, four Commanders of Naval Forces and other high-ranked officials visited the Show as official delegations. The extensive programme of delegations was fully implemented, its format exceeded previous IMDS exhibitions.

Official foreign delegations visited such enterprises as Krylov State Research Centre, Baltic Shipyard, Sredne-Neviski Shipbuilding Plant, Marine engineering company AQUA-SERVICE.

Over 120 official negotiations were held in the presence of the Commander-in-Chief of the Russian Navy, officials of Federal Service for Military-Technical Cooperation, representatives of Rosoboronexport, United Shipbuilding Corporation and other leading companies.

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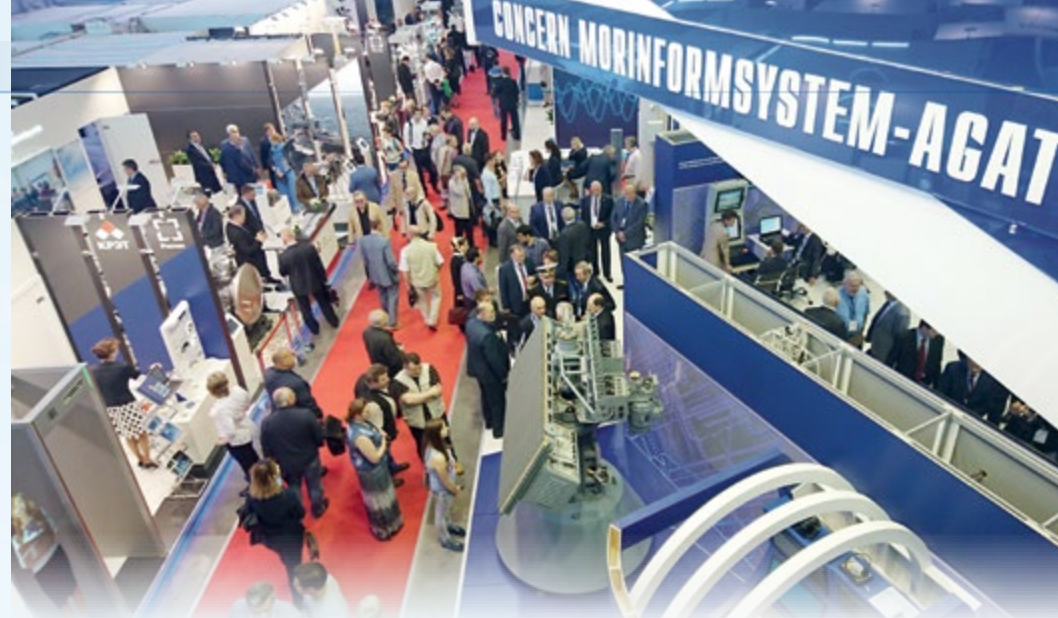
Within congress and business events there were 22 events including four scientific conferences.

Traditionally there were two IMDS-2017 award sailing regattas supported by the sailing union of St. Petersburg.

Over 47000 specialists visited IMDS-2017. Considering the link of St. Petersburg citizens with marine industry, patriotic traditions and interest in the Show, citizens and guests had an opportunity to attend the exhibition, warships and boats at the quays.

The results of the Show are the evidence of Russian and foreign companies pursue the active marketing policy aimed to broaden their participation in the international cooperation on development and production of technically sophisticated systems such as warships.

The Show is a dynamically developing event, which proved its high efficiency and importance. /RN&TG/



D.V. Konoplev
A.V. Zhukov

KASHTAN, KASHTAN-M AND PANTSIR-ME

Ship-Based Air Defense Missile-Gun Systems

Surface ships, including small-displacement ships, must be reliably protected against air strikes. In order to ensure combat stability at the level of 0.95 only one anti-ship missile is allowed to approach defended ships with probability of 0.05. Since to engage a small-displacement surface ship at least two anti-ship missiles are launched, the probability of killing each such missile with air-defense assets of the ship shall not be less than 0.98. This level of probability to kill an anti-ship missile can be achieved only when it is engaged with SAMs and AA guns at several lines of approach.

The only systems in the world that combine within a single turret mount a powerful artillery armament, efficient multi-mode missile weapon and an integrated radar-optical weapon control system are the Russian Kashtan, Kashtan-M and Pantsir-ME developed at KBP, Tula. With two types of weapons within the systems, which gives them significant advantage these systems possess better performances of each weapon separately as compared to counterparts.

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With two types of weapons within the systems, which gives them significant advantage these systems possess better performances of each

weapon separately as compared to counterparts.

Target handling capability and killing potential of one channel of these systems with missile-gun weapon is 2–4 times higher than the same of the systems with only artillery armament. The difference in efficiency has increased with the advent of advanced targets (increase of their velocity at decrease of lateral dimensions).

The specified systems have passed a big number of trials at shore positions as well as comprehensive ship tests.

At present, the systems are mass produced and used on a number of ships in Russian Navy as well as supplied abroad.

High efficiency of killing anti-ship missiles is ensured owing to the following peculiarities of these systems:

- modular design principle (1 command module and 4 fighting modules depending on the ship type) allows flexible arrangement of its protection;
- combination within a single turret mount of missile and artillery weapons and the integrated radar-optical weapon control system allows increasing of firing accuracy due to elimination of errors related to deformations of the ship's hull when the weapons and weapon control system are installed at different places aboard a ship and provides assured destruction of anti-ship due to reduction of errors of artillery weapon firing;
- successive fire at a target with two missiles and final engagement in the close zone with artillery armament ensure the kill probability close to 1;
- development of high-precision integrated guidance systems with radar mm-band channels and optronic channels with automatic target tracking capable of guiding the SAM at a target with high accuracy during flight at any altitude;
- guiding a SAM with radar uplink system of the fighting module to a low flying anti-ship missile without limitation of the flight altitude with high accuracy owing to



Surface-to-air
missile and
AO-18KD AA
automatic gun

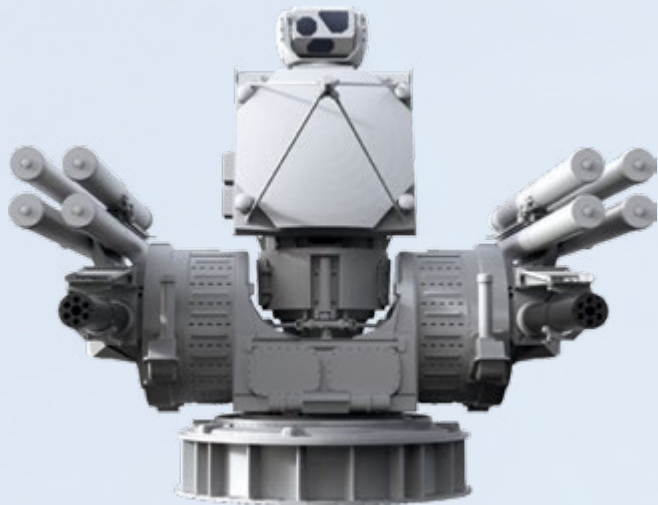
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- implementation of two factors – a narrow beam and diffusion scattering of waves against water surface within millimeter band;
- co-processing of signals from the radar and optical channels of target and SAM tracking with automatic selection of an optimum mode ensures high jamming immunity of the system as compared to systems having only radar or only optical guidance systems;
- implementation of correlation-contrast processing of signals from the optronic system with capability to memorize the target

- patter ensures reliable tracking in different target environments;
- use of two super high rate AA automatic guns with the total fire rate of 10000 rounds per minute as compared to the GAU-8/A gun of the Goalkeeper system allows reducing of burst duration required to kill a target by a factor of 3 (down to 1.2 sec) and reducing of mean range of target engagement by a factor of 1.5 to the 300-500 meters target line which increases the kill probability by 1.5–2 times;
- implementation of fully automatic operation mode;

Deployment of air defense
missile-gun system on a ship





Turret mount with radar of the Pantsir-ME system

– use of agile small-size SAMs with the fragmentation-rode warhead;
– each fighting module is outfitted with storage and reloading system containing 32 SAMs (8 SAMs are on the turret mount ready for launch)
All combat operation processes – target detection, friend-or-foe identification, high threat target selection, assignment of a target designation for tracking assets, firing by missiles and guns, estimation of firing results and transfer of fire to another target, are carried out without crew participation.
Combination within a single turret mount of missile and artillery weapons allowed for 2–2.5 fold reduction of required space and volumes for its installation. For instance, the typical arrangement of missile and artillery systems on a ship requires space and

Combination within a single turret mount of missile and artillery weapons and the integrated radar-optical weapon control system allows increasing of firing accuracy due to elimination of errors related to deformations of the ship's hull when the weapons and weapon control system are installed at different places aboard a ship and provides assured destruction of anti-ship due to reduction of errors of artillery weaponry firing.

underdeck rooms for placement of an artillery mount, SAM launchers with vertical launch and an outer post with a guidance system, while Kashtan, Kashtan-M and Pantsir-ME system occupy space and volume that are required to allocate on a ship only one artillery mount.
On small surface ships (displacement 500 – 3000 t) any of the given systems within the command module and one – two fighting modules is a sufficient air-defense asset for efficient ship protection without assistance of other air-defense means. On large surface ships (displacement over 4000 t) the given system fulfills the functions of a short-range AD system capable of killing air threats that passed through long-range AD systems.
As per the evaluations, the Kashtan system outperforms the

Crotale Naval system 1.5–2 fold, and the Goalkeeper system 2.5–3 fold in terms of target handling capability.
Air threats to ships are ever-improving: flight velocity increases, maneuverability and application tactics improve, radar observability decreases, wherefore KBP jointly with co-contractors upgraded the Kashtan (code name Kashtan-M) and Kashtan-M (code name Pantsir-ME) systems.
Basic line of modernization:
– use of a command module with its own 3D search radar (SR), which allowed for decrease of final targeting time by 3–5 times;
– expansion of engagement envelope in range and in altitude of SAM;
– use of multi-functional radar with phased antenna array ensures simultaneous engagement of 4

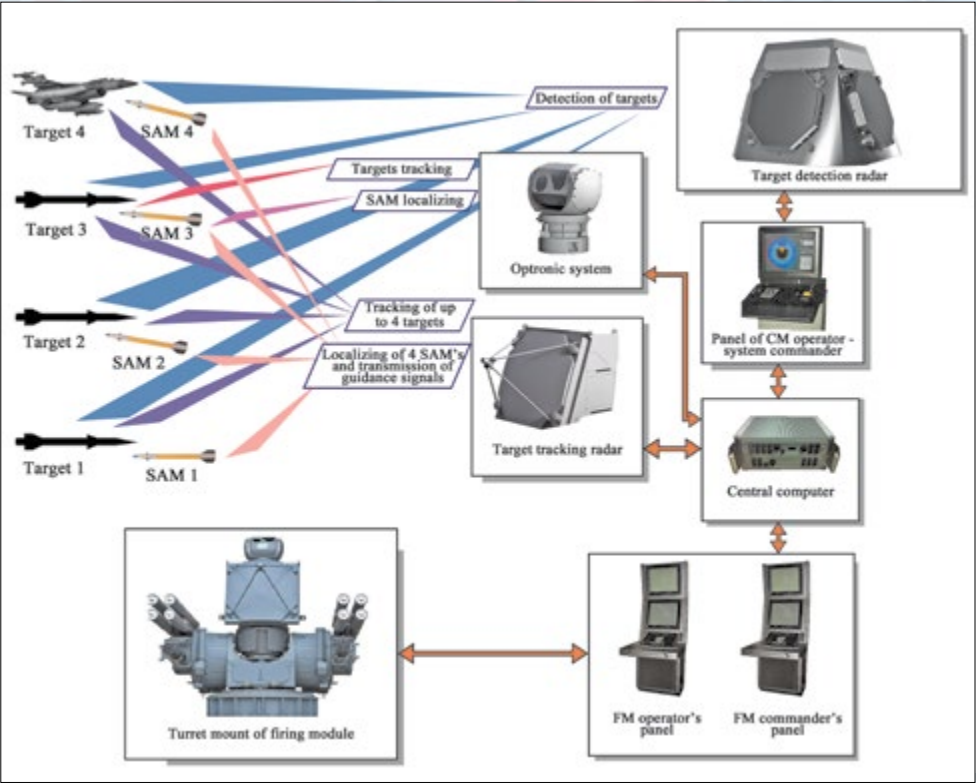
targets with 4 SAMs (including engagement of new and modernized anti-ship missiles)
– use of a thermal-imaging system along with a TV-optical system of target tracking allows for increase of system application rate;
– use of the artillery weapon based on the GSh-6-30KD AA automatic guns has enabled to increase the muzzle velocity of the projectiles and to apply APDS rounds, to increase the firing accuracy and target kill probability owing to reduction to 300 m of the minimum permissible safe kill range of the anti-ship missile (owing to detonation of the anti-ship missile warhead when fired by the APDS round). Reduction of the anti-ship missile minimum permissible safe kill range down to 300 m allows the artillery system with the 10000 rds/min rate of fire engage in the automatic mode up to 5–7 anti-ship missiles (before ammunition is expended) that approach from the same direction at 3–4 sec. intervals (e.g. the Goalkeeper system can fire targets at over 6 sec. intervals);
– reduction of the response time owing to the increase of speeds and accelerations of the missile-gun mount laying;
– improvement of the system reliability by 2 to 3 times as well as enhancement of the operating specifications of the system components through reduction of number of the control post instruments and use of modern hardware components.

The results of the modernization the killing potential of the Pantsir-ME system per time unit increased by 2-3 times as compared to the Kashtan-M system.
All that ensure combat readiness of protected ships against all modern air threats including low-altitude high-precision weapons.
The Pantsir-ME, Kashtan-M and Kashtan single-post air defense missile-gun systems are the most advanced systems of such type and have no counterparts world-wide.
Specifications of Kashtan, Kashtan-M and Pantsir-ME systems are given in the table.

Basic specifications of systems

Specification	Kashtan	Kashtan-M	Pantsir-ME
Engagement envelope: by missiles, km: - range - altitude	1.5 – 8 0.005 – 3.5	1.5 – 10 0.002 – 6	1.5 – 20 0.002 – 15
by guns, km: - range - altitude	0.5 – 4 0.002 – 3	0.5 – 4 0.002 – 3	0.5 – 4 0 – 3
Guidance system	Radar and TV-optical	Radar and optronic – TV + thermal imager (TV+TI)	Radar and optronic – TV + thermal imager (TV+TI)
Response time, sec.	6 – 8	3 – 6	3 – 5
Number of Simultaneously Engaged Targets	1	1	4
Ammunition load, pcs: SAMs on launchers / in storage and reloading system artillery rounds	8/32 1000	8/32 1000	8/32 1000
AA gun type	AO-18K	AO-18KD	AO-18KD
Weight, kg fighting module with ammunition load turret mount without ammunition load	12000 6250	10000 6500	7100 5500

All combat operation processes – target detection, friend-or-foe identification, high threat target selection, assignment of a target designation for tracking assets, firing by missiles and guns, estimation of firing results and transfer of fire to another target, are carried out without crew participation.



Functional diagram of Pantsir-ME guidance system



THREE BIG SHOWS

Rosoboronexport: breakthrough products for arms market to be presented at this summer's exhibitions in Russia

Rosoboronexport (part of the Rostec State Corporation) is providing support to the largest international exhibitions of armaments and military equipment, which are to be held in Russia in 2019. The company is sponsoring the International Maritime Defence Show 'IMDS-2019', the International Aviation and Space Salon 'MAKS-2019', as well as the International Military-Technical Forum 'ARMY-2019'.



The Maritime Defence Show, ARMY and MAKS are always memorable and meaningful events, which are attended by practically all our foreign partners and potential customers from the majority of the world regions. Here one can see all the trends of the Russian defence industry, assess the highest level of the development of technologies and design ideas. Rosoboronexport is an inherent participant and a traditional supporter of these exhibitions, which consistently enter the TOP-5 of the largest world shows in their respective segments. They constantly give us the maximum monetization out of all the exhibition events in the world,' said Rosoboronexport's Director General Alexander Mikheev.

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Alexander Mikheev

The International Military-Technical Forum 'ARMY-2019', which will be held on June 25-30, presents the key newly-designed export products and bestsellers of the Russian defence industry for all the services and branches of the armed forces, as well as for special operations and anti-terrorist units.

This year the visitors of the ARMY will have an opportunity to see in the 'Patriot' park a number of newly-designed products, which are of a potentially breakthrough character for the world market, i.e. the Kalashnikov assault rifles of the newest 200th series, new generation special vehicle 'Tigr-2', the 'Viking' and 'Tor-E2' air defence missile systems, combat vehicle of a squad equipped with the 'Gibka-S' MANPADs, means to counter unmanned aerial systems, as well as new solutions in the area of electronic countermeasures.

For sure, the guests' attention will be drawn by the world famous brands, e.g. air defence missile system S-400 'Triumph', air defence missile and cannon complex 'Pantsir-S1', anti-tank missile systems of the 'Kornet' family, the 'Terminator' fire support combat vehicle and many other new products in the area of fire arms and close combat assets.

A number of newly-designed products are also prepared for the representatives of the naval forces of foreign states, who will visit the International Maritime Defence Show in Saint-Petersburg on July 10-14. The manufacturers will display the full-scale specimen of the 'Rubezh-ME' coastal missile system, multi-purpose integrated radar system 'Zaslon', air defence missile sys-

tem 'Redut', different ships of Russian production, including the 'Karakurt-E' small missile ship of project 22800E.

For the delegations representing air force and for all the guests of the International Aviation and Space Salon 'MAKS-2019' in the Moscow region's town of Zhukovsky on August 27 – September 1, the following pieces of equipment will be presented: the newest Su-57 fighters of the fifth generation, light military transport aircraft Il-112V, multipurpose supermanoeuvrable fighters Su-35 and Su-30SM, training aircraft (combat trainers) Yak-130, combat helicopters Mi-28NE and Ka-52, military transport helicopters Mi-171SH and Mi-17V5, and other aviation systems.

For Rosoboronexport, the International Maritime Defence Show, MAKS and ARMY are an important marketing tool. We invite to them the maximum number of foreign delegations, which have a perfect opportunity to satisfy the needs of their defence and law-



enforcement agencies in the sophisticated Russian materiel, to receive as much detailed consultations as possible, related to the distinctive technical features of the weapons, as well as to the modalities and particularities of their combat use,' added Alexander Mikheev. /RN&TG/

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Alexander Mikheev

Sergey Kulik

SECURE RESCUE AT ANY HEIGHT



Unique autonomous rescue parachuting back-pack system for emergency escape

The innovative Russian private Space Rescue Systems Ltd. (SRS Ltd.) company (www.cosmic-rs.com) proposes a unique and unrivalled emergency rescue vehicle SPARS® – an Autonomous Rescue Pneumo Transformable Chute Back-pack System – a validated forefront rescue solution for guaranteed secure individual emergency escape from nearly any high elevation structure (skyscrapers, offshore platforms etc.). The SPARS® project is resulted in a creation of a brand new pneumo-framed aerodynamic devices technology. There is no doubt in the near future this solution is going to be a must-have in skyscrapers construction all over the world.

The SRS Ltd. proposes a SPARS® high rise escape technology that has a global nature. It is uncovered market niche with an obvious but unrealized human requirement to be and to feel safe while living or working in high elevation buildings. In case of emergency than traditional evacuation is impossible or ineffective those people all over the world have practically no means of urgent secure rescue from the height and need an alternative solution.

Actually the technical reviews shows that at present there are practically no means for secure alternative escape starting from 60÷80 m height and higher available on the market. But according to the said firefighter's statistics about 3÷5% of people being caught in alarm situation on the high-rise building used to try escaping from the windows and

usually perished. On the other side homeland security analytics says that in average an every skyscraper in the world is expected to be subjected to a fire case (terroristic attack or other emergency) once in every 47 years.

So the SRS Ltd. has decided to resolve the problem in finding an alternative to traditional evacuation methods technical solution. It takes about eight years of R&D to resolve the task. Finally it is resulted in creation a brand new escape technology – an Autonomous Rescue Pneumo Transformable Chute Back-pack Solution for secure personal rescue from high-elevation structure in case of emergency than traditional evacuation methods are impossible.

The SRS Ltd company in outsourcing cooperation with 18 leading Russian and foreign aerospace companies has fulfilled full-scale research and development activities to devel-

op the project from conceptual proposal stage to releasing operating prototypes unparalleled anywhere in the world.

The SPARS® escape technology is based on a synergy of sophisticated aerospace technologies such as Air-Aspirator Rapid Inflation; Elastic Pneumo-Frame Catapult Ejection; Air-Drag Deceleration; Air-Bag Shock Absorbing and others. Such technologies were invented for space probes deceleration during descent in atmospheres of Solar system planets and its landings on surfaces.

The SPARS® device provides a secure individual escape of untrained person or valuables cargos with weights 45÷120 kg. from about any of existing high-rise (50÷1000m) facilities (skyscrapers; towers; offshore platforms etc.) with guaranteed safe landing on any underlying surface in urban terrain or water in

case of emergencies than traditional evacuation methods are impossible.

The SPARS® solution meets the Russian Ministry of Emergency Situations (EMERCOM) requirements for high-rise emergency escape apparatus (GOST R 22.9.08-2005; GOST R 12.4.206-99) and provides for the following unique capabilities, never implemented before:

1. Alternative of emergency escape (so-called 'last resort rescue')
2. Emergency evacuation of an untrained person having weight of 45÷120 kg, from heights of 50÷1,000 m;
3. Ready-for-use in 45÷60 sec;
4. Self-sustained operation and independently selected escape route;
5. User-friendly operation for untrained persons and fully automated rescue procedure right from start;
6. Personal protection against external hazards during evacuation;
7. Appropriate weight of a back-pack-type carried device;
8. Secure injury-free landing on any underlying surface.

The SPARS® unit for individual use had required a special certificate basis. In this regard the National Standard (GOST) 4240-001-2012 specifying medical and technical requirements for injury-free operation by untrained persons rescued by means of new type SPARS® shock-

absorbing systems entered into force in 2013.

To have certification tests performed a special Hybrid-III (USA) crush test dummy-based anthropomorphic (bionic-like) instrumentation station has been developed and created by the SRS Ltd., which has no equals in Russia.

A full cycle of comprehensive calculations and testing to validate design properties and performance has been performed. Up to now the SPARS® device technical operational reliability is 98.7% but further testing is under way.

New SPARS® escape solution provides the following advantages:

1. Alternative (a 'last resort') escape mean for ordinary person in case of emergency in the high-rise structure;
2. Secure rescue of untrained personnel (18÷70 years old) from high elevations from 5 till 1000m (no practical means available starting from 50 m height);
3. Off-line capability of the system provides mobility that helps to find optimal self-escape way of out from emergency situation;
4. Smooth automated ejection from the emergency object after manual initialization of the system;
5. Guaranteed deploy of the canopy with 3÷5 m loss of height irrespective of air flow speed pressure;
6. Protection from dangerous external factors (fire, hits, smoke) during descent;

The SPARS® General Specifications

1. Total Assembly Weight – 25 kg
2. Rescue Payload Weight – 45÷120 kg
3. Descent Elevations – 5÷1000 m
4. Landing Velocity – 5÷7 m/s
5. Landing Angle – < 30°
6. Footboard Barrier Elevation – 1.5 m
7. Descent Time – 3÷150 s
8. Ready-to-use Time – 45÷60 s
9. Launch Initialization Time – 15÷20 s
10. Inflating Gas – Air;
11. General Dimensions:
 - a. Assembled – 900x450x300 mm
 - b. In Descent mode – 6,500x2,700mm (without canopy)

Actual Landing Impact Loads:

Acceleration directions:

'chest-to-back' – up to 8÷10 g

'side-to-side', 'head-to-pelvis' – up to ± 6 g

Acceleration Exposition Time – less than 0.5 s

Acceleration Growth Velocity – less than 500 1/s

User's age – 18÷70 years

7. Safe landing on any underlying surface in urban terrain;
8. Reusable and does not sink.

In packed and assembly complete mode the SPARS® system weights 25 kg with back-pack dimensions





850x450x350mm and has easy – to-use suspension system.

The SPARS® has its Technical Data Sheet (TU 801130–5047075064–01–10) and working design documents issued. Under the SRS Ltd requirements Russian gas-filling systems (GFS) manufacturing company has mastered Autonomous Two-Stage GFS for SPARS® (TU 8042–017–45307693–2013).

The SRS Ltd. Intellectual Property Rights on SPARS® and its ‘know-hows’ have been completely protected within Russia (9 Patens, 3 Trade Marks) and abroad under PCT (Patent Cooperation Treaty) procedures 2 ‘umbrella’ requests for SPARS® have entered national level in 15 countries and covered 78% skyscrapers and

95% potential SPARS® manufacturers. 13 Patents of the US, China, Japan, Canada, South Korea, Singapore, the Ukraine, Indonesia, Malasia and Australia have been already received.

Three Russian EMERCOM Certificates of Conformity were received for the SPARS®. ‘Aerospace medicine and military ergonomics’ R&D Institute of the Russian Air Force has granted an official approval for the SPARS® physical adaptability.

The SRS Ltd. company now is looking for cooperation with a strategic Partner and/or investor in order to industrialize the brand new SPARS® product; to make it commercial; to prepare and set up its production and to enter with it into a global commercial market having all nec-

essary intellectually property rights protected.

An accurate assessment of the terms, timeframes and investments required for the SPARS® industrialization it is foreseen that a Partner from the region where product itself (or its production) could be demanded (Middle East, China, US, Europe, Asia-Pacific etc.) could formulate and provide the SRS Ltd. Company with the regional authority technical requirements to upgrade the product specifications and also could determine the necessary level of licensing.

At the same time in order to reduce production costs it is desirable to find and select a local manufacturer taking into account its technical capabilities and possibility to use appropriate production process technologies.

Upon receiving necessary information from a Partner the SRS Ltd. Company could finalize the design documentation, to fabricate a prototype with specifications meeting local needs and to determine expected investments and timeframes necessary to prepare and to run mass production of the product in the region.

Shares and Conditions in the business organization is a matter of further negotiations. The SRS Ltd. Company would be ready to demonstrate its good willing approach and to meet a Partner in negotiations halfway with necessary flexibility in some critical questions aiming to achieve mutually beneficial cooperation.

Such forms of cooperation as Joint Venture, Technical, Manufacturing or License Agreements are feasible.

For a strategic industrial Partner sought who would be interested to

run mass production of the SPARS® in the region and enter an empty market with protected rights it would be necessary to have production technology experience in the fields of:

- thin coated/laminated fabric manufacturing;
- assembly from these fabrics a complex air-beam-frame air-proof inflatable structures;
- parachute canopy manufacturing;
- air-aspirator gas filling manufacturing;
- plastics (carbon) manufacturing and forming
- human field (air-borne) tests plastic forming and others.

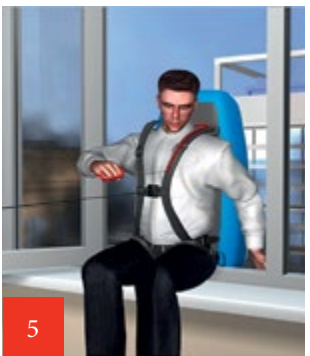
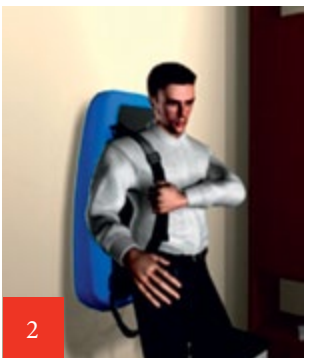
A Partner sought may be expected to undertake part of those activities or provide financing for already SRS Ltd. Company existing outsourcing manufacturing solution in Russia on a mutually beneficial basis.

As for the SPARS® solution operation such a potential entity sought (hotels, profitable houses; skyscraper’s management company; offshore platform management; air-borne attractions & entertainment companies etc.) should only require a free window exit sized 1000x500 mm at the appropriate height to use Autonomous Pneumo Transformable Escape Chute and propose to its clients an additional exceptional secure service with limited warranty.

General market estimations shows there are over 7,303 finished and 2,500 under construction skyscrapers worldwide with the heights of 100÷828m, over 100,000 buildings having height of 50÷100m and more than 800 offshore platforms. Taking that analysis into account the SPARS® may have potential market capacity of up to \$700-850 million annually.

Furthermore, the SPARS® estimated potential market capacity is worth over \$3.5 billion in commercial sector alone. The Governments market is bigger but for accepting that new technology implementation it may require some updates of the appropriate local norms and regulations.

/R&N&G/



There are following innovations in the proposed SPARS® technology:

1. A brand new free parachuting technology (means and escape method) was created for emergency escape from heights higher than 50 m where practical methods for safe evacuation of a person are not available on the market.
2. Sinergy solution based on specially designed and produced from film-laminated fabric a rapid inflatable air-beam single volume frame structure for:
 - Elastic catapult ejection of a human from a window of an emergency object;
 - Forced deploy of the canopy with only 3÷5 m loss of height and irrespective of air flow speed pressure for deployment (usual parachute requires of 25÷100 m free fall and/or 250÷350 km/h speed of airplane to be deployed);
 - Guaranteed safe landing with 5÷6 m/s vertical velocity on any underlying surface in urban terrain using integrated air-frame shock absorbing pneumo dumper.
3. Fully automatic mode of usage (after manual initialisation of the apparatus) and all the descend envelope accelerations bearable for an ordinary person make the escape solution available for use by untrained people from 18 till 70 years old;
4. New type of light weight air-proof film coated fabric for air-beam inflatable frame structure was created.

The Special National Standard (GOST) for shock acceleration limits for untrained human using new type of lodgment Rescue Parachuting Systems was issued.
The Crash test dummy Hybrid-III 50% percentile was instrumented, calibrated with the help of centrifuge, certified and used as anthropomorphic instrument for human acceleration checking during field tests and validation of the Autonomous Pneumo Transformable Escape Chute.



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SUCCESSFUL LAUNCH



Two space carrier rockets (CR) were launched on 4th of April: at 14:01 Moscow time from the launch pad of the Baikonur cosmodrome and headed toward the ISS Soyuz-2.1a with the transport cargo vehicle Progress MS-11, and Soyuz-ST-B was launched from the Guiana Space Center with the Fregat-MT upper stage rocket and four O3b communication satellites at 20:03 Moscow time. In both cases, the RD-107A/RD-108A serial production engines of PJSC Kuznetsov, installed on the CR, functioned successfully.

The Progress MS-11 transport spacecraft docked to the Pirs module of the International Space Station at 17:22 Moscow time, thus becoming the fastest spacecraft in the history of flights to the ISS: only 3 hours and 21 minutes passed from launch to docking. Previously, the title of record holder belonged to Progress MS-09, which in July of 2018 docked with the ISS in 3 hours 40 minutes after launching from Baikonur. The Progress MS-11 ship delivered over 2.5 tons of various cargoes to the station: more than 1.4 tons of dry cargo, 900 kg of fuel, 420 kg of water in storage tanks, and also 47 kg of compressed air and oxygen in cylinders. In the packing of the cargo compartment contained scientific equipment, components for the life support system, as well as containers with food products, clothing, medicines and personal care products for crew members.

Having successfully launched from the Guiana Space Center, Soyuz-ST-B carrier rockets launched four European O3b telecommunications spacecraft to the calculated orbits, which will add to the large-scale homonymic constellation of satellites. There are now 16 such satellites in orbit, they provide high-speed mobile and fixed communications to residents of remote and developing regions.

We remind that the operation of Samara built rockets and engines from the Guiana Space Center began in October 2011. The launch of Soyuz-ST-B carrier rockets with RD-107A/RD-108A engines from the Kourou cosmodrome became the twenty-second in a row.

Equipment Supply

Rostec Electronics holding of Rostec State Corporation had created a matrix of high-speed switches with a control driver for the European Space Agency. The equipment was intended for use in near-earth orbit space radars. The new development was one and a half times cheaper than foreign analogues and surpasses them in a number of technical specifications.

The matrix allowed the radar to switch to either transmitting or receiving a signal. The device was designed on request of the Italian supplier of the European Space Agency. Customers had the need to create a new version of radar – cheaper than existing versions with equal technical parameters.

The development of Rostec was one and a half times cheaper than its foreign counterparts, and surpassed them in some characteristics. Thus, the total loss was not more than 0.3 dB, and the total isolation (signal suppression between certain inputs or outputs of the device) was not less than 60 dB. At the same time, the device was more compact and weighs less.

‘Rostec State Corporation created a wide range of high-technology science-intensive products, which were in demand not only in Russia, but also abroad. The interest of the European Space Agency once again confirmed that our developments met the highest international standards. Deliveries of a new matrix for space ra-



dars were carried out within the framework of the national project ‘International cooperation and export’. In the new radar model, our production matrix will replace expensive foreign analogues. Devices with such characteristics will be used in the civilian field for the first time’, said Oleg Evtushenko, executive director of the Rostec State Corporation.

Earlier, Ruselectronics holding supplied ferrite products to the Center for space applications of government of India. The materials supplied were used as part of ultra high frequency devices for space satellites.

Shvabe Revived Telescopes

Novosibirsk located factory of Shvabe holding of Rostec State Corporation was preparing for a serial production of Newton's telescopes. These were the exact replicas of the original reflector created by the great scientist in 1668.

The idea of recreating the classic Isaac Newton's reflecting telescope originated in 2008, when thousands of scientists and amateur astronomers came to the capital of Siberia aiming to see the total solar eclipse on August the 1st. Then the specialists of the Novosibirsk Instrument-Making Plant (IMP), which is part of the Shvabe Holding, released a limited batch of optical instruments for observing stars as memorable souvenirs.

TAL-35 – is the exact copy of the historical original. The only difference is in the image quality. If Newton used a polished bronze plate for reflection, the replica is equipped with an optical mirror processed by aluminium plating. Thus, despite being a purpose made souvenir, these telescopes can be used for observations.

‘The souvenirs turned out to be so popular that the first batch was sold



out almost immediately, and from 2010 the IMP continued production of its occasional copies – on individual order. At the end of last year, we decided to start full-scale production, which we plan to launch in spring. In doing so, we were guided not only by the popularity of TAL-35 as souvenir products, but also by the fact that teaching in astronomy was resumed in schools of Russia, the homeland of space explorers and great astronomical discoveries, a dis-

cipline that forms the mindset of creators and winners. We are confident that Newton's telescopes were the first step in big science for many young people’, said Vasily Rassokhin, general director of the IMP.

The first telescope lens was created by Galileo Galilei in 1609 which is considered to be a refractor telescope. Poor image quality encouraged astronomers to constantly modify the device. They found that the image quality increased with increase of focal length of the eyepiece, which led, in turn, to an increase in the size of telescopes – some reached a length of 50-60 meters. In the mid-1660s, Isaac Newton proved that the cause of poor image quality is chromatism, which can be eliminated if a spherical mirror is used instead of convex lenses. Newton introduced his telescope in 1668, which was only 15 cm long and earned him worldwide fame.

Monitoring the State of Runway Strips

Ruselectronics holding of Rostec State Corporation began preliminary tests of the complex for measuring the adhesion coefficient of the airfield pavement to aircraft chassis. The equipment facilitates quick preparation of the airfield for operation and prevents the aircraft from rolling out of the runway strip. The cost of the complex is several times lower than of its foreign analogues currently used at Russian civilian airports.

The automated complex is a two-wheeled device with a control unit that is towed along the runway at different speeds. The device measures the braking force of the wheels and registers the adhesion coefficient to the surface. Data on the state of surface is transmitted to the operator in automatic mode.

‘Mass production of the complex is scheduled to start on the fourth quarter of 2019. The equipment enables responding to changes in timely manner to the runway strip conditions, which then ensures the safety of aircraft take-off and landing. Such equipment is essential for safe operation of all aerodromes. Nowadays for these purposes, civilian airports mainly use foreign technological equipment or domestic equipment from the 1970-s. The development of our specialists from Ruselectronics is about 5 times cheaper than their foreign counterparts, and provides higher reading accuracy’, commented Rostekh's executive director Oleg Evtushenko.



It was recalled that Rostec created earlier a modern airfield complex SP-2010 for landing an aircraft in adverse weather conditions at any time of the day. Resonator antennas and other know-hows were used in the newest digital complex, thanks to which moisture, precipitation and icing no longer affect its operation. SP-2010 is the best in the world for a number of characteristics.

VK-2500 in China

The type certificate of the helicopter turboshaft engine VK-2500, designed and produced by the Saint Petersburg company UEC-Klimov (part of the United Engine Corporation (UEC) of the Rostec State Corporation), was validated in China. After that the powerplant could be used in Russian-made civilian helicopters in China, which allowed to geographically expand the sales and operation of Russian Mi and Ka helicopters.



The validation process of the VK-2500 engine was carried out in close cooperation between the Chinese aviation authorities and the Russian Mil Moscow Helicopter Plant (part of the Russian Helicopters holding company of Rostec) and the Russian Federal Air Transport Agency. This was the first occasion in 19 years when The Civil Aviation Administration of China has certified a Russian helicopter engine. UEC's next step was to certify the VK-2500PS-03 engine for helicopters in China as well as to validate the type certificate of VK-2500PS-03 in India, South Korea, Brazil and Mexico.

‘China is one of Rostec's traditional cooperation partners in the fields of both military and civilian technology, and helicopters are one of the most important parts of this cooperation. In 2017, UEC presented a modernization project of Chinese helicopters aimed at replacing the TVZ-117 engine to the more ad-

vanced VK-2500, which sparked significant interest of the helicopter operators. Last year, demonstration flights of the Mi-171 helicopter equipped with VK-2500 engines were held in the Chinese city of Lijiang. The Ministry of Emergency Situations and Civil Aviation Administration of China highly appreciated the capabilities of the helicopter for cargo transportation and extinguishing high altitude fires. The successful validation of the VK-2500 type certificate allowed us to start the modernization project of Russian helicopters in China’, noted the Aviation Cluster Industrial Director of the Rostec, Anatoly Serdyukov.

VK-2500 has been designed to replace the TVZ-117 helicopter engine. It has three different modifications within the take-off power range of 2000 – 2400 hp. The powerplant introduces a digital integrated automatic control system (ACS) instead of analog one, advanced sensors, operating hours and monitoring counter and better construction materials. This provides better performance indicators, such as increased power in emergency flight modes, temperature control in a wider range of outdoor conditions and higher service life. VK-2500 gives fundamentally new possibilities for helicopter operations in high-mountain regions and regions with hot climate.

Today, UEC is increasing production rates of VK-2500 engines to meet the needs of state and export contractors. The engines are exclusively assembled from Russian components.

MILITARY EQUIPMENT AT FAMEX

Rosoboronexport, a member of Rostec, was setting up a joint Russian exposition at the Mexico Aerospace Fair FAMEX-2019 which was taking place at AFB 1 in Santa Lucia, Mexico, on April 24-27.

‘Rosoboronexport took consistent steps to strengthen its positions in Latin America. Here people are well aware of and appreciate Russian aviation, helicopter and automotive equipment for outstanding performance and reliability. We were going to keep cooperating with Latin American countries to the extent of supplying the whole range of military products, including modern Russian weapons, advanced drones, AD platforms and ammunition among them. In a number of states in the region we already demonstrated our expertise in construction of aftersales infrastructure to maintain supplied equipment and train personnel. We were open to any opportunity in the area’, said Director General Alexander Mikheev of Rosoboronexport.

FAMEX has been conducted under auspices of Mexico's Ministry of National Defense since 2015. This year saw Rosoboronexport for the second time at the event.

The joint expo included the booths of Rosoboronexport (No. 121 in Hall C) and Russian Helicopters (No. 118 in Hall D) displaying over 200 pieces of military equipment. Additionally, a delegation of the Irkut Corp. demonstrated its products.

Rosoboronexport believed that the most promising future faced the Yak-130 combat-trainer and MiG-29M multirole frontline fighter. Other platforms that had everything there was to pique the interest of foreign customers are the Mi-17V-5 and Mi-171Sh military transport helicopters, Mi-35M attack helicopter with troop-carrying capacity, Mi-28NE and Ka-52 gunships, as well as Ka-226T light multipurpose helicopter.

There was definite export potential in the Orlan-E, Orlan-10E, and Takhion unmanned aircraft systems, as well as AD systems, namely Pantsir-S1 gun-missile system, Viking and Buk-M2E SAMs, and Verba and Igla-S MANPADS.

Besides, the interest in military assets and gear for agencies fighting crime, terrorism and drug mafia was very much alive in the region. Thus, Rosoboronexport expected the BTR-80A/82A personnel carrier, assorted small arms and grenade launchers, Tigr-M and Typhoon vehicles, which had already gained popularity in the region, to gather crowds of regional specialists as well.

FAMEX 2019 also saw various Russian Comprehensive Security solutions suitable for large sports and cultural events, aerial and off-shore regulation, control of large municipalities, administrative entities and facilities.



Vladimir Karnozov

RUSSIAN WARSHIPS IN ASIAN SERVICE

Russian-origin naval assets are found in India, China, Vietnam, Indonesia and North Korea. Surface combatants are represented by aircraft carriers, destroyers, frigates, corvettes, anti-submarine ships, minesweepers as well as missile, torpedo and patrol boats. Indonesia used to have a cruiser. There are also some landing ships, fleet oilers and various auxiliary vessels. Collectively, China, India and Vietnam operate 27 Kilo-class diesel-electric submarines. Besides, India has taken a nuclear-powered submarine in operating lease for ten years, and is likely to get one more. So, the list of classes is rather impressive.

The Soviet Union began exporting naval assets to Asia-Pacific shortly after WW2. By 1960 the People's Republic of China received a Project 629 ballistic-missile submarine, fourteen WW2-vintage submarines, ten Project 613 and 633 diesel-electric submarines (including hulls for completion locally), eight Project 122B patrol ships, six Project 254 minesweepers, 22 missile and torpedo boats of Project 183 along with 90 older ones and other equipment. PRC also received design and manufacturing documentation

on Project 633 submarines, Project 50 escort ships and Project 254 minesweepers. Even though relations between Moscow and Beijing deteriorated in the early sixties, the Chinese industry was able to carry one with production of these ships and their local derivatives.

In the early sixties the Soviet Union supported Indonesia in her struggle against the colonial powers by supplying advanced equipment such as a Project 68bis cruiser and twelve Project 613 diesel-electric submarines. The military assistance terminated after the nationalists

came to power in 1965. That same year New Delhi awarded Moscow first contracts for naval equipment and since then has remained the world's largest customer for Russian warships.

Submarines

Apart from a handful of outdated Soviet submarines and their Chinese clones in North Korea, there are 27 relatively modern Kilo-class submarines in service with three Asia-Pacific nations. China received a couple of Project 877EK boats built at Sormovo in Nizhny Novgorod in 1994-1995 and

a pair of more advanced Project 636s assembled at Admiralty Shipyards in St. Petersburg in 1996-1998. Then it procured eight Project 636M submarines in 2004-2006 of which one was built in Nizhny Novgorod, five in St. Petersburg and two at Sevmash in Severodvinsk. The latter version features the Club-S tube-launched missile system employing 3M54 anti-ship weapons. China has paid about U.S.\$ 3 billion for these submarines, missiles and torpedoes to them.

In 2009 Vietnam placed order worth U.S.\$ 4 billion for six Project 636.1 boats complete with shore infrastructure and support package. The first submarine arrived at Cam Ranh in December 2013. Today, all six are operational: HQ-182 Hà Nội (Hanoi), HQ-183 Hồ Chí Minh (Ho Chi Minh city), HQ-184 Hải Phòng (Haiphong), HQ-185 Khánh Hòa (Khanghoa), HQ-186 «Đà Nẵng» (Danang) and HQ-187 Bà Rịa-Vũng Tàu (Vangtau).

The Indian navy acquired its first submarines from the Soviet Union after attempts to buy Porpoise or Oberon boats from United Kingdom proved futile. In September 1965 the customer signed for four I641 boats (NATO codename: Foxtrot), and, six years later, filed a follow-on order for four improved Project I641Ks. The first Indian Foxtrot was inducted fifty years ago and was later replaced by the Kilo.

In 1984 India placed order for six Project 877EKM submarines. Sindhuraj and S59 Sindhuratna were built at Sormovo. The Admiralty Shipyards added S55 Sindhugosh, S56 Sindhudhvaj, S58 Sinduvir and S60 Sindhukesari. The latter company accepted a follow-on contract to assemble S61 Sindhukirti and S62 Sindhuvijay in 1990-1991. Second follow-on order also went to St. Petersburg: S63 Sindhurakshak and S65 Sindhushastra were inducted in 1997 and 2000. The latter was first to be armed with the Club-S missile system. Earlier-built submarines were outfitted with that weaponry during a major overhaul. Today, a couple of Indian Kilos is undergoing heavy maintenance and life-time extension work at Zvezdochka in Severodvinsk.

The Indian navy was the only one in the world to have leased nuclear-powered submarines. A Project 670 boat raised the Indian flag in January 1988 and served for three years under local designation of Chakra. During that time, her crews were receiving assistance from 38 Soviet technicians via four translators. Today, the Indian navy operates a Project 971 boat on ten years operating lease terms. Hiring Russian equipment shall help local specialists with their own nuclear program which commenced back in 1978.

India is considering lease of an additional nuclear submarine from Russia and a replacement to INS Sindurakshak lost to internal explosion in August 2013. Besides, New Delhi has recently re-activated the Project 75i tender for six conventional boats with Project 677 Lada – or, better, her export version Amur 1650i – among the bids. According to the Pentagon annual reports to U.S. Congress, China is working with Russia on a customized version of the Amur 1650 with an air-independent propulsion system. Later this year Indonesia is expected to make a decision whether to procure Kilo class submarines.

Aircraft carriers

The aircraft carrier of the Russian type was developed during the eighties by the Nevskoye design bureau in St. Petersburg. It represents a conventionally powered ship providing basing for fighter jets built to "short take-off but arrested recovery" (STOBAR) concept. Today, there are three such carriers in service: Kuznetsov in Russia, Liaoning in China and Vikramaditya in India. These have many things in common, including the fact that their hulls were built at the dockyard in Nikolaev, Ukraine.

Kuznetsov became operational in December 1990. This Project 1143.5 ship displaces 61,400 tons. Her hangar measures about four thousand square meters (dimensions 153x26x7.2 meters) and flight deck 14,800 square meters (305x70 meters). There are an angled deck (at 7 degree) with the landing strip 205 meters long and 26 meters wide

and a 14.3-degree ski jump on the bow. Kuznetsov was to be followed by Varyag, but the latter was not complete due to the breakup of the Soviet Union. At a readiness of 67%, she was sold to China and, in March 2001, arrived at Dalian. Completed in 2012 under the new name of Liaoning, she now serves the flag-ship of the People's Liberation Army Navy (PLAN).

INS Vikramaditya was made through refit and modernization of ex-Russian navy Admiral Gorshkov. This Project 1143.4 heavy aircraft carrying cruiser went into commission in December 1987 and remained operational for five years. India bought her on condition that the cruiser will be transformed into a through-deck aircraft carrier under Project 11430 at Sevmash in Severodvinsk. In the new shape the ship was handed over to the Indian navy in November 2013. Because of the smaller hangar (130x23 meters), the customer preferred the smaller MiG-29K/KUB to the larger Sukhoi-33. According to specification, Vikramaditya's air wing is made up of 24 MiGs, four Ka-31 and two Chetak helicopters. This compares to 26 Su-27K and 24 Kamov helicopters for Kuznetsov. India bought 45 MiG-29K/KUBs from Russia, while China reverse-engineered the Su-33 to produce the J-15.

Using Russian designs as points of reference, India and China are constructing new STOBAR carriers locally. INS Vikrant was laid down in 2008 at Cochin. Compared to Virkamaditya, her full displacement is reduced from 45,000 down to 40,000 tons. Completion is expected in 2018. China is building a larger carrier, Shandong.

Destroyers

Today, China is the only foreign operator of guided missile destroyers imported from Russia. The four Project 956E/EM ships acquired at the turn of the century remain the only surface combatants of foreign make in PLAN inventory. PRC paid U.S.\$ 0.8 billion for the first pair and \$1.4 billion for the second. This was a big money for the time when Russian weapons were selling cheaply. Reportedly, since 2014 these destroy-



ers have been undergoing a major refit and modernization program to help them stay in service for many more years.

The primary weapon system of these ships is the Moskit (Mosquito) employing 3M80 anti-ship missiles. Air cover is provided by the Uragan (Shtil) system employing 9M317E anti-aircraft missiles and two sets of six-barrel Gatling-type AK630 30-mm rapid-fire guns. Accepted into service in 1984, the four-ton Moskit weapon accelerates to Mach 2.8 and has a firing range of 120km. Improved 3M80MBE and 3M82 (Moskit-M) versions can strike at longer distances. In 2000-2006 PRC procured one hundred Moskit missiles at a cost of US\$ 1.5 million each.

Hangzhou (DDG136) and Fuzhou (DDG137) of Project 956E became operational in December 1999 and November 2000, respectively. They were broadly similar to the Soviet/Russian navy sister-ships (seventeen destroyers went into commission in 1982-1994) except having radio-electronic equipment and weapons systems of export versions. Inducted in 2005-2006, Taizhou (DDG138) and Ningbo (DDG139) are bigger (full displacement 8,500 tons) and come with a proper helicopter hangar at the expense of the stern 130-mm cannon mount. They feature KVG-3D boilers consuming diesel fuel in lieu

of KVG-3s running on the furnace oil found in all other sister ships.

The Severnoye Design House (SDB) in St. Petersburg (since 'Severnoye' in Russian means Northern, this organization is also referred to as NDB) came up with an improved Project 21956 but failed to sell it to the Chinese. Consequently, the Zhdanov shipbuilding plant in St. Petersburg – now known as the Northern Dockyard – converted to other ship classes.

India also has destroyers, but these are built locally, at Mazagon Dock Limited (MDL) in Mumbai. NDB provided assistance on their development. A starting point was Project 11000, a design that did not go into production. Its drawings were used in 1978 as a first iteration to what became Project 15. Lead ship, D61 Delhi, was started in 1992 and completed five years later. She has a full displacement of 6200 tons, Ukrainian gas turbines and a complete set of Russian weapons: Uran-E anti-ship system (employing Kh-35/3M24E anti-ship missiles), Shtil SAM, 100-mm AK-100 cannon mount, AK630 rapid fire guns, RBU-6000 rocket launchers, 21-in torpedo tubes as well as Fregat-MAE radar.

The lead ship of the class was followed by D60 Mysore and D62 Mumbai going into commission in 1999-2001. These were followed

by three Project 15A Kolkata class destroyers, laid down in 2003-2006 and commissioned in 2014-2016. Next step in the evolution shall be four Project 15B Visakhapatnam class destroyers due for entry into service after 2018. Displacing 7400 tons, these have a reduced radar signature and carry a mix of weapons and systems from Russian, Israeli and European OEMs. The whole series relies on the same 163-meter-long hull and Ukrainian gas-turbines.

Less Russian content is found in the three Project 17 Shivalik surface combatants built in Mumbai in 2000-2012. Classified as frigates, they displace the same amount of water as the Delhi, while carrying Shtil anti-ship and Club-N strike missiles. Ukrainian turbines gave way to a CODOG propulsion employing LM2500 turbines whose production have mastered locally under license from General Electric.

Frigates

First sales of Russian guided missile frigates occurred in 1975, when India placed order for three Project 61ME ships. Six years later the customer requested two more. Their design was based on the Project 61 to which twenty 'large antisubmarine ships' had been built for the Soviet navy. Nicknamed 'the singing frigates' for a characteristic noise coming from COGAG propulsion, these were first Soviet – and Indian – navy ships to employ gas turbines for both cruise

and chase. At 4025/4905 tons (standard/full), the Indian frigates were larger than their Soviet sister ships and carried additional weaponry: four launchers for P-20 anti-ship missiles and a battery of 30-mm rapid-fire guns. The stern 76-mm cannon mount was removed to empty place for a hangar housing a Ka-25PL ASW helicopter. The first ship was laid at Nikolaev in September 1976 and handed over to the customer in May 1980 as D51 Rajput. She was followed by D52 Rana (1982), D53 Ranjit (1983), D54 Ranvir (1986) and D55 Ranjivey (1988). This series made the first case in history when the Soviet industry obliged a foreign client with warships of not a factory-standard, but a special export version developed to the customer's specific requirements. All five remain in service, including three re-armed with Indo-Russian BrahMos PJ-10 missiles.

New Delhi went for Russian frigates again in 1997. It signed an initial contract worth U.S.\$ 1 billion for three Project 11356 ships. F40 Talwar, F43 Trishul and F44 Tabar were delivered in 2002-2003. They represented a tailor made design based on the Project 11351 border patrol vessel and were the first to have a brand-new A190 cannon mount of 100-mm caliber. In 2006 the customer placed a follow-on order worth U.S.\$ 1.56 billion for three more ships. Instead of the Baltic Plant in St. Petersburg these were built at the Yantar dockyard in Kaliningrad. F45 Teg, F50

Tarkash and F51 Triand went into commission in 2012-2013. Instead of the Club-N system, these came with vertical launch silos for BrahMos missiles. The Kashtan artillery-missile system for close-in air defense was replaced by AK630 30-mm rapid-fire guns. Other design changes were to replace Russian MG-345 bow sonar and a towed array to it with newer systems of Indian origin developed for operations in the specific hydrological environment of the Indian Ocean.

During President Putin's visit to New Delhi in October 2016, an inter-government agreement was signed on four additional frigates. Two of them would be built in Russia and the remaining pair in India under license. Like the first trio, these would come with the vertical launch system (VLS) for the Club-N system employing three different types of missiles – 3M54 for antishipping, 3M14 for land strikes and 91R for submarine warfare. Older Shtil (Uragan) anti-aircraft defense system will be replaced by the more advanced Shtil-1. While the Uragan can simultaneously engage four to six aerial targets, the Shtil-1 – thanks to its multi-channel firing capability – can handle up to twelve targets at a time and has a larger ammunition stock (two 3S90E.1 subsystems employing three modules each loaded with twelve 9M317M missiles against a total of 48 9M38M1 previously). The Shtil-1 is advertised as able to defeat a group of enemy

aircraft committing a coordinated attack from different directions.

It is rumored that the new Indian ships will be using hulls laid down in 2013-2014 at the Yantar as Butakov, Istomin and Kornilov frigates of Project 11356R for the Russian navy. Their construction was halted in 2015 due to Ukraine refusing to sell propulsion systems on political reasons. At the same time, Zorya-Mashproekt DT59 boost and DS71 cruise gas-turbines are available for India, provided it buys them directly from the manufacturer.

Corvettes

The most important of the recent programs on acquisition of surface combatant for the Vietnamese navy is do with the Project 11661E 'Gepard 3.9' corvettes with a full displacement of 2200 tons. Two hulls were laid down in 2007, and commissioned four years later as HQ-011 Đinh Tiên Hoàng and HQ-012 Lý Thái Tổ. Today, they are the most modern and capable surface warships in the Vietnamese inventory. Apart from guns and torpedoes, they come with the Uran guided missile system (employing Kh-35E weapons), Sosna-R anti-aircraft missiles, and a pad for Kamov Ka-28 helicopter.

Keels of the second pair were laid down in September 2013. Because of the recent disagreements with Ukraine, Russian shipbuilders had to search for alternatives to Zorya-Mashproekt turbines elsewhere. Late



last year, the second pair of the frigates commenced trials in the Black Sea. Vietnam is negotiating a follow-on order for two more ships.

India has never bought missiles corvettes from Russia, but cooperated on their designs in a view of producing them locally. Shipwrights from St. Petersburg assisted in development of the Project 25 Kukri class with full load of 1350 tons and P-20 missiles. Four of them were built at Mazagon Dock Limited (MDL) and Garden Reach Shipbuilders and Engineers (GRSE) in 1989-1991. Larger (1500 ton) Project 25A Kora followed with completion of four ships at GRSE in 1998-2004 and a fifth for Mauritius in 2013. Many of their combat systems are of Russian origin including the Uran-E anti-ship missile set.



Russian shipwrights rendered assistance to the Indian navy in the late 1970s on refit and modernization of old British frigates that involved outfitting them with anti-ship missiles. Besides, as MDL continued license production of the Leander class frigates, the baseline design was reworked to employ P-20 anti-ship and Osa anti-aircraft missiles, AK-725 and AK-630 artillery pieces as well as Angara-U radar of the Russian origin. Known as Project 16 Godavari class, these were followed by Project 16A Brahmaputra, with three more ships completed at GRSE in Kolkata in 2000-2005.

Patrol vessels

The Indian started to receive Russian warships in the late sixties. The first were Project 368 patrol boats displacing about 100 tons: P246 Panvel, P247 Pamban, P248 Puri, P249 Panaji and P250 Policat were delivered in February – March 1967. Their sister ships also served with the Vietnamese navy.

Coming next were five Project 159E antisubmarine ships (NATO codename: Petya III) built in Khararovsk, the capital city of Russia's Far East. P77 Kamorta, P78 Kadmatt, P79 Kitan, P80 Kavaratti and P81 Katchall went into commission in 1968-1969. Shortly after New Delhi place a follow-on order for five more. They came from the Soviet navy stocks with subsequent refit into export version. P68 Arnala, P69

Androth and P73 Anjadip were built at the Yantar in 1968-1969 and handed over to the customer in 1972. The remaining two – P74 Andaman and P75 Amini – were built in Khabarovsk in 1973-74.

Hanoi also acquired five Project 159E vessels. Despite the age, they are still operational. As in case with India, these were first Vietnamese navy ships with gas turbines for boost, enabling the 1120-tonne vessel to accelerate up to 32 knots. Designed primarily for antisubmarine patrols, they are now employed on coastal patrol duties since their outdated sonar set is no longer

able to handle modern underwater threats.

With the rise of the domestic production, India switched to making patrol boats locally. Hanoi also wanted to master production of small displacement vessels. First, it applied to NDB, which offered the 'Patrol Ship of 500 ton displacement' (PS-500 or Project 12412). The developer advertised it as 'first-ever successful application of deep V shaping in hulls of such displacement'. Under contract signed in 1996, one such vessel was built in Ho Chi Minh city with Russian support. Even though the Vietnamese navy commissioned the HQ-381 in 2001, the respective industrial program has been put on hold.

Instead, the customer went for the TT400TP, a derivative of the Ukrainian 'Lan' missile boat. The 480-tonne HQ-272 was commissioned in January 2012. Reportedly, local makers are constructing more of these for the navy and for the coastal guard, in the last case with 2*2 25mm rapid-fire cannons instead of a 76-mm AK-176 and a six-barrel 30-mm AK-630. Besides, in 2002-2012 Vietnam acquired six smaller patrol boats displacing 375 tons from Russia, built to Project 10412 Svetlyak.

Indonesia operates about forty Cold War era warships built to Russian designs, including minesweepers and patrol boats. Most of them were acquired in Germany in 1993 following the reunion of the Western and Eastern parts of the country. The most numerous in the Indonesian inventory are 900-tonne antisubmarine ships (operated as coast guard vessels) built by the Peene-Werft plant in East Germany to Russian project 1331M. All of these have been re-equipped with MTU diesels, but still keeps many of Russian-origin systems. Moscow is offering a lifetime extension and modernization program involving installation of new weapons systems. Along with modern missiles (the 3M55 Yakhont anti-ship weapon is already on board of the Indonesian navy frigate KRI 354 Oswald Siahaan), torpedoes, mines and artillery, Indonesia is also offered radars and other systems for use on these and other warships.

Torpedo and missile boats

Torpedo boats were made in the Soviet Union almost to its demise. The most popular with domestic and overseas customers was the Project 206. The most recent of those were completed in 1978-1985 to Project 206ME design, including five for Vietnam. Displacing about 250 tons, they carry four 21-in torpedo tubes, 57-mm and 25-mm artillery pieces. These boats operate alongside with few older Project 206 vessels on coastal patrol duties.

The Project 205 missile boat based on the same hull was built in several hundred copies in Russia and China (Type 021 Huangfen). Most of them have gone for scrap; few remaining examples are still operational. India received sixteen such boats. The first contact, awarded in 1969 to the plant in Rybinsk was for eight hulls with P-15 missiles. K82 Veer, K83 Vidjut, K84 Vijeta, K85 Vinash, K86 Nipat, K87 Nashak, K88 Nirbhik and K89 Nirghat were delivered on the eve of the 1971 Indo-Pakistan War. They won much acclaim during the hostilities by sinking enemy ships and destroying infrastructure in port and naval base of Karachi. The follow-on order came in 1973 for eight boats armed with evolved P-20 missiles: K90 Prachand, K91 Pralaya, K92 Pratap, K93 Prabal, K94 Chapal, K95 Chamak, K96 Chatak and K97 Charag went into commission in 1976-1977.

The 60-m-long boats built to Project 1234 are officially classified as small (light) missile ships, for they carried not only anti-ship, but also Osa-AK anti-aircraft missiles for self-protection. Production run in 1967-1992 accounted for 67 hulls, some of which are still operational. India ordered three, and these were built in 1976-1977 at Almaz in Leningrad (now St. Petersburg) as K71 Vijaydurg, K72 Sindhudurg and K73 Hosdurg.

In parallel to the Project 1234 program, Russia built dozens of Molniya series boats in various versions since 1979. As part of that effort, in 1981-1992 twenty boats were completed to Project 1241RE design, including one for the Soviet navy to serve as train-

ing tool for foreign crews. Compared to the Project 1234, they were smaller, with a 50-meter-long hull, but carried a similar weapons set. In 1981-1983 Moscow and New Delhi signed documents under which the Indian navy should receive twenty copies with P20 anti-ship missiles (further evolution of the P-15) and gas-turbine propulsion. Five were built at the shipyard in Rybinsk, and attained operational status in 1987-1989.

Collapse of the Soviet Union caused difficulties in setting up license production for what called the Veer class. Mazagon Docks Limited (MDL) completed two and Goa Shipyard Limited (GSL) four ships in 1991-1997. Later on, under a separate contract, the local dockyards built two more boats in 2002 – Prabal and Pralaya – with Uran-E missile system. It is interesting to notice that officially the system was accepted into service in June 2003, following completion of fire trials.

Under a separate contract signed in 1984, India bought four antisubmarine ships of Project 1241PE based on the same hull. They were commissioned in 1989-1991 as P33 Abhay, P34 Ajay, P35 Akshay and P36 Agray. Instead of missiles, these ships carried sonar set with keel-mounted and towed antennae. Besides, a single boat was built to Project 12421 with the 3M80 Moskit missiles. Although she successfully underwent testing, the intended customer refused to buy it.

Vietnam started negotiating on the Molniya in the late 1980s. First off, it acquired two boats – HQ-371 and HQ-372 – built in 1990-1991 but not accepted by the Russian navy. Besides, Hanoi acquired rights for license production of the improved Project 1241.8 design displacing 500 tons and carrying 16 Kh-35 (3M24) missiles. After a pause that followed, in 2003 the Russian industry won a comprehensive deal, to make six of such vessels and assist in setting up a license production line at the Ba Son dockyard in Hanoi. Today, the Vietnamese navy operates twelve Molniya vessels, including four made locally. Ba Son delivered first pair in 2014, second in 2015, and is looking to produce up to ten eventually.

Other classes

In 1967, India ordered six minesweepers of Project 266ME. These were built at Sredne-Nevsky plant in Leningrad and commissioned in 1978-1980: M61 Pondicherry, M62 Porbander, M63 Bedi, M64 Bhavnagar, M65 Alleppey and M66 Ratnagiri. In 1982 the customer placed a follow-on order for six more. They became operational in 1986-1989 as M67 Karwar, M68 Cannanore, M69 Cuddalore, M70 Kakinada, M71 Kozhikode and M72 Konkan. Besides, India bought six smaller minesweepers of Project 1258E, commissioned in 1983-1984 as M83 Mahe, M84 Malvan, M85 Mangrol, M86 Malpe, M87 Mulki and M88 Magdala. Vietnam has also acquired a number of Russian minesweepers, including 460-ton vessels of Project 1265E.

The Indian navy operates A58 Jyoti fleet oiler manufactured at the Admiralty Shipyard in 1993-1996. Other auxiliary ships include submarine tenders A14 Amba (A54), a Project 1886E ship which is a former Soviet PB-7 built at Nikolaev. There is also A15 Nistar submariners rescue vessel of Project 532 acquired in 1971, which is ex-Soviet-navy SS-53 completed in 1962. There are a few amphibious/landing ships built to Russian designs in service with the Pacific nations. With Russian assistance, Vietnam built the HQ-571 Truong Sa landing ship in 2012.

Apart from ships, Asia-Pacific nations have acquired about seventy Kamov Ka-28 ASW (India, China, Vietnam) and Ka-31 radar-picket helicopters (India and China). India operated Tupolev-142MK and continues using Ilyushin-38SD ASW aircraft. Besides, Vietnam has procured Bastion (NATO: SSC-5) coastal defense system employing the Yakhont supersonic cruise missile, and, along with few other nations, continues using the older Rubezh (SSC-1) and Redut (SSC-3). The respective contract was signed in 2006, shipments commenced in 2010. India and China buy Russian naval weapons, radars, electronics, various onboard systems and their components for installation on the ships of indigenous designs.

Russia believes that the long and eventful history of weapons sales in the region will help raise new orders, and, hopefully, extend their geography.

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